



**TURUN
YLIOPISTO**
UNIVERSITY
OF TURKU

BULLYING AMONG SCHOOL-AGED CHILDREN AND ADOLESCENTS

**Prevalence of Bullying Victimization,
Mental Health Symptoms Associated
with Bullying Victimization, Relative Age
Effects and Bullying as a Predictor of
Later Violent Offenses**

Elina Tiiri



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Later Violent Offenses

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*Some deeds leave perennial stains.
In other's lives and your own.
So please, make those be the acts of
altruism and philanthropy,
not the ones of scorn and distress.*

Anonymous, 2020

UNIVERSITY OF TURKU

Faculty of Medicine

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Department of Child Psychiatry

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ABSTRACT

Bullying includes repetition, intentional harm and an imbalance of power that decreases the victim's possibility to escape it. The aim of this thesis was to study the prevalence of bullying victimization and school perceptions, the association between victimization and mental health symptoms, and relative age effects in bullying using cross-sectional samples. The association between bullying involvement and violent offenses in later life were studied in a longitudinal cohort.

Time-trends of bullying victimization and school perceptions were studied among 13–15-year-olds (N = 3997) in Finland in 2008–2014, before and after the implementation of the KiVa antibullying program. The prevalence of victimization was also studied among 13–15-year-olds (N = 21 668) in 13 Asian and European countries. The association between victimization and mental health symptoms was studied in both samples. The associations between the relative age of the child and bullying victimization and perpetration were studied among Finnish 8–9-year-old children (N = 8576), as was the association between bullying victimization and perpetration in childhood and violent offenses in later life (N = 5405). When the subjects were 15–31 years old, violent offenses were extracted from the Finnish National Police Register.

The prevalence of victimization varied across countries. Face-to-face victimization decreased among Finnish adolescents from 2008 to 2014, but there were no changes in cyberbullying victimization. Adolescents increasingly perceived that bullying was intervened in at school. Victimization, especially by both traditional and cyberbullying, was associated with more mental health symptoms. Victimization was associated with young relative age, and perpetrating bullying was associated with old relative age. Being a bully in childhood was associated with violent offenses in later life.

The findings suggest that there are adverse effects of bullying victimization and perpetration. The association between bullying victimization and mental health symptoms emphasizes the importance of counteracting bullying.

KEYWORDS: Bullying, cyberbullying, victimization, prevalence, mental health, relative age, violence, cross-cultural, cross-sectional studies, longitudinal studies

TURUN YLIOPISTO

Lääketieteellinen tiedekunta

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ELINA TIIRI: Kouluikäisten lasten ja nuorten kiusaaminen. Kiusatuksi joutumisen esiintyvyys, siihen liittyvät mielenterveysoireet, suhteellisen iän vaikutus ja kiusaaminen myöhemmän väkivaltarikollisuuden ennustajana.

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TIIVISTELMÄ

Kiusaamiseen sisältyy toistuvuutta, tarkoituksellista vahingoittamista ja voiman tai vallan epäsuhta, joka vaikeuttaa puolustautumista. Tässä väitöskirjatutkimuksessa selvitettiin poikkileikkaustutkimuksin kiusatuksi joutumisen ja kouluun liittyvien havaintojen yleisyyttä, mielenterveyden oireiden yhteyttä kiusatuksi joutumiseen sekä suhteellisen iän yhteyttä kiusaamiseen. Pitkittäistutkimuksella selvitettiin myöhemmän väkivaltarikollisuuden yhteyttä lapsuusiän kiusaamiseen.

Kiusatuksi joutumisen ja kouluun liittyvien havaintojen muutosta 2008–2014 selvitettiin 13–15-vuotiailla (N = 3997), ennen ja jälkeen kiusaamisen vastaisen KiVa Koulun implementointia. Kiusatuksi joutumisen esiintyvyyttä selvitettiin 13 Aasian ja Euroopan maassa kerätyssä 13–15-vuotiaiden aineistossa (N = 21 668). Molemmista näissä aineistoissa tutkittiin kiusatuksi joutumisen yhteyttä mielenterveyden oireisiin. Suhteellisen iän yhteyttä kiusaamiseen ja kiusatuksi joutumiseen (N = 8576) selvitettiin 8–9-vuotiaiden aineistossa, kuten myös lapsuusiässä tapahtuneen kiusaamisen yhteyttä myöhempään väkivaltarikollisuuteen (N = 5405). Väkivaltarikosepäilyjä koskevat tiedot saatiin poliisin rekisteristä ajalta, jona tutkittavat olivat olleet 15–31-vuotiaita.

Kiusatuksi joutumisen yleisyys vaihteli eri maissa. Nuorten kokema perinteinen kiusaaminen väheni Suomessa 2008–2014, mutta nettikiusaamisessa ei tapahtunut muutoksia. Nuoret kokivat enenevästi, että kiusaamiseen puututtiin koulussa. Kiusatuiksi joutuneilla oli muita enemmän mielenterveyden oireita varsinkin, jos kiusaamista oli tapahtunut sekä perinteisesti että netissä. Kiusatuksi joutuminen oli yleisempää vuosiluokan nuorimmilla ja toisten kiusaaminen vanhimmilla. Toisten kiusaaminen lapsuusiässä oli yhteydessä myöhempään väkivaltarikollisuuteen.

Löydökset viittaavat kiusaamisen haitallisuuteen niin kiusattuna kuin kiusaajana. Kiusatuksi joutumisen ja mielenterveyden oireiden välinen yhteys merkitsee sitä, että kiusaamisen väheneminen on tärkeää.

AVAINSANAT: Kiusaaminen, nettikiusaaminen, uhriksi joutuminen, esiintyvyys, mielenterveys, suhteellinen ikä, väkivalta, monikulttuurinen, poikkileikkaustutkimukset, pitkittäistutkimukset

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Abbreviations

ADHD	Attention-deficit/hyperactivity disorder
ALSPAC	the Avon Longitudinal Study of Parents and Children
BDI	the Beck Depression Inventory
CAPA	the Child and Adolescent Psychiatric Assessment
CBQ-R	Cyberbullying Questionnaire, Revised
CDC	Centers for Disease Control and Prevention
CDI	Children's Depression Inventory
CI	Confidence interval
CRP	C-reactive protein
DASS	the Depression Anxiety Stress Scale
DISC-IV	the Diagnostic Interview Schedule for Children, version IV
DSM	the Diagnostic and Statistical Manual of Mental Disorders
EACMHS	the Eurasian Child and Adolescent Mental Health Study
GEE	Generalized estimating equation
GLMM	Generalized linear mixed model
GSHS	the Global School-based Student Health Survey
HBSC	the Health Behavior in School-Aged Children Study
HPA axis	Hypothalamic-pituitary-adrenal axis
HR	Hazard ratio
IQR	Interquartile range
LSYPE	the Longitudinal Study of Young People in England
MCS	the Millennium Cohort Study
MDD	Major depressive disorder
OBPP	the Olweus Bullying Prevention Program
OECD	the Organisation for Economic Co-operation and Development
OR	Odds ratio
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
SD	Standard deviation
SDQ	the Strengths and Difficulties Questionnaire
TIMMS	Trends in International Mathematics and Science Study

WHO the World Health Organization
YSR the 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 Tiiri E, Luntamo T, Mishina K, Sillanmäki L, Brunstein Klomek A, Sourander A. Did bullying victimization decrease after nationwide school-based antibullying program? A time-trend study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 2020; 59: 531–540.
- II Chudal R,* Tiiri E,* Brunstein Klomek A, Ong SH, Fossum S, Kaneko H, Kolaitis G, Lesinskiene S, Li L, Nguyen HM, Praharaj SK, Sillanmäki L, Slobodskaya HR, Srabstein JC, Wiguna T, Zamani Z, Sourander A, the EACMHS Study Group. Victimization by traditional bullying and cyberbullying and the combination of these among adolescents in 13 European and Asian countries. *European Child & Adolescent Psychiatry*, 2022; 31: 1391–1404.
*Joint first authors
- III Tiiri E, Lempinen L, Chudal R, Vuori M, Sourander A. Relative age is associated with bullying victimisation and perpetration among children aged eight to nine. *Acta Paediatrica*, 2020; 109: 2656–2663.
- IV Tiiri E, Uotila J, Sillanmäki L, Elonheimo H, Brunstein Klomek A, Sourander A. Bullying at 8 years and violent offenses by 31 years: the Finnish nationwide 1981 birth cohort study. *European Child & Adolescent Psychiatry*, 2022; April 6 [Online ahead of print.]

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1 Introduction

Bullying is a global phenomenon that affects not only children and adolescents but also adults (Monks, et al., 2009). It has been estimated that as many as 20–25% of youth are involved in bullying, whether it be as victims, perpetrators or bully-victims, those who act as both perpetrators and victims of bullying (Juvonen & Graham, 2014). The commonly accepted definition of bullying among children and adolescents includes three key aspects: repetition, intentional harm and an imbalance of power (Olweus, 1995). Power imbalance means that the bully holds power that decreases the victim's possibility to defend themselves or escape the bullying.

Research on bullying began in Scandinavia around the shift of decade between the 1960s and the 1970s (Arora, 1996; Olweus, 2013), and the definition of bullying by Olweus (1995) emerged from this Western research tradition. School violence began raising concerns in Japan in the 1970s, and in the 1980s the Japanese term *ijime* was recognized as a distinctive phenomenon, closely corresponding to bullying (Rios-Ellis, et al., 2000; Smith, 2014). Since the 1990s, research on bullying has rapidly increased, which has led to an exponential increase in publications on the topic in this century. Electronic bullying, or cyberbullying, emerged as technology developed, and Olweus' definition of bullying has also been applied to this (Smith, et al., 2008). Cyberbullying has been of an increasing research interest during the last 15 years. It has been considered to share the three key aspects of face-to-face bullying, although they may be manifested differently. In the cyber context, there are additional aspects that are not relevant in the face-to-face context, namely, the possible anonymity of the bully and accessibility at any place and time (Kowalski, et al., 2014). In the cyber context, harmful material can also be spread uncontrollably. The American Centers for Disease Control and Prevention (CDC) has stated that bullying may occur in multiple contexts, such as at schools, in neighborhoods and electronically, and that bullying among youth occurs between individuals who are not siblings or current dating partners (Gladden, et al., 2014). Interestingly, their definition leaves out sibling bullying, which has recently been shown to be common (Wolke, et al., 2015) and which has been of research interest especially during the last 10 years.

The evolution of the definition of bullying over decades exemplifies the complexity of the phenomenon. For example, the need to capture the features of cyberbullying in the definition of bullying resulted from technological development that created a new context for bullying. This demonstrates the need for a social-ecological understanding of bullying. A social-ecological understanding of bullying means that bullying is shaped by various contexts that are related to each other, such as individual characteristics, peers, family and the environment (Espelage & De La Rue, 2011). In other words, for example in terms of school bullying, the complex, nested ecologies constitute the school climate, and school-based aggression reflects this (Espelage, et al., 2014). The social-ecological perspective was beautifully captured by a senior high school student in 2020 (published with permission):

Our sentiment towards bullying is all wrong. It isn't its own entity, detached from commonplace interactions, something that can be solved through punishment. Bullies aren't all malicious wretches, disposed to tormenting others. The phenomenon is merely the manifestation of a climate where an insult is a jest and punching down is wittiness.

The negative impact of bullying on children and adolescents lies not only in its prevalence and contemporaneous effects, but also in the possible long-term adverse effects. These may last up to adulthood and include adverse effects on health (e.g. Brunstein Klomek, et al., 2015; Hamm, et al., 2015; Wolke & Lereya, 2015) and socioeconomic situation (e.g. Farrington & Ttofi, 2011; Wolke & Lereya, 2015), including criminality (e.g. Brunstein Klomek, et al., 2015; Sourander, et al., 2007a; Wolke, et al., 2013). It is worth noting that long-term adverse effects may influence victims, bullies and bully-victims (e.g. Brunstein Klomek, et al., 2015). It is also noteworthy that these adverse effects have been associated with experiences of bullying in childhood or adolescence, which, according to the World Health Organization (WHO), includes ages 10–19 (The World Health Organization, 2022), and can manifest years or even decades after the bullying takes place.

Effectively addressing bullying could prevent psychiatric and socioeconomic difficulties in ages up to adulthood and reduce costs for society (Arseneault, 2018). Therefore, it is important to improve the understanding of the phenomenon. In this thesis, bullying is approached from different perspectives to explore the prevalence of bullying victimization and some outcomes associated with bullying victimization, perpetration or both.

2 Review of the Literature

2.1 Defining bullying

The commonly accepted definition of bullying includes three key aspects: repetition, intentional harm and an imbalance of power (Olweus, 1995). In a bullying situation, a person or persons with more power repetitively inflict intentional aggressive or harmful acts towards another person or persons. The imbalance of power decreases the victim's possibility to defend themselves or to escape bullying, and can be created, for example, by greater popularity or physical power of the bully or a larger number of bullies compared to the victim(s). The widely used diagnostic manuals, the International Classification of Diseases (ICD-11) (The World Health Organization, 2019), its former version (ICD-10) and the Diagnostic and Statistical Manual of Mental Diseases (DSM-V) (American Psychiatric Association, 2013) include bullying as a feature that is characteristic of conduct disorders. Conduct disorders, in turn, include behavior that violates age-appropriate societal expectations and norms in a repetitive and persistent manner.

Bullying research started in Sweden as a study of mobbing (in Swedish, *mobbning*), in which the negative act is carried out by a group (Arora, 1996; Olweus, 2013). However, in the commonly accepted definition of bullying in the Western research tradition, there can be one or more bullies (Olweus, 1995). The definition by Olweus (1995) has faced some critique, especially because the key aspect of repetition excluded single attacks or threats that could have major impact on the victim (Arora, 1996; Finkelhor, et al., 2012; Juvonen & Graham, 2014). Yet, the definition by Olweus has been applied to electronic or cyberbullying (Smith, et al., 2008). Cyberbullying has also been considered to include repetition, intentional harm and power imbalance. Bullying is also an act of harm in the cyber context, where the power imbalance may be created, for example, by different levels of technical skills of the individuals involved (Kowalski, et al., 2014), and repetition and intention may be expressed through the sharing of the harmful material (Livingstone & Smith, 2014). There are, however, aspects of cyberbullying that are not relevant in the face-to-face context. Anonymity can hide not only the bully's identity but also the victim's reaction to bullying, possibly reducing empathy towards the victim. Accessibility also distinguishes bullying in the two contexts—

cyberbullying can reach the victim at any place and time (Kowalski, et al., 2014). In the cyber context, harmful material may be spread uncontrollably, increasing its publicity.

The CDC has stated that bullying is a type of violence. The CDC has built its definition of bullying on that of Olweus, but also tackles the critique towards it. The CDC also addresses the lack of a well-established definition of cyberbullying, with an aim to support the use of a uniform definition. According to the CDC's general definition, bullying among youth is any unwanted behavior(s) by a person or a group of people who are not siblings or current dating partners that involves a power imbalance and is repeated multiple times or is highly likely to be repeated. Bullying may inflict physical, psychological, social or educational harm or distress on the targeted person. According to the CDC, bullying may occur in multiple contexts such as at schools, in neighborhoods and electronically. The mode of bullying may be direct (occurring in the presence of the targeted person, for example, hitting or calling names face-to-face) or indirect (aggressive behavior not directly communicated to the victim, e.g. spreading rumors). The types of bullying include physical, verbal and relational bullying and damaging the victim's property. Verbal bullying can be oral or written. Relational bullying involves behaviors meant to harm the reputation and relationships of the victim (Gladden, et al., 2014).

Physical, verbal and relational bullying are commonly referred to as *traditional bullying* to distinguish them from *cyberbullying*. Traditional (especially relational) and cyberbullying have been found to be relatively strongly correlated, suggesting behavioral similarities in bullying across contexts (Modecki, et al., 2014). Their relationship has been discussed (Hinduja & Patchin, 2012; Olweus, 2012). It has been argued that cyberbullying is a manifestation of bullying in general, and does not create many new victims (Olweus, 2012; Wolke, et al., 2017). Indeed, a meta-analysis on the subject found that some of the strongest predictors of cyberbullying victimization and perpetration were offline victimization and perpetration (Guo, 2016). Furthermore, a review article stated that cyberbullying was often an extension of school bullying, indicating that they were not entirely distinct phenomena (Antoniadou & Kokkinos, 2015). On the other hand, the article pointed out differences between school bullying and cyberbullying. There was a small group of students who were only involved in cyberbullying, which means that cyberbullying may have caused more students to be involved in bullying than would have been the case if there had only been school bullying. Those who were involved in both school bullying and cyberbullying did not necessarily adopt the same roles in the the two contexts. These findings indicate that the two phenomena are not entirely the same either (Antoniadou & Kokkinos, 2015). Supporting this, there have also been studies that have reported that, although traditional and cyberbullying overlap, there have been cases of individuals involved in bullying in one context but not in both (e.g.

Juvonen & Gross, 2008; Li, et al., 2020; Waasdorp & Bradshaw, 2015; Wang, et al., 2019; Ybarra, et al., 2007).

The definition by the CDC excludes sibling bullying. In their review article, Wolke et al. (2015) modified the definition by the CDC to define sibling bullying as any unwanted aggressive behavior(s) by a sibling that involves an observed or perceived power imbalance and is repeated multiple times or is highly likely to be repeated. Sibling bullying may inflict harm or distress on the targeted sibling, including physical, psychological or social harm. It encompasses the same modes and types of bullying as peer bullying (Wolke, et al., 2015).

Research on bullying has concentrated on European and North American countries (Zych, et al., 2015), with less emphasis on, for example, South Asian countries (Sittichai & Smith, 2015). The structural aspects of bullying may vary across countries. Across Western countries, these differences are not very significant, but more relevant distinctions can be observed when compared to bullying in Japan and South Korea (Smith, 2014). The Japanese *ijime* has been considered to closely correspond to bullying (Rios-Ellis, et al., 2000; Smith, 2014). *Ijime* has been defined as aggressive behavior that involves someone with a dominant position in a group-interaction process causing mental and/or physical suffering through intentional or collective acts to another person inside the group (Rios-Ellis, et al., 2000; Smith, 2014). *Ijime* is collective bullying (Yoneyama, 2001) and typically a within-class or within-group phenomenon (Kanetsuna & Smith, 2002). In *ijime*, power imbalance also stems from a group-interaction process (Strohmeier, et al., 2013). In South Korea, *wang-ta* with its milder and more severe forms, *eun-ta* and *jun-ta*, respectively (Lee, et al., 2012), share similarities with *ijime* (Koo, et al., 2008; Lee, et al., 2012).

2.2 Prevalence of bullying victimization, perpetration and being a bully-victim

Studies on the prevalence of bullying involvement have been based on cross-sectional study designs. In cross-sectional studies, a random sample of a general population is taken at a specific moment in time to assess the study question (Schwartz & Susser, 2006). Data collection methods can also differ and affect results. These methods can include questionnaires, nominations, interviews, drawings and observations (Smith, 2014). Considering these variations, it is not surprising that the estimates of prevalence vary widely. In a meta-analysis of 80 studies on concurrent traditional and cyberbullying among adolescents between 12 and 18 years of age, the mean prevalence rate was 36% for traditional bullying victimization and 15% for cyberbullying victimization. For perpetration, these were 35% and 16%, respectively (Modecki, et al., 2014). The rate of being a bully-victim

has been reported to be considerably lower, about 4–6% (Salmivalli, 2010). On the other hand, the prevalence of bullying involvement among youth, either as victims, bullies or bully-victims, has been estimated to be 20–25% (Juvonen & Graham, 2014).

The School Health Promotion Study (*Kouluterveyskysely*) is a large population-based school health survey in Finland. According to this, the rates of those who were victimized by bullying at least once a week were 7.9% among fourth and fifth graders, 6.0% among eighth and ninth graders, 1.1% among those who attended upper secondary school and 2.9% among those who were in vocational school. Similarly, the rates of those who bullied others at least once a week were 2.4%, 2.8%, 0.6% and 1.7%, respectively (Finnish Institute for Health and Welfare, 2022).

Sibling bullying has been found to be more common than peer bullying (Dantchev, et al., 2019; Wolke, et al., 2015). In their review article, Wolke et al. (2015) report that the prevalence of any victimization by sibling bullying was from 15% to 50%, and the rate for perpetrating any sibling bullying varied from 10% to 40%. Unlike with peer bullying, the prevalence of sibling bully-victims was found to be particularly high, and most children who were involved in sibling bullying had been bully-victims (Wolke, et al., 2015).

2.2.1 Changes in the prevalence of bullying victimization, perpetration and being a bully-victim

Key points:

- Most studies on changes in the prevalence of bullying have focused on victimization, with fewer studies on perpetration and an even smaller amount on being a bully-victim.
- Even though the findings vary, traditional bullying victimization and perpetration have mostly been reported to have decreased or to have shown no changes in prevalence.
- Findings in changes in the rates of cyberbullying victimization have varied substantially, with some indications of increased rates.

In time-trend assessments, consecutive cross-sectional studies of prevalence are compared to form an understanding of change of prevalence over time. For the reliability of time-trend assessments, uniform methodology at different points of time is needed. This includes comparable sampling and the ascertainment of and defining of “caseness” (Collishaw, 2015; Collishaw, et al., 2004; Roberts, et al., 1998; Smith & Rutter, 1995). When bullying is studied, these are aimed to by using

questionnaires with similar wording, for example, or by carefully repeating the study procedure at different study points.

2.2.1.1 Traditional bullying

Most time-trend studies on traditional bullying involvement, either as a victim, a bully or a bully-victim (Table 1), have been based on WHO collaborative surveys, the Health Behavior in School-Aged Children (HBSC) study and the Global School-based Student Health Survey (GSHS). The HBSC surveys include European and North American countries, while most countries in which the GSHS was carried out are in Africa, Asia, Middle and South America and the Western Pacific region. Most studies, including the HBSC and the GSHS, and some other studies (Azeredo, et al., 2019; Kessel Schneider, et al., 2015; Li, et al., 2020; Pontes, et al., 2018; Waasdorp, et al., 2017), provide a definition of bullying. Most surveys on traditional bullying involvement have been self-administered, but studies that included younger children have been based on information from parents (Finkelhor, et al., 2010; Nordhagen, et al., 2005), both children and their parents (Finkelhor, et al., 2010) or children, their parents and teachers (Ilola & Sourander, 2013; Santalahti, et al., 2008; Sourander, et al., 2016). Differences in study methodologies have likely reduced the comparability of the studies (Modecki, et al., 2014), but not the reliability of the time-trend assessments, at least if the methodologies were similar in different study years of each time-trend study. In the HBSC surveys, there was a change in the wording of the question on victimization between the surveys of 1998 and 2002 (Molcho, et al., 2009). Likewise, the study by Nordhagen et al. (2005) provides some examples of bullying in the latter study year, but not in the former.

Findings on time-trends of traditional bullying victimization have varied. Finnish population-based surveys have mostly reported stability in the rates. According to the School Health Promotion Study, the rates of victimization were 5.5% and 6.0% in 2019 and 2021, respectively (Finnish Institute for Health and Welfare, 2021). Knaappila et al. (2018) reported an interesting study finding based on the School Health Promotion Study from 2000 to 2015. They found that while there were only minor changes in the rates of being victimized by bullying at the population level in Finland, victimization increased among the most socioeconomically disadvantaged adolescents. Time-trend studies on traditional victimization among children have been scarce, but these include three Finnish studies that have partly been based on the same samples (Ilola & Sourander, 2013; Santalahti, et al., 2008; Sourander, et al., 2016). Children's parents reported decreases in victimization, while the children themselves and their teachers did not report any significant changes from 1989 to 2013 (Sourander, et al., 2016). Most of the HBSC surveys on traditional victimization have indicated decreases (Chester, et al., 2015; Cosma, et al., 2020;

2015; Molcho, et al., 2009; Perlus, et al., 2014; Sarková, et al., 2017; Vieno, et al., 2015; Zaborskis, et al., 2005) or no changes (Chester, et al., 2015; Cosma, et al., 2017; Molcho, et al., 2009; Perlus, et al., 2014; Sanchez-Queija, et al., 2017). There were some indications of increased victimization based on both the HBSC surveys (Chester, et al., 2015; Cosma, et al., 2020; 2017; Molcho, et al., 2009; Schnohr & Niclasen, 2006) and the GSHS surveys (Dos Santos, et al., 2021; Granero, et al., 2011; Peltzer & Pengpid, 2021; 2016; Pengpid & Peltzer, 2021; 2020). Similarly, other studies have reported various time-trends in traditional victimization (Azeredo, et al., 2019; Clark, et al., 2013; Finkelhor, et al., 2010; Kessel Schneider, et al., 2015; Li, et al., 2020; Nordhagen, et al., 2005; Pontes, et al., 2018; Waasdorp, et al., 2017). The pattern of change across sexes has mostly been reported to be similar, even though some studies have reported differences across sexes (Chester, et al., 2015; Cosma, et al., 2020; 2017; Kessel Schneider, et al., 2015; Peltzer & Pengpid, 2021; Pengpid & Peltzer, 2021; Perlus, et al., 2014; Pontes, et al., 2018; Molcho, et al., 2009). Kennedy (2021) carried out a meta-regression study on bullying trends among adolescents from 1998 to 2017 in the United States. This meta-regression included 91 original studies and reported that traditional victimization has increased among girls but declined among boys.

There have been fewer time-trend studies on traditional bullying perpetration (Table 1). In the large Finnish population-based samples, perpetration has shown slight but significant reductions among adolescents from 2000 to 2015 (Knaappila, et al., 2018), and stability from 2019 to 2021 (Finnish Institute for Health and Welfare, 2021). Similarly, Sourander et al. (2016) reported stability or reductions among Finnish children from 1989 to 2013. Kennedy (2021) reported reductions in traditional bullying perpetration in the United States from 1998 to 2017. Most HBSC studies on the time-trends of traditional bullying perpetration have also found declining rates (Cosma, et al., 2015; Molcho, et al., 2009; Perlus, et al., 2014; Sarková, et al., 2017; Vieno, et al., 2015), even though some increases or no changes have also been reported (Molcho, et al., 2009; Schnohr & Niclasen, 2006; Zaborskis, et al., 2005).

Studies on being a bully-victim involved in traditional bullying have been scarce and have reported inconsistent findings on time-trends (Cosma, et al., 2015; Ilola, et al., 2016; Schnohr & Niclasen, 2006) (Table 1).

Table 1. The literature on time-trend studies on traditional bullying victimization, perpetration and being a bully-victim. Changes in prevalence are presented from the first study year to the last, unless otherwise specified.

REFERENCE	STUDY YEARS	COUNTRY (REGION)	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
HBSC STUDY REPORTS:					
ZABORSKIS, ET AL., 2005	1994, 1998, 2002	Lithuania	N = 16 104 Age: 11, 13, 15; M n/a Resp: 96%	Self-report. Victimized by bullying/ bullied others two or three times a month or more in the past couple of months.	Victimized by bullying: Girls 39.5% to 32.3%. Boys 41.7% to 36.4%. Bullied others: Girls 27.9% to 26.5%. Boys 40.3% to 41.3%.
SCHNOHR & NICLASSEN, 2006	1994, 1998, 2002	Greenland	N = 3861 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by bullying/ bullied others at least weekly during this term.	Victimized by bullying: Total 6.7% to 11.4%. Girls 6.2% to 12.4%. Boys 7.2% to 10.1%. Bullied others: Total 5.3% to 6.6%. Girls 3.6% to 4.6%. Boys 7.1% to 9.3%. Bully-victim: Total 4.6% to 7.8%. Girls 3.4% to 8.3%. Boys 5.9% to 7.2%.
MOLCHO, ET AL., 2009	1993/1994, 1997/1998, 2001/2002, 2005/2006	21 to 27 countries in Europe and North America	N = 491 752 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Occasional: Victimized by bullying/bullied others once or more at school this term (1993–1998)/in the past couple of months (2001–2006). Chronic: Victimized by bullying/ bullied others more than twice at school this term (1993–1998)/two or more times a month at school in the past couple of months (2001–2006).	Victimized by bullying: Girls. Occasional, decrease (↓) in 12, increase (↑) in 6, no change (↔) in 8 countries. Chronic, decrease (↓) in 18 countries, increase (↑) in 1 country, no change (↔) in 8 countries. Boys. Occasional, decrease (↓) in 19, increase (↑) in 2, no change (↔) in 6 countries. Chronic, decrease (↓) in 19 countries, increase (↑) in 1 country, no change (↔) in 7 countries. Bullied others: Girls. Occasional, decrease (↓) in 12, increase (↑) in 5, no change (↔) in 9 countries. Chronic, decrease (↓) in 16 countries, increase (↑) in 1 country, no change (↔) in 9 countries. Boys. Occasional, decrease (↓) in 17, increase (↑) in 3, no change (↔) in 6 countries. Chronic, decrease (↓) in 17, increase (↑) in 2, no change (↔) in 7 countries.

REFERENCE	STUDY YEARS	COUNTRY (REGION)	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
PERLUS, ET AL., 2014	1998, 2002, 2006, 2010	USA	N = 50 659 Age: Grade 6–10; M n/a Resp: n/a	Self-report. Victimized by bullying/ bullied others two times a month or more at school in the past couple of months.	Victimized by bullying: Total 13.7% to 10.2% (↓). Girls 11.4% to 9.7% (↔). Boys 16.4% to 10.7% (↓). Bullied others: Total 16.5% to 7.5% (↓). Girls 11.2% to 5.6% (↓). Boys 22.7% to 9.3% (↓).
CHESTER, ET AL., 2015	2001/2002, 2005/2006, 2009/2010	33 countries in Europe and North America	N = 581 838 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Occasional: Victimized by bullying once or more at school in the past couple of months. Chronic: Victimized by bullying two or three times a month or more at school in the past couple of months.	Victimized by bullying: Girls. Occasional, decrease (↓) in 18, increase (↑) in 4, no change (↔) in 11 countries. Chronic, decrease (↓) in 8, increase (↑) in 3, no change (↔) in 22 countries. Boys. Occasional, decrease (↓) in 17, increase (↑) in 4, no change (↔) in 12 countries. Chronic, decrease (↓) in 12, increase (↑) in 6, no change (↔) in 15 countries.
COSMA, ET AL., 2015	2006, 2010, 2014	Romania	N = 14 068 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by bullying/ bullied others at least two or three times a month in the past couple of months.	Victimized by bullying: Total 16.5% to 11.5% (↓). Girls 13.4% to 8.9% (↓). Boys 20.2% to 14.3% (↓). Bullied others: Total 23.0% to 16.0% (↓). Girls 18.8% to 11.2% (↓). Boys 28.3% to 21.3% (↓). Bully-victim: Total 7.9% to 5.1% (↓). Girls 5.9% to 3.3% (↓). Boys 10.3% to 7.2% (↓).
VIENO, ET AL., 2015	2002, 2006, 2010	Italy	N = 13 174 Age: 11, 13, 15; M 11.67 (SD 0.39), 13.69 (0.37), 15.70 (0.38) Resp: 71.89% (total)	Self-report. Occasional: Victimized by bullying/bullied others once or twice at school in the past couple of months. Frequent: Victimized by bullying/bullied others more than two or three times a month at school in the past couple of months	Victimized by bullying: Girls. Occasional 18.4% to 5.7% (↓); frequent 9.2% to 4.0% (↓). Boys. Occasional 21.5% to 9.4% (↓); frequent 12.8% to 6.5% (↓). Bullied others: Girls. Occasional 21.1% to 10.4% (↓); frequent 8.0% to 4.1% (↓). Boys. Occasional 28.9% to 16.1% (↓); frequent 18.8% to 8.4% (↓).

REFERENCE	STUDY YEARS	COUNTRY (REGION)	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
SANCHEZ-QUEIJA, ET AL., 2016	2006, 2010, 2014	Spain	N = 64 099 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by bullying at least two or three times a month at school in the past couple of months.	Victimized by bullying: Total 3.9% to 4.3% (↔).
COSMA, ET AL., 2017	1994, 1998, 2002, 2006, 2010, 2014	Scotland	N = 37 658 Age: 11–18; M n/a Resp: n/a	Self-report. Victimized by bullying at least two or three times a month in the past couple of months.	Victimized by bullying: Girls. Age 11 11.8% to 17.1% (↑); age 13 11.3% to 18.8% (↑); age 15 6.8% to 8.9% (↔). Boys. Age 11 11.5% to 15.8% (↑); age 13 13.3% to 13.5% (↔); age 15 7.7% to 10.5% (↑).
SARKOVA, ET AL., 2017	1994, 1998, 2002, 2006, 2010, 2014	Czech Republic	N = 21 079 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by bullying at least once at school in the past couple of months.	Victimized by bullying: Girls. Age 11 49.3% to 17.3% (↓); age 13 37.8% to 19.6% (↓); age 15 22.4% to 15.1% (↓). Boys. Age 11 57.9% to 20.2% (↓); age 13 41.8% to 19.7% (↓); age 15 29.9% to 14.7% (↓). Bullied others: Girls. Age 11 37.5% to 8.3% (↓); age 13 33.2% to 10.9% (↓); age 15 20.7% to 11.3% (↓). Boys. Age 11 46.5% to 16.7% (↓); age 13 42.5% to 20.5% (↓); age 15 38.9% to 19.8% (↓).
COSMA, ET AL., 2020	2002, 2006, 2010, 2014	37 Europe, North America	N = 764 518 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by bullying at least two or three times a month at school in the past couple of months.	Victimized by bullying: Girls. Decrease (↓) in 12, increase (↑) in 8, no change (↔) in 17 countries. Boys. Decrease (↓) in 21, increase (↑) in 6, no change (↔) in 10 countries.
GSHS STUDY REPORTS:					
GRANERO, ET AL., 2011	2003/2004, 2007/2008	Venezuela	N = 2940 Age: Grade 7–9; M n/a Resp: n/a	Self-report. Victimized by bullying on one or more days during the past 30 days.	Victimized by bullying: Total 33.4% to 43.6%. Girls 31.4% to 41.2%. Boys 35.6% to 46.2%.

REFERENCE	STUDY YEARS	COUNTRY (REGION)	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
PELTZER & PENGPID, 2016	2003, 2007, 2011	Philippines	N = 18 285 Age: 11–16; M 14.7 (SD 1.2) Resp: 84%, 81%, 82%	Self-report. Victimized by bullying on how many days during the past 30 days.	Victimized by bullying: Girls 36.1% to 49.1% (↑). Boys 34.7% to 46.0% (↑).
PENGPID & PELTZER, 2020	2005, 2010, 2016	United Arab Emirates	N = 24 220 Age: M 14; Grades 8, 9, 10 Resp: 89%, 91%, 80%	Self-report. Victimized by bullying on one or more days during the past 30 days.	Victimized by bullying: Girls 17.2% to 20.5% (↑). Boys 24.5% to 29.9% (↑).
DOS SANTOS, ET AL., 2021	2011, 2016	Brazil	N = 12 290 Age: 14–19; M n/a Resp: 95%, 98%	Self-report. Victimized by bullying once or more during the past 30 days.	Victimized by bullying: Girls 11.7% to 18.8%. Boys 14.9% to 18.6%.
PELTZER & PENGPID, 2021	2007, 2012, 2018	Argentina	N = 115 697 Age: 13–17; M 14.6 (SD 1.2) Resp: 77%, 71%, 63%	Self-report. Victimized by bullying on one or more days during the past 30 days (2007, 2012). Victimized by bullying ever during the past 12 months (2018).	Victimized by bullying: Girls 23.6% to 34.9% (↑). Boys 26.6% to 29.7% (↔).
PENGPID & PELTZER, 2021	2006, 2010, 2016	Morocco	N = 13 109 Age: M n/a, median 14 (IQR 3) Resp: 84%, 92%, 91%	Self-report. Victimized by bullying on one or more days during the past 30 days.	Victimized by bullying: Girls 23.7% to 33.9% (↑). Boys 41.1% to 41.8% (↔).

REFERENCE	STUDY YEARS	COUNTRY (REGION)	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
OTHER STUDY REPORTS:					
NORDHAGEN, ET AL., 2005	1984, 1996	Denmark, Finland, Norway, Sweden	N = 20 954 Age: 2–17; M n/a Resp: 56–83%, 65–72%	Parent report: Victimized by bullying often or now and then.	Victimized by bullying: Total of all countries 13.7% to 16.4% (↑).
FINKELHOR, ET AL., 2010	2002/2003, 2008	USA	N = 6076 Age: 2–17; M n/a Resp: 79%, 71%	Parent interview (2–9 years of age) or parent and child interview (10–17 years of age) by phone: Physical/emotional bullying victimization within the year prior to the interview.	Victimized by bullying: Total: Physically bullied 21.7% to 14.8% (↓). Emotionally bullied 24.9% to 22.0% (↔).
CLARK, ET AL., 2013	2001, 2007, 2012	New Zealand	N = 27 174 Age: 12–18; M n/a Resp: 74%, 74%, 68%	Self-report. Victimized by bullying at school at least weekly.	Victimized by bullying: Total 7.1% to 6.2% (↔).
KESSEL SCHNEIDER, ET AL., 2015	Biennial surveys 2006 to 2012	USA	N = 66 965 Age: Grade 9–12; M n/a Resp: 89–90%	Self-report. Victimized by bullying on school property during the past 12 months.	Victimized by bullying: Total 25.5% to 22.5% (↓). Girls 26.4% to 26.4% (↔). Boys 24.5% to 18.4% (↓).
SOURANDER, ET AL., 2016; ILOLA & SOURANDER, 2013; SANTALAHTI, ET AL., 2008	1989, 1999, 2005, 2013	Finland	N = 4217 Age: 8; M n/a Resp: 95%, 86%, 84%, 86%	Self-report. Victimized by bullying/ bullied others in the past two weeks. Parent and teacher reports: Victimized by bullying/bullied others in the last 12 months.	Victimized by bullying: Girls 1989 to 2013. Self-report (↔). Sometimes 26.5% to 24.9%; frequently 1.5% to 1.7%. Parent (↓). Sometimes 16.4% to 11.3%; frequently 0.6% to 0.0%. Teacher (↔). Sometimes 4.3% to 3.3%; frequently 0.2% to 0.0%. Boys 1989 to 2013. Self-report (↔). Sometimes 33.3% to 31.3%; frequently 7.1% to 5.2%. Parent (↓). Sometimes

REFERENCE	STUDY YEARS	COUNTRY (REGION)	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
WAASDORP, ET AL., 2017	Yearly surveys 2005 to 2014	USA	N = 246 306 Age: Grade 4–12; M n/a Resp: 74% (total)	Self-report. Victimized by bullying/ bullied others at least twice in the past month.	27.6% to 20.2%; frequently 1.5% to 1.8%. Teacher (↔). Sometimes 13.1% to 10.9%; frequently 1.3% to 0.8%. Bullied others: Girls 1989 to 2013. Self-report (↓). Sometimes 11.1% to 6.0%; frequently 0.2% to 0.2%. Parent (↓). Sometimes 8.9% to 4.1%; frequently 0% to 0.2%. Teacher (↔). Sometimes 4.6% to 6.2%; frequently 0.4% to 0.5%. Boys 1989 to 2013. Self-report (↔). Sometimes 24.5% to 20.6%; frequently 1.4% to 1.0%. Parent (↓). Sometimes 24.4% to 17.7%; frequently 0.6% to 0.4%. Teacher (↔). Sometimes 21.0% to 21.1%; frequently 5.1% to 3.7%. Bully-victim: Girls 1989 to 2005 0% to 0%. Boys 1989 to 2005 2.6% to 2.5%. Victimized by bullying: Total 28.5% to 13.4% (↓). Bullied others: Total 21.3% to 7.1% (↓).
KNAAPPILA, ET AL., 2018	Biennial surveys 2000/2001 to 2014/2015	Finland	N = 761 278 Age: 14–16; Girls M 15.3 (SD 0.6), boys M 15.4 (SD 0.7) Resp: n/a	Self-report. Victimized by bullying/ bullied others at school at least about once a week this semester.	Victimized by bullying: Girls. Overall prevalence 5.9% (↑). Boys. Overall prevalence 8.6% (↔). Bullied others: Girls. Overall prevalence 2.8% (↓). Boys. Overall prevalence 9.4% (↓).
PONTES, ET AL., 2018	Biennial surveys 2009 to 2015	USA	N = 61 042 Age: Grade 9–12; M n/a Resp: 71%, 71%, 68%, 60%	Self-report. Victimized by bullying at school during the past 12 months.	Victimized by bullying: Total 19.9% to 20.2% (↔). Girls 21.2% to 24.8% (↑). Boys 18.7% to 15.8% (↓).

REFERENCE	STUDY YEARS	COUNTRY (REGION)	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
AZEREDO, ET AL., 2019	2009, 2012, 2015	Brazil	N = 173 310 Age: Grade 9 (14–15 years); M 14.2 (SD 0.02), 14.3 (0.02), 14.2 (0.02) Resp: n/a	Self-report. Victimized by bullying by schoolmates twice or more in the last month.	Victimized by bullying: Total 14.2% to 21.7%.
LI, ET AL., 2020	Biennial surveys 2011 to 2019	USA	N = 72 605 Age: Grade 9–12; M n/a Resp: over 60% every study year	Self-report. Victimized by bullying on school property during the past 12 months.	Victimized by bullying: Total 11.4% to 9.3% (↔). Girls 9.8% to 10.0% (↔). Boys 12.8% to 8.6% (↔).
THE SCHOOL HEALTH PROMOTION STUDY	2019, 2021	Finland	N = 163 250 Age: Grades 8 and 9; M n/a Resp: n/a	Self-report. Victimized by bullying/ bullied others at least about once a week.	Victimized by bullying: Total 5.5% to 6.0%. Girls 4.5% to 5.6%. Boys 6.4% to 6.3%. Bullied others: Total 3.0% to 2.8%. Girls 1.4% to 1.2%. Boys 4.6% to 4.4%.

Abbreviation: N, number; M, mean; SD, standard deviation; n/a, not available; resp., response rate; HBSC, the Health Behavior in School-Aged Children Study; GSHS, the Global School-based Student Health Survey; IQR, interquartile range
 Note: Arrow indicates statistical significance at least at the level $p < 0.05$ (decrease ↓ or increase ↑) or non-significance (↔)

2.2.1.2 Cyberbullying

Time-trend studies on cyberbullying have been carried out in western countries, mostly in the USA (Table 2). Some studies have included a definition of bullying and have given examples of electronic devices used for cyberbullying (Kessel Schneider, et al., 2015; Li, et al., 2020; Pontes, et al., 2018; Rivers & Noret, 2010; Waasdorp, et al., 2017), but the definitions of cyberbullying have varied between these studies. Two studies assessed online harassment and defined it as threats or other offensive behavior, excluding sexual solicitations, that were sent online to a youth or posted online about a youth for others to see (Jones, et al., 2013; 2012). There were also differences in the time periods over which victimization was assessed in these studies.

Most of the time-trend studies on cyberbullying have focused on cyberbullying victimization, and their findings have varied substantially. The studies indicate that cyberbullying victimization increased (Jones, et al., 2013; 2012; Kessel Schneider, et al., 2015; Trompeter, et al., 2022), did not significantly change (Li, et al., 2020; Pontes, et al., 2018) or decreased (Waasdorp, et al., 2017). Some studies reported similar patterns of change across sexes (Kessel Schneider, et al., 2015; Li, et al., 2020; Pontes, et al., 2018; Rivers & Noret, 2010), while others reported increases among girls only (Jones, et al., 2012; Rivers & Noret, 2010). The meta-regression study by Kennedy (2021) reported that cyberbullying victimization increased in the United States from 2000 to 2017.

One study reported time-trends on cyberbullying perpetration (Trompeter, et al., 2022) (Table 2). They found no changes from 2015 to 2019, but they reported a significant increase from 2019 to 2020; there was also a change in methodology from 2019 to 2020 (Trompeter, et al., 2022). No studies have reported time-trends on being a cyberbully-victim.

2.2.1.3 Combined traditional and cyberbullying

Time-trends of combined traditional and cyberbullying victimization have been reported in two studies (Kessel Schneider, et al., 2015; Li, et al., 2020) (Tables 1 and 2). According to Kessel Schneider et al. (2015), the prevalence of combined victimization increased significantly from 9% in 2006 to 11% in 2012. Among girls, the increase was significant, from 10% to 15%, whereas among boys, there was no statistically significant increase. Li et al. (2020) reported percentages of combined victimization, and these increased from 9.3% in 2011 to 10.2% in 2019.

There have been no studies on time-trends of combined traditional and cyberbullying perpetration or being a bully-victim in both traditional and cyber contexts.

Table 2. The literature on time-trend studies on cyberbullying victimization and perpetration. Changes in prevalence are presented from the first study year to the last.

REFERENCE	STUDY YEARS	COUNTRY	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
RIVERS & NORET, 2010	Yearly surveys 2002 to 2006	England	N = approximately 12 500 Age: 11–13; M n/a Resp: n/a	Self-report: Ever received any nasty or threatening text messages or emails. Any: once or more. Frequent: once a week or more.	Victimized by cyberbullying: Girls. Any 18.8% to 20.8%; frequent 0.7% to 1.7%. Boys. Any 13.8% to 10.3%; frequent 0.8% to 1.8%.
JONES, ET AL., 2013; JONES, ET AL., 2012	2000, 2005, 2010	USA	N = 4561 Age: 10–17; M n/a Resp: 82%, 54%, 54%	Parent and youth interview by phone: self-reported harassment on the internet in the past year. Harassment was defined as threats or other offensive behavior online (not sexual solicitations).	Victimized by cyberbullying: Total. Any 6% to 11% (↑); distressing 3% to 5% (↑); repeated 2% to 5% (↑). Girls. Any 7% to 15% (↑); distressing 3% to 8% (↑). Boys. Any 6% to 7% (↔); distressing 2% to 2% (↔).
KESSEL SCHNEIDER, ET AL., 2015	Biennial surveys 2006 to 2012	USA	N = 66 965 Age: Grade 9–12; M n/a Resp: 89–90%	Self-report: Victimized by cyberbullying during the past 12 months (the internet, cell phones, or other electronic devices).	Victimized by cyberbullying: Total 14.6% to 21.5% (↑). Girls 17.0% to 27.4% (↑). Boys 12.0% to 14.7% (↑).
WAASDORP, ET AL., 2017	Yearly surveys 2005 to 2014	USA	N = 246 306 Age: Grade 4–12; M n/a Resp: 74%	Self-report: Victimized by cyberbullying in the past month.	Victimized by cyberbullying: Total 6.0% to 3.6% (↓).
PONTES, ET AL., 2018	2011, 2013, 2015	USA	N = 43 728 Age: Grade 9–12; M n/a Resp: 71%, 68%, 60%	Self-report: Victimized by cyberbullying during the past 12 months.	Victimized by cyberbullying: Total 16.2% to 15.5% (↔). Girls 22.1% to 21.7% (↔). Boys 10.8% to 9.7% (↔).
LI, ET AL., 2020	Biennial surveys 2011 to 2019	USA	N = 72 605 Age: Grade 9–12; M n/a Resp: over 60% every study year	Self-report: Victimized by cyberbullying during the past 12 months.	Victimized by cyberbullying: Total 6.8% to 5.5% (↔). Girls 9.1% to 6.8% (↔). Boys 4.7% to 4.1% (↔).

REFERENCE	STUDY YEARS	COUNTRY	PARTICIPANTS	ITEM	CHANGE IN PREVALENCE
TROMPETER, ET AL., 2022	Yearly surveys 2015 to 2020	Australia	N = 1418 Age: 11–16; M 13.6 Resp: n/a	Self-report: Victimized by cyberbullying/ cyberbullied others at least three times during the past school term. CBQ-R (2015–2019), Cyber Bullying Participant Roles Scale (2020).	Victimized by cyberbullying: Prevalence n/a (↑). Cyberbullied others: 2015–2019 (↔), 2019–2020 (↑).

Abbreviation: N, number; M, mean; SD, standard deviation; n/a, not available; resp., response rate; IQR, interquartile range; CBQ-R, Cyberbullying Questionnaire, Revised

Note: Arrow indicates statistical significance at least at the level $p < 0.05$ (decrease ↓ or increase ↑) or non-significance (↔)

2.2.2 Cross-cultural studies on the prevalence of bullying victimization, perpetration and being a bully-victim

Key points:

- Cross-cultural studies on bullying have focused on victimization, with less emphasis on bullying perpetration and especially being a bully-victim.
- Studies have reported wide variations in the prevalence of traditional and cyberbullying victimization and perpetration.
- Combined traditional and cyberbullying victimization has been reported in only few cross-cultural studies.

Although bullying is a global problem, research has concentrated on Western countries (Zych, et al., 2015). Cross-cultural research compares two or more cultural groups on variables of interest. The advantages of cross-cultural research include enhancing international collaboration of researchers and gaining deeper knowledge and understanding, but the risks that have been recognized include challenges in methodologies and in interpreting the findings (van de Vijver & Matsumoto, 2011). Cross-cultural epidemiological studies on bullying (Tables 3, 4 and 5) have usually been exploratory or descriptive, with an aim to document similarities and differences in bullying, and with limited capability to address the causes behind the findings.

2.2.2.1 Traditional bullying

Most cross-cultural studies on the prevalence of traditional bullying have been based on the WHO collaborative surveys, the HBSC and the GSHS. The main focus has been on bullying victimization—there have been fewer studies that have assessed bullying perpetration and being a bully-victim (Tables 3 and 5). The studies have been based on self-reported information, but otherwise, there have methodological differences across studies. The HBSC and GSHS surveys included definitions of bullying, as did some other studies (Görzig, et al., 2017; Li, 2008). Studies by Nguyen et al. (2020) and Yanagida et al. (2016) provided specific behavioral descriptions of bullying. The number of countries included in the studies have ranged from two (Li, 2008; Wolke, et al., 2001a) to 82 (Tang, et al., 2020). Only one study has focused on children (Wolke, et al., 2001a). The studies included countries with different economic levels, but the majority of them were high-income economies (The World Bank, 2021a), even though there were studies with a wide range of economies (e.g. Cosma, et al., 2020; Elgar, et al., 2015). Nguyen, et al., (2020) included four low-income to upper-middle income economies.

The prevalence of traditional victimization varies widely among adolescents across countries. When girls and boys have been combined, the range has been from

5% in Sweden (Nansel, et al., 2004) to 74.2% in Samoa (Koyanagi, et al., 2019). Similarly, the variation was wide when girls and boys were assessed separately (see Cosma, et al., 2020; Elgar, et al., 2015; Koyanagi, et al., 2019; Zaborskis, et al., 2019). Most studies that reported the prevalence by sex and by country found that, in the majority of countries, boys were more commonly victimized (Cosma, et al., 2020; Due, et al., 2005; Due & Holstein, 2008; Elgar, et al., 2015; Koyanagi, et al., 2019; Tang, et al., 2020). Similarly, most of the studies that have assessed sex differences in the pooled sample of countries have reported that victimization was more common among boys (Due et al., 2009; Fleming & Jacobsen, 2010; Görzig, et al., 2017; Kim, et al., 2022; Zaborskis, et al., 2019). However, one study had found the opposite (Craig, et al., 2009), and some studies found no differences (Aboagye, et al., 2021; Arnarsson, et al., 2020; Tang, et al., 2020).

Cross-cultural studies on bullying perpetration have been scarce. Nansel et al. (2004) reported that the prevalence varied from 3% in Sweden and Wales to 20% in Denmark, when girls and boys were combined. More recently, Zaborskis et al. (2019) reported variations from 7.7% in Israel to 26.2% in Lithuania. Variations in prevalence have also been reported among girls and boys, separately (Wolke, et al., 2001a; Zaborskis, et al., 2019). Studies that have assessed prevalence by sex have reported that bullying perpetration is more common among boys than girls (Kim, et al., 2022; Wolke, et al., 2001a; Zaborskis, et al., 2019). According to the HBSC studies, the prevalence of bully-victims among adolescents varied from 1% in Sweden to 20% in Lithuania (Nansel, et al., 2004).

The Organisation for Economic Co-operation and Development (OECD) carries out the Programme for International Student Assessment (PISA) to assess the extent to which adolescents of 15 years of age have obtained key knowledge and skills essential for full participation in social and economic life (OECD, 2019; 2017). Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS) cover educational achievement. TIMSS is carried out among students in the fourth and eighth grades, and PIRLS among fourth graders (Martin, et al., 2016; 2012; Mullis, et al., 2020; 2017; 2012). They all assess bullying victimization by inquiring whether the students have experienced any bullying incidents that have been consequently described. Since PISA 2018, TIMSS 2015 and PIRLS 2016 were conducted, the studies have pointed out that some bullying experiences can happen electronically. However, the surveys do not directly measure cyberbullying. The rate of bullying victimization in the surveys has varied widely, from 0% among eighth graders in Japan to 65% among 15-year-olds in the Philippines (Martin, et al., 2016; 2012; Mullis, et al., 2020; 2017; 2012; OECD, 2019; 2017).

Table 3. The literature on cross-cultural studies on traditional bullying victimization, perpetration and being a bully-victim.

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	TRADITIONAL VICTIMIZATION	Prevalence
			Item	
WOLKE, ET AL., 2001A N/A	2 England, Germany	N = 3915 Age: 6, 8; England M 6.71 (SD 0.56), M 8.32 (SD 0.58), Germany M 8.11 (SD 0.61) Resp: England 91%, Germany 85.4%	Child interview. Victimized by bullying/bullied others at least four times during in the past six months or at least once per week.	Range of prevalence across countries: Victimized by bullying: Total 16.0% (Germany, age 8) to 44.6% (England, age 6). Girls 18.6% (Germany, age 8) to 42.8% (England, age 6). Boys 13.6% (Germany, age 8) to 46.3% (England, age 6). Bullied others: Total 3.9% (England, age 6) to 8.9% (Germany, age 8). Girls 2.9% (England, age 6 and age 8) to 5.0% (Germany, age 8). Boys 4.9% (England, age 6) to 12.5% (Germany, age 8). Bully-victims: Total 10.1% (England, age 6) to 13.9% (England, age 8). Girls 6.4% (England, age 6) to 9.9% (England, age 8). Boys 13.5% (England, age 6) to 18.4% (Germany, age 8). Prevalence in pooled sample of all countries: n/a
NANSEL, ET AL., 2004 HBSC 1997–1998	25 Europe, North America	N = 113 200 Age: 11, 13, 15; M n/a Resp: 74% to 99%	Self-report. Victimized by bullying/bullied others more than twice during this term at school.	Range of prevalence across countries: Victimized by bullying: Total 5% (Sweden) to 20% (Lithuania). Bullied others: Total 3% (Sweden, Wales) to 20% (Denmark). Bully-victims: Total 1% (Sweden) to 20% (Lithuania). Prevalence in pooled sample of all countries: Victimized by bullying: Total 11%. Bullied others: Total 10%. Bully-victims: Total 6%.
DUE, ET AL., 2005 HBSC 1997–1998	28 Europe, North America	N = 123 227 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by bullying more than twice at school during this term.	Range of prevalence across countries: Victimized by bullying: Girls 5.1% (Sweden) to 38.2% (Lithuania). Boys 6.3% (Sweden) to 41.4% (Lithuania). Prevalence in pooled sample of all countries: Victimized by bullying: Girls 15.2%. Boys 18.4%.

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	TRADITIONAL VICTIMIZATION
DUE & HOLSTEIN, 2008 HBSC 2001–2002 GSHS 2003–2007	66 Africa, Americas, Eastern Mediterranean, Europe, Southeast Asia, Western Pacific	HBSC: N = 106 803 Age: 13, 15; M n/a GSHS: N = 111 301 Age: 13–15; M n/a Total: N = 218 104 Resp: n/a	Range of prevalence across countries: Victimized by bullying: HBSC: Girls 14.2% (the Czech Republic) to 64.4% (Lithuania). Boys 16.0% (Sweden) to 62.7% (Lithuania). GSHS: Girls 7.1% (Tajikistan) to 67.1% (Zambia). Boys 7.1% (Tajikistan) to 70.2% (Zimbabwe). Prevalence in pooled sample of all countries: Victimized by bullying: HBSC: Total 32.1%. Girls 29.2%. Boys 33.3%. GSHS: Total 37.4%. Girls 35.3%. Boys 39.5%.
CRAIG, ET AL., 2009 HBSC 2005–2006	40 Europe, North America	N = 202 056 Age: 11, 13, 15; M n/a Resp: n/a	Range of prevalence across countries: n/a Prevalence in pooled sample of all countries: Victimized by bullying: Total 12.6%.
DUE, ET AL., 2009 HBSC 2001–2002	35 Europe, North America	N = 162 305 Age: 11, 13, 15; M n/a Resp: n/a	Range of prevalence across countries: Victimized by bullying: Girls 4.1% (Malta, Sweden) to 32.3% (Lithuania). Boys 5.3% (Hungary) to 36.3% (Lithuania). Prevalence in pooled sample of all countries: Victimized by bullying: Girls 10.9%. Boys 11.0%.
FLEMING & JACOBSEN, 2010 GSHS 2003–2006	19 Africa, America, Asia, Middle East	N = 104 614 Age: 13–15; M n/a Resp: n/a	Range of prevalence across countries: Victimized by bullying: Total 7.8% (Tajikistan) to 60.9% (Zambia). Girls 8.2% (Tajikistan) to 63.1% (Zambia). Boys 7.3% (Tajikistan) to 61.7% (Zimbabwe). Prevalence in pooled sample of all countries: Victimized by bullying: Total 4.2%. Girls 32.6%. Boys 36.0%.

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	TRADITIONAL VICTIMIZATION
ELGAR, ET AL., 2015 HBSC, GSHS 2003–2011	79 Africa, Americas, Asia, Europe, Eastern Mediterranean	N = 333 736 Age: 11–16; M 13.5 (SD 1.6) Resp: total (school x student) 44% to 100%, average 75.4%	Self-report. HBSC: Victimized by bullying at least once at school in the past couple of months. GSHS: Victimized by bullying at least on one day during the past 30 days. Range of prevalence across countries: Victimized by bullying: Girls 8.7% (Italy) to 70.3% (Egypt). Boys 12.4% (Armenia) to 72.3% (Egypt). Prevalence in pooled sample of all countries: Victimized by bullying: Girls 27.2%, Boys 32.4%.
PENGPID & PELTZER, 2016 GSHS YEAR N/A	6 Iraq, Kuwait, Malaysia, Mongolia, Philippines, Vietnam	N = 44 231 Age: M 15.1 (SD 1.5) Resp: 82% to 96%	Self-report. Victimized by bullying at least on one day during the past 30 days. Range of prevalence across countries: Victimized by bullying: Total 17.9% (Malaysia) to 47.7% (Philippines). Prevalence in pooled sample of all countries: Victimized by bullying: Total 31.4%.
KOYANAGI, ET AL., 2019 GSHS 2009–2015	48 Africa, Americas, Eastern Mediterranean, Southeast Asia, Western Pacific	N = 134 229 Age: 12–15; M 13.8 (SD 0.95) Resp: 65% to 97%	Self-report. Victimized by bullying at least on one day during the past 30 days. Range of prevalence across countries: Victimized by bullying: Total 13.2% (Laos) to 74.2% (Samoa). Girls 11.3% (Laos) to 69.1% (Samoa). Boys 15.2% (Laos) to 79.0% (Samoa). Prevalence in pooled sample of all countries: Victimized by bullying: Total 30.4%.
NGUYEN, ET AL., 2020 THE YOUNG LIVES 2009	4 Ethiopia, India, Peru, Vietnam	N = 3536 Age: 15; M 14.9 (SD 0.3) to 15.1 (SD 0.3) Resp: n/a	Self-report. Victimized by bullying at least twice in the past year. Range of prevalence across countries: Victimized by bullying: Total 27.4% (Ethiopia) to 61.5% (Peru). Girls 22.2% (Ethiopia) to 63.3% (Peru). Boys 32.5% (Ethiopia) to 59.9% (Peru). Prevalence in pooled sample of all countries: n/a

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	TRADITIONAL VICTIMIZATION
TANG, ET AL., 2020 GSHS 2003–2014	82 Africa, Americas, Eastern Mediterranean, Europe, Southeast Asia, Western Pacific	N = 220 310 Age: 12–15; M 13.9 Resp: n/a	Self-report. Victimized by bullying at least on one day during the past 30 days. Range of prevalence across countries: Victimized by bullying: Total 7.7% (Tajikistan) to 74.1% (Samoa). Girls 8.2% (Tajikistan) to 69.1% (Samoa). Boys 7.1% (Tajikistan) to 78.9% (Samoa). Prevalence in pooled sample of all countries: Victimized by bullying: Total 35.3%. Girls 33.3%. Boys 37.4%.
ABOAGYE, ET AL., 2021 GSHS 2010–2017	11 Benin, Eswatini, Ghana, Liberia, Mauritania, Mauritius, Mozambique, Namibia, Seychelles, Sierra Leone, Tanzania	N = 25 454 Age: 12–18; M n/a Resp: 55% to 88%	Self-report. Victimized by bullying at least on one day during the past 30 days. Range of prevalence across countries: Victimized by bullying: Total 22.2% (Mauritius) to 54.6% (Sierra Leone). Prevalence in pooled sample of all countries: Victimized by bullying: Total 38.8%.

Abbreviation: M, mean; SD, standard deviation; n/a, not available; resp., response rate; GSHS, the Global School-based Student Health Survey; HBSC, the Health Behavior in School-Aged Children Study

2.2.2.2 Cyberbullying

The majority of cross-cultural studies that have assessed cyberbullying have included less than ten countries, with the HBSC-based studies as an exception (Tables 4 and 5). Again, methodological differences have been considerable. In all cross-cultural studies on cyberbullying, the information has been self-administered. The HBSC surveys have included a definition of bullying and have provided some specific examples of cyberbullying behaviors (Arnarsson, et al., 2020; Cosma et al., 2020; Craig et al., 2020; Kim, et al., 2022; Zaborskis et al., 2019). Some other studies have included a definition of cyberbullying (Athanasίου, et al., 2018; Li, 2008; Tsitsika, et al., 2015), a definition of bullying with further questions that indicated whether bullying had happened electronically (e.g. “on the internet”) (Görzig, et al., 2017) or specific behavioral descriptions of cyberbullying incidents (Calmaestra et al., 2020; Chen & Chen, 2020; Yanagida et al., 2016). The majority of the countries in all these studies have been high-income economies (The World Bank, 2021a). Some studies have also included upper-middle economies (Athanasίου, et al., 2018; Calmaestra et al., 2020; Chen & Chen, 2020; Cosma et al., 2020; Görzig, et al., 2017; Kim, et al., 2022; Tsitsika, et al., 2015; Yanagida, et al., 2016), but only two studies have included a low-income country (Cosma et al., 2020; Li, 2008).

The prevalence of cyberbullying victimization in combined samples of girls and boys has been found to vary from 2.8% in Portugal (Görzig, et al., 2017) to 37.3% in Romania (Athanasίου, et al., 2018; Tsitsika, et al., 2015) in cross-cultural studies (Tables 4 and 5). There have been wide variations in prevalence among girls and boys across countries (Athanasίου, et al., 2018; Cosma, et al., 2020). Most studies have reported sex differences, but they have used different methodologies to assess them. Some studies have reported that cyberbullying victimization is more common among girls than boys, when the sample of all countries are pooled (Arnarsson, et al., 2020; Craig, et al., 2020; Görzig, et al., 2017; Tsitsika, et al., 2015), but one study reported the opposite (Zaborskis, et al., 2019). Studies that have reported the prevalence by sex in each country have had diverse findings (Athanasίου, et al., 2018; Calmaestra, et al., 2020; Cosma, et al., 2020).

As with cyberbullying victimization, the rates of cyberbullying perpetration have varied widely. When girls and boys were pooled, the prevalence was from 3.0% in Spain (Calmaestra, et al., 2020) to 20.6% in Taiwan (Chen & Chen, 2020). Studies that have reported sex differences, have reported higher rates of perpetration among boys than girls (Calmaestra, et al., 2020; Craig et al., 2020; Kim, et al., 2022). Calmaestra et al. (2020) reported on the prevalence of being a cyberbully-victim in a study that included Ecuador and Spain. When the countries and sexes were pooled, the prevalence was 8.8%, but when the prevalence was analyzed by country and by sex, the variations were wide (Table 4).

Table 4. The literature on cross-cultural studies on cyberbullying victimization, perpetration and being a cyberbully-victim.

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	Item	Prevalence
TSITSIKA, ET AL., 2015 EU NET ADB STUDY 2011–2012	6 Greece, Iceland, the Netherlands, Poland, Romania, Spain	N = 10 930 Age: 14–17; M 15.8 (SD 0.7) Resp: n/a	Self-report. Victimized by cyberbullying in the past 12 months on the internet.	Range of prevalence across countries: Total 13.3% (Spain) to 37.3% (Romania) Prevalence in pooled sample of all countries: Total 21.4%. Girls: 23.9%. Boys: 18.5%.
ATHANASIOU, ET AL., 2018 EU NET ADB STUDY 2011–2012	7 Germany, Greece, Iceland the Netherlands, Poland, Romania, Spain	N = 12 372 Age: 14–17; M n/a Resp: 62.9% to 95.0%	Self-report. Victimized by cyberbullying in the past 12 months on the internet.	Range of prevalence across countries: Total 13.3% (Spain) to 37.3% (Romania). Girls 15.7% (Spain) to 39.0% (Romania). Boys 10.7% (Spain) to 35.1% (Romania). Prevalence in pooled sample of all countries: Total 21.9%
CALMAESTRA, ET AL., 2020 N/A	2 Ecuador, Spain	N = 33 303 Age: 11–18; M 13.91 (SD 1.326) Resp: n/a	Self-report. Victimized by cyberbullying/bullied others electronically at least once a month.	Range of prevalence across countries: Victimized by cyberbullying: Total 8.7% (Ecuador) to 9.8% (Spain). Girls 9.1% (Ecuador) to 11.0% (Spain). Boys 8.3% (Ecuador) to 8.5% (Spain). Bullied others electronically: Total 3.0% (Spain) to 5.1% (Ecuador). Girls 2.7% (Spain) to 4.5% (Ecuador). Boys 3.4% (Spain) to 5.7% (Ecuador). Cyberbully-victim: Total 6.1% (Spain) to 14.5% (Ecuador). Girls 5.0% (Spain) to 12.3% (Ecuador). Boys 7.2% (Spain) to 16.6% (Ecuador). Prevalence in pooled sample of all countries: Victimized by cyberbullying: Total 9.4%. Bullied others electronically: Total 3.7%. Cyberbully-victim: Total 8.8%

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	CYBERBULLYING VICTIMIZATION
CHEN & CHEN, 2020 N/A	3 China, Hong Kong, Taiwan	N = 2582 Grade: 4–12; M n/a Resp: n/a	Self-report. Victimized by cyberbullying/bullied others electronically in the past three months on the internet or via electronic devices. Range of prevalence across countries: Victimized by cyberbullying: Total 23.8% (China) to 33.0% (Hong Kong). Bullied others electronically: Total 7.7% (China) to 20.6% (Taiwan). Prevalence in pooled sample of all countries: Victimized by cyberbullying: Total 29.7%. Bullied others electronically: Total 16.7%.
CRAIG, ET AL., 2020 HBSC 2017–2018	42 Europe, North America	N = 180 919 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by cyberbullying/bullied others electronically at least once in the past couple of months. Range of prevalence across countries: Victimized by cyberbullying: Girls 3.8% (Greece, 11 years) to 27.8% (Latvia, 13 years). Boys 2.2% (Albania, 13 years) to 28.5% (Lithuania, 15 years). Bullied others electronically: Girls 0.7% (Greece, 11 years) to 19.4% (Romania, 15 years). Boys 1.8% (Norway, 11 years) to 31.4% (Latvia, 15 years). Prevalence in pooled sample of all countries, median (minimum, maximum): Victimized by cyberbullying: Girls: Age 11 12.7% (3.8%, 24.5%); age 13 13.9% (6.4%, 27.8%); age 15 12.7% (5.3%, 20.9%). Boys: Age 11 12.5% (4.0%, 27.5%); age 13 11.9% (2.2%, 24.3%); age 15 11.3% (3.2%, 28.5%). Bullied others electronically: Girls: Age 11 6.1% (0.7%, 14.0%); age 13 7.2% (2.5%, 19.1%); age 15 7.5% (1.6%, 19.4%). Boys: Age 11 7.6% (1.8%, 26.7%); age 13 10.3% (3.1%, 28.8%); age 15 11.8% (3.6%, 31.4%).

Abbreviation: M, mean; SD, standard deviation; n/a, not available; resp., response rate; HBSC, the Health Behavior in School-Aged Children Study

Table 5. The literature on cross-cultural studies on both traditional and cyberbullying victimization and perpetration.

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	Item	Prevalence
LI, ET AL., 2007 N/A	2 Canada, China	N = 354 Age: Canada:12–15; M n/a; China: grade 7 Resp: Canada n/a, China 97.5%	Self-report. Victimized by any traditional and cyberbullying/bullied others traditionally or electronically; no time frame.	Range of prevalence across countries: Victimized by bullying: Traditionally: Total 55% (Canada) to 65% (China). Electronically: Total 25% (Canada) to 33% (China). Bullied others: Traditionally: Total 31% (Canada) to 34% (China). Electronically: Total 7% (China) to 15% (Canada). Prevalence in pooled sample of all countries: n/a
YANAGIDA, ET AL., 2016 N/A	3 Austria, Cyprus (Greek), Romania	N = 1966 Age: 12; M n/a Resp: n/a	Self-report. Victimized by traditional and cyberbullying/bullied others traditionally or electronically in the past 2 months.	Range of prevalence across countries: Victimized by bullying: Traditionally: Total once or twice: 25.7% (Romania) to 35.0% (Austria); at least two or three times a month 16.8% (Cyprus) to 21.9% (Austria). Electronically: Total once or twice: 4.1% (Cyprus) to 8.5% (Romania); at least two or three times a month 2.9% (Cyprus) to 3.7% (Romania). Bullied others: Traditionally: Total once or twice: 22.8% (Romania) to 38.5% (Austria); at least two or three times a month 7.8% (Romania) to 14.4% (Austria). Electronically: Total once or twice: 2.9% (Cyprus) to 5.5% (Austria); at least two or three times a month 1.0% (Cyprus) to 1.5% (Austria, Romania). Prevalence in pooled sample of all countries: n/a
GÖRZIG, ET AL., 2017 EU KIDS ONLINE 2010	18 Europe	N = 15 813 Age: 9–16; M 12.43 (SD 2.28) Resp: n/a	Self-report. Victimized by any traditional and cyberbullying in the past 12 months.	Range of prevalence across countries: Victimized by bullying: Traditionally: Total 5.8% (Portugal) to 24.8% (Romania). Electronically: Total 2.8% (Portugal) to 15.4% (Romania). Prevalence in pooled sample of all countries: n/a

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	TRADITIONAL AND CYBERBULLYING VICTIMIZATION
ZABORSKIS, ET AL., 2019 HBSC 2013–2014	3 Israel, Lithuania, Luxembourg	N = 3814 Age: 15; M 15.67 (SD 0.35) Resp: exceeded 80% in the majority of countries	Self-report. Victimized by bullying/bullied others at least two or three times a month at school or electronically in the past couple of months. Range of prevalence across countries: Victimized by bullying: Traditionally: Total 6.0% (Israel) to 25.6% (Lithuania). Girls 2.8% (Israel) to 21.9% (Lithuania). Boys 9.1% (Luxembourg) to 28.9% (Lithuania). Electronically: Total 4.5% (Luxembourg) to 7.8% (Lithuania). Girls 3.8% (Israel) to 5.6% (Lithuania). Boys 4.6% (Luxembourg) to 9.9% (Lithuania). Bullied others: Traditionally: Total 7.7% (Israel) to 26.2% (Lithuania). Girls 2.8% (Israel) to 17.8% (Lithuania). Boys 14.1% (Israel) to 33.8% (Lithuania). Prevalence in pooled sample of all countries: Victimized by bullying: Traditionally: Total 15.6%. Girls 12.8%. Boys 18.7%. Electronically: Total 6.5%. Girls 4.6%. Boys 8.5%. Bullied others: Traditionally: Total 16.7%. Girls 10.1%. Boys 23.9%.
ARNARSSON, ET AL., 2020 HBSC 2013/2014	6 Denmark, Finland, Greenland, Iceland, Norway, Sweden	N = 32 210 Age: 11, 13, 15; M n/a Resp: school level 20–99%, student level 52– 91%	Self-report. Victimized by bullying at least two or three times a month at school or by messages or by pictures electronically in the past couple of months. Range of prevalence across countries: Victimized by bullying: Traditionally: Girls 0.3% (Iceland, 15 years) to 18.6% (Greenland, 15 years). Boys 1.4% (Iceland, 15 years) to 26.4% (Greenland, 11 years). Electronically: Girls 0.6% (Sweden, 11 years) to 7.1% (Greenland, 15 years). Boys 0.5% (Finland, 11 years) to 9.1% (Greenland, 15 years). Combined victimization: Girls 0.2% (Iceland, 15 years) to 4.9% (Greenland, 13 years). Boys 0.5% (Sweden and Iceland, 11 years, Iceland, 15 years) to 7.1% (Greenland, 13 years). Prevalence in pooled sample of all countries: n/a
COSMA, ET AL., 2020 HBSC 2014	37 Europe, North America	N = 210 855 Age: 11, 13, 15; M n/a Resp: n/a	Self-report. Victimized by bullying at least two or three times a month at school or electronically in the past couple of months. Range of prevalence across countries: Victimized by bullying: Traditionally: Girls 4% (Iceland, Spain) to 26% (Lithuania). Boys 4% (Sweden) to 32% (Lithuania). Electronically: Girls 1.0% (Greece) to 9.0% (Russian Federation). Boys 1.5% (France, Germany) to 11.0% (Greenland). Combined victimization: Girls 0.5% (Greece) to 5.1% (Lithuania). Boys 0.6% (France, Germany) to 6.5% (Lithuania). Prevalence in pooled sample of all countries: Victimized by bullying: Traditionally: Girls 10%. Boys 12%. Electronically: Girls 4.2%. Boys 4.3%. Combined victimization: Girls 1.9%. Boys 2.0%.

REFERENCE, STUDY, YEAR	COUNTRIES (N), REGIONS	PARTICIPANTS	TRADITIONAL AND CYBERBULLYING VICTIMIZATION
<p>KIM, ET AL., 2022 HBSC 2017/2018</p>	<p>45 Europe, North America, Middle East</p>	<p>N = 230 757 Age: 11, 13, 15; M n/a Resp: n/a</p>	<p>Self-report. Victimized by bullying/bullied others at school more than once or twice in the last two months. Victimized by cyberbullying/cyberbullied others in the last two months.</p> <p>Range of prevalence across countries: n/a Prevalence in pooled sample of all countries, median (minimum, maximum): Victimized by bullying: Traditionally: Girls 8.5% (3.1%, 26.1%). Boys 9.6% (2.8%, 29.3%) Electronically: Girls 12.1% (5.6%, 22.8%). Boys 12.2% (4.0%, 24.4%). Bullied others: Traditionally: Girls 2.9% (0.8%, 13.4%). Boys 6.5% (1.3%, 24.4%). Electronically: Girls 6.7% (1.9%, 17.0%). Boys 10.4% (3.4%, 26.5%).</p>

Abbreviation: M, mean; SD, standard deviation; n/a, not available; resp., response rate; HBSC, the Health Behavior in School-Aged Children Study

2.2.2.3 Combined traditional and cyberbullying

Two cross-cultural studies have reported combined traditional and cyberbullying victimization (Table 5) based on the HBSC surveys. Thus, the studies have mainly focused on high-income economies. Cosma et al. (2020) found that, in the total sample of countries, 1.9% of girls and 2.0% of boys reported combined victimization. The prevalence of combined victimization varied widely across countries and sexes (Arnarsson, et al., 2020; Cosma, et al., 2020). Cosma et al. (2020) also reported that, in the total sample of countries, 45.8% of those who reported cybervictimization, also reported traditional victimization (girls, 45.3%; boys, 46.5%). There were wide variations across countries, sexes and age groups. Among girls, the smallest overlap was 0.1% (Greece, girls, age 15 years) and the largest was 80.0% (Greece, girls, age 11 years). Among boys, the range was from 12.5% (Hungary, boys, age 11 years) to 82.7% (the Netherlands, boys, age 11 years).

There have not been any cross-cultural studies on the other roles in combined traditional and cyberbullying.

2.3 Temporal stability in bullying victimization, perpetration and being a bully-victim

Answers to the question of the stability of bullying involvement, i.e. when a person continues to be involved in bullying over time, appear to be somewhat diverse. In general, the roles of bullying victimization and bullying perpetration have involved an element of instability more often than they have stability (Juvonen & Graham, 2014). Study findings indicate some continuity in bullying victimization from childhood to adolescence (Oncioiu, et al., 2020; Sourander, et al., 2000). According to Oncioiu et al. (2020), there was a trajectory with high-chronic victimization that covered about 11% of the study participants from 6 to 17 years of age. Smith (2014) states that the stability of the victim role appears to increase with age. Continuity in bullying perpetration has also been found (Smith, 2014; Sourander, et al., 2000). When it comes to physical aggression, a study that included six datasets from three countries found continuity from childhood to adolescence (Broidy, et al., 2003). In terms of stability of the bully role, Juvonen and Graham (2014) concluded that less than 10% of young people repeatedly bully others throughout their childhood. Bully-victims appear to be particularly at risk of remaining involved in bullying over time, even though they may adapt different roles in bullying (Kim, et al., 2009; Kumpulainen, et al., 1999). The dynamism of bullying has also been emphasized, namely that the roles may overlap over time so that those in the early years may differ from those later on (Juvonen & Graham, 2014). Indeed, a recent meta-analysis has found that while bullying victimization and perpetration were strongly correlated, their longitudinal relationships were reciprocal or bidirectional. This

indicates that bullying victimization is as likely to lead to future perpetration as perpetration is likely to lead to victimization (Walters, 2021).

2.4 Bullying in a social-ecological context

According to the socio-ecological theory of development, all individuals are part of interrelated systems, and their development and behaviors are shaped by the relations between these systems and their individual characteristics. The concepts of *microsystem*, *mesosystem*, *exosystem* and *macrosystem* have been included in the socio-ecological theory (e.g. Bronfenbrenner, 1996). The theory has been widely adapted to the phenomenon of bullying. In the socio-ecological understanding of bullying, the microsystem refers to the immediate interrelations of a child: systems like family, peer group or school class. Bullying behaviors are considered to be part of the microsystem. The mesosystem is a system of microsystems, and in the context of bullying, this includes interrelations of the family and the peer group or the family and school, for example. The exosystem includes interrelations of such systems that do not all include the individual. Thus, the exosystem includes influences from other contexts, for example, antibullying policies. The macrosystem includes cultural values and attitudes towards bullying (Swearer & Espelage, 2004; see also Baldry, et al., 2015).

Bullying can also be conceptualized as a group phenomenon, in which those who are not directly involved in bullying incidents as victims, bullies or bully-victims may have roles as assistants or reinforcers of bullies or defenders of victims, whereas some children and adolescents withdraw from the situations (outsiders) (Salmivalli, 2010; Salmivalli, et al., 1996). The characteristics of these groups and their interactions have been studied. Even though research on bullying roles has mainly focused on traditional bullying, there have been indications that in cyberbullying, there are both online and offline defenders of cyberbullying victims as well as reinforcers of cyberbullies and those who withdraw from the situations (Guo, et al., 2021).

2.4.1 Individual factors associated with bullying victimization, perpetration and being a bully-victim

Key points:

- Bullying is most common in early adolescence, declining after that.
- Boys are generally more involved in bullying than girls.
- Being electronically active is associated with cyberbullying victimization and perpetration.
- Victims of bullying have been described as submissive and insecure, with peer problems, loneliness and internalizing (emotional) symptoms.
- Bullies tend to display externalizing (behavioral) symptoms.
- Bully-victims are a troubled group with dysregulation and both proactive and reactive aggression.
- Research evidence suggests that the relatively youngest within a school grade were at a higher risk of victimization by bullying compared to their relatively older peers. It is not known if the relative age effects found in victimization were independent of the psychopathology of the child.

Involvement in bullying is not equally common in all age groups. Copeland et al. (2013a) found in their cohort study that victimization by bullying was twice as common in childhood, ages 9–13, as it was in adolescence, ages 14–16. Bullying peaks during early adolescence and declines after that (Hymel & Swearer, 2015), although there have been some study findings that have indicated that the prevalence of cyberbullying victimization increased with age among adolescents (Görzig, et al., 2017; Tsitsika, et al., 2015).

Sex differences have been found in involvement of bullying. Boys have generally been more involved in bullying than girls (e.g. Cook, et al., 2010; Cosma, et al., 2015; Craig, et al., 2009; Due, et al., 2005; Fergusson, et al., 2014; Kim, et al., 2011; Nordhagen, et al., 2005; Sanchez-Queija, et al., 2017). There have been indications that victim status does not differ by sex (Copeland, et al., 2013a; Salmivalli, et al., 1996; Wolke, et al., 2013), but bullies and bully-victims are more likely to be boys than the non-involved children (Copeland, et al., 2013a; Wolke, et al., 2013). Sex differences in the types of bullying involvement have also been found. Boys tend to be more involved in physical bullying than girls (Barzilay, et al., 2017; Juvonen & Graham, 2014; Silva, et al., 2013; Waasdorp & Bradshaw, 2015). The findings on sex differences have been more equivocal with verbal and relational bullying and cyberbullying. Some studies have indicated that boys are more involved in verbal bullying (Barzilay, et al., 2017), while some have indicated the opposite (Waasdorp & Bradshaw, 2015) or found no differences (Silva, et al., 2013). Some

studies have suggested that girls are more involved in relational bullying (Barzilay, et al., 2017; Crick & Grotpeter, 1995; Waasdorp & Bradshaw, 2015; Wolke, et al., 2017), but not all studies have supported these findings (Silva, et al., 2013). Despite this ambiguity, girls have been likely to use relational tactics to aggress their peers (Juvonen & Graham, 2014). The findings on sex differences in involvement in cyberbullying have been somewhat inconsistent (Livingstone & Smith, 2014), although recent study reports have suggested that girls have been more involved in cyberbullying as victims (Guo, 2016; Kowalski, et al., 2019; Smith, et al., 2019). For cyberbullying perpetration, sex differences have remained unclear (Kowalski, et al., 2019).

A meta-analysis on ethnic group differences in bullying victimization indicated no significant findings when ethnic majorities and minorities were compared (Vitoroulis & Vaillancourt, 2015). Similarly, Smith (2014) concluded that, although racist bullying occurred, it was not clear whether there were major differences in the experiences of bullying among racial groups. The findings have also been mixed for cyberbullying involvement (Kowalski, et al., 2019). Sexual minority youth have been found to be more likely bullied than heterosexuals (Katz-Wise & Hyde, 2012; Kessel Schneider, et al., 2015; 2012; Smith, 2014), both traditionally and electronically (Kessel Schneider, et al., 2012; Kowalski, et al., 2019). Even though research on the associations between bullying and children with chronic somatic conditions and disabilities has been scarce, study findings suggest that they have been more likely to be involved in bullying than their peers without these issues (Beckman, et al., 2016; Nordhagen, et al., 2005; Smith, 2014). Early pubertal maturation has been associated with being a bully among boys, while late maturation has been associated with being left alone (Jormanainen, et al., 2014). Understandably, being active electronically has been linked to victimization or perpetration of cyberbullying (Guo, 2016; Kowalski, et al., 2019; Ybarra, et al., 2007).

Victims have been characterized as submissive and insecure (Cook, et al., 2010; Juvonen, et al., 2003; Juvonen & Graham, 2014; Menesini & Salmivalli, 2017). They have been reported to have problems with peers (Forero, et al., 1999; Gini, 2008; Ilola, et al., 2016; Juvonen, et al., 2003; Mohseny, et al., 2019; Nansel, et al., 2004; 2001; Sourander, et al., 2010), to have a smaller number of friends (Hodges & Perry, 1999), as being lonely (Forero, et al., 1999; Juvonen, et al., 2003; Nansel, et al., 2001) and as being rejected (Hodges & Perry, 1999; Salmivalli, et al., 1996) or not popular (Salmivalli, et al., 1996). A meta-analysis that covered 121 studies on victim status reported that inadequate social and problem-solving skills and negative cognitions related to self were associated with victim status (Cook, et al., 2010). Furthermore, low self-esteem has been reported as a risk factor for cyberbullying victimization (Kowalski, et al., 2019). Internalizing symptoms that comprise

emotional symptoms such as anxiety or depressive mood (Goodman & Scott, 2012) has also been found to be typical of victims of bullying (e.g. Cook, et al., 2010; Guo, 2016), as has physical weakness (Hodges & Perry, 1999).

Bullies appear as a heterogenic group (Menesini & Salmivalli, 2017), although they are characterized by externalizing behavior (Cook, et al., 2010; Guo, 2016), meaning symptoms that are directed outwards, such as aggression and disruptive behavior (Goodman & Scott, 2012). Some findings suggest that bullies value dominance and high status in their peer group (Sitsema, et al., 2009), and bullies have indeed been found to be popular (Caravita, et al., 2009; Juvonen, et al., 2003). On the other hand, bullies have also been reported not to be necessarily well liked or socially preferred among their peers (Caravita, et al., 2009; Salmivalli, et al., 1996; Sentse, et al., 2014). Bullying has been found to be associated with peer problems (Juvonen, et al., 2003; Mohseny, et al., 2019) and impulsivity (Jolliffe & Farrington, 2011; Kowalski, et al., 2019). Both low cognitive empathy, that is, having skills in recognizing others' emotions and seeing from their perspectives, and low affective empathy, that is, the ability to share others' feelings, have been associated with school bullying perpetration (Zych, et al., 2019) and cyberbullying perpetration (Kowalski, et al., 2019). A meta-analytical study involving 120 studies that assessed bully status reported that being a bully was associated with negative attitudes and beliefs about others, and troubles in problem solving and social competence (Cook, et al., 2010). Bullies have also shown high levels of callous-unemotional traits (Zych, et al., 2019), characterized by low empathy and guilt, a lack of concern regarding performance in tasks and deficient affect (Frick, et al., 2014). Cyberbullying perpetration has been associated with antisocial personality traits (Guo, 2016; Kowalski, et al., 2019).

Bully-victims have been described as a distinct group and the most troubled of those involved in bullying (Juvonen, et al., 2003). They have been characterized by high maladjustment, dysregulation and both proactive and reactive aggression (Juvonen & Graham, 2014; Menesini & Salmivalli, 2017). The meta-analysis by Cook et al. (2010) included 31 studies that assessed bully-victims, and found that they had comorbid externalizing and internalizing symptoms. Bully-victims were also found to have negative self- and other-related beliefs, inadequate problem-solving skills and low social competence (Cook, et al., 2010). Bully-victimization has been reported to be associated with loneliness (Forero, et al., 1999) and peer problems (Ilola, et al., 2016; Juvonen, et al., 2003; Nansel, et al., 2004; Sourander, et al., 2010).

Assistants and reinforcers of bullies, defenders of victims and outsiders are not directly involved in bullying incidents. Assistants and reinforcers of bullies have demonstrated attitudes that are more approving of bullying, while defending the victim or withdrawing from the situation have been related to antibullying attitudes

and moral disapproval of bullying (Salmivalli & Voeten, 2004). Empathy has been positively associated with both defenders (Caravita, et al., 2009; Gini, 2008; Lambe, et al., 2019) and outsiders (Gini, 2008). However, defenders have demonstrated higher levels of social self-efficacy (perception of being competent in social situations and assertive in interpersonal relationships) compared to outsiders (Gini, et al., 2008). Defenders have also been found to be popular children, with high social acceptance (Caravita, et al., 2009; Lambe, et al., 2019; Salmivalli, et al., 1996) and low moral disengagement (Lambe, et al., 2019).

In many countries, children enter school based on their calendar age at a fixed date. For example, in Finland, children usually enter school in mid-August the year they turn seven. Fixed age grouping results in age differences of almost one year among children within the same school grade. The actual age of a child compared to other children within the school grade is referred to as relative age. Relative age effect means that the relatively youngest children within a school grade have an increased probability of various adversities compared to their oldest peers. Already in the 1990s, relative age effects were found in sports, which is also based on age groupings (Barnsley, et al., 1992; Thompson, et al., 1991). Relative age effects have been found in receiving a diagnosis of, and/or medication for, attention-deficit/hyperactivity disorder (ADHD) (Caye, et al., 2020; Holland & Sayal, 2019; Whitely, et al., 2019), in lower educational attainment (Kuntsi, et al., 2022; Lien, et al., 2005; Martin, et al., 2004; Zoëga, et al., 2012), in the likelihood of needing/receiving special education (Dhuey & Lipscomb, 2010; Gledhill, et al., 2002) and even in receiving a diagnosis of intellectual disability (Root, et al., 2019) or a specific learning disorder (Arrhenius, et al., 2021). It is important to distinguish relative age effects (Goodman, et al., 2003) from birth month or seasonality effects, which may also influence health, possibly through seasonally dependent early developmental mechanisms (Boland, et al., 2015).

Only one peer reviewed article has been published on relative age effects in bullying victimization (Table 6). This was based on self-reported school bullying in a cross-cultural sample of children about 10 years of age. The findings support relative age effects in victimization. The relatively younger children were more likely to be bullied than the older children (Mühlenweg, 2010).

Two British reports have assessed relative age effects in victimization based on four surveys altogether. They reported mixed results. The Department of Education (2010) reported two surveys, and the results suggested that the relatively youngest children and adolescents had an increased likelihood to be bullied. Another report included the findings of three surveys. These had mixed results as two of them did not find relative age effects in self-reported victimization, whereas one suggested relative age effects in victimization based on self-reports of children but not based on their parents' reports (Crawford, et al., 2011). The mixed findings based on

children's and their parents' reports may be explained by adults not always being aware of children's experiences or by different perceptions of children and their parents. It is also possible that relative age effect is at its largest among younger age groups, when the difference in relative age in proportion to the actual age is largest (Crawford, et al., 2011).

The existing studies have not controlled for the psychopathology of the child. Thus, it is not clear whether the relative age effects found in victimization were independent of the child's psychopathology. This is particularly important because several studies have suggested that psychiatric symptoms can function both as antecedents and consequences of victimization (Christina, et al., 2021; Hodges & Perry, 1999; Kaltiala-Heino, et al., 2010; Reijntjes, et al., 2011; 2010), and that there were relative age effects also in the emotional wellbeing and psychiatric diagnoses of children and adolescents. The vastest evidence of adversities among the relatively youngest has been found in ADHD or receiving medication for it (Caye, et al., 2020; Holland & Sayal, 2019; Whitely, et al., 2019). Relative age effects have also been found in psychopathology (Goodman, et al., 2003; Kuntsi, et al., 2022; Matsubayashi & Ueda, 2015; Patalay, et al. 2015; Price, et al., 2017; Root, et al., 2019) and emotional wellbeing (Ando, et al., 2019). These findings have been explained by age-related differences in physical growth and maturity (Bonati, et al., 2018; Sayal, et al., 2017; Whitely, et al., 2019) and cognitive and social skills (Patalay, et al., 2015) between the youngest and the oldest children within a fixed age-based group. These differences may predispose the youngest within the school grade to adversities. Interestingly, some Danish studies did not find relative age effects in ADHD medication use (Dalsgaard, et al., 2014; Pottegård, et al., 2014), and one of the explanations they provide is that a relatively large proportion of the relatively youngest Danish children are held back one year in the school system (Pottegård, et al., 2014).

There have been no previous studies on the association of relative age with bullying perpetration or being a bully-victim among children or adolescents.

Table 6. The literature on the association between relative age and bullying victimization.

REFERENCE, COUNTRY	SAMPLE SIZE	SURVEY	AGE, GRADE	INFORMANT	CONFOUNDING FACTORS	FINDINGS
MÜHLENWEG, 2010 17 COUNTRIES	98 633	PIRLS	About 10 (grade 4)	Child	Season of birth	The relatively older children were eight percentage points less likely to be victimized.
DEPARTMENT FOR EDUCATION, 2010 GREAT BRITAIN	n/a	LSYPE	13	Child, parent	n/a	Self-reported incidence of suffering extreme levels of bullying (violent bullying) was 3% among the relatively youngest and 2% among the relatively oldest children ($p = 0.05$). Parents of the relatively youngest children were slightly more likely to report frequent victimization (7%) compared to the middle and relatively oldest groups of children (about 5–6%).
	n/a	TellUs	10, 12, 14	Child	n/a	The relatively youngest children were six percentage points more likely to be bullied than the relatively oldest at ages 10 and 12, falling to five percentage points at age 14.
CRAWFORD, ET AL., 2011 GREAT BRITAIN	About 8500	MCS	7	Child, parent	Sex, household income, ethnic background, family structure, household work status at birth, household work status, mother's and father's highest qualification, mother's and father's socioeconomic classification, household tenure, household financial difficulties, breastfeeding, smoking in the same room as child, birth weight, twin/triplet, birth order, month of interview.	The relatively youngest children were nine percentage points more likely to report being bullied always or sometimes than the oldest children. No statistically significant findings in the parent reports.

REFERENCE, COUNTRY	SAMPLE SIZE	SURVEY	AGE, GRADE	INFORMANT	CONFOUNDING FACTORS	FINDINGS
	7381	ALSPAC	8, 10	Child	Sex, household income, mother's age at birth, ethnic background, household status at birth, mother at work, father at work, mother's highest level of education, father's highest level of education, mother's class, father's class, social housing since child's birth, household has not always owned/mortgaged home since child's birth, financial difficulties, breastfeeding, smoking in same room as child, birthweight, twin, birth order, survey cohort, month of interview.	No statistically significant findings.
	About 12 000	LSYPE	14–17	Child	Sex, household income, mother's age at birth, single parent household at birth, ethnic background, single parent household, mother's work status, father's work status, mother's highest level of education, father's socioeconomic classification, housing tenure, financial circumstances, number of older siblings, birthweight, month of interview.	No statistically significant findings.

Abbreviation: PIRLS, Progress in International Reading Literacy Study; n/a, not available; LSYPE, the Longitudinal Study of Young People in England; MCS, the Millennium Cohort Study; ALSPAC, the Avon Longitudinal Study of Parents and Children

2.4.2 Family-level factors associated with bullying victimization, perpetration and being a bully-victim

Key points:

- Family hardships, such as negative parenting, have been found to be associated with bullying.
- Socioeconomic status is fairly weakly associated with bullying.

A meta-analytic study found fairly weak associations between socioeconomic status and bullying. Being a victim or a bully-victim was associated with low socioeconomic status. On the other hand, victims and bullies were slightly less likely to have high socioeconomic backgrounds compared to those who were not involved in bullying. Socioeconomic status was a poor predictor of bullying others (Tippett & Wolke, 2014).

Family hardships have been associated with bullying. A meta-analysis has found that negative parenting, such as abuse, neglect or maladaptive parenting, was associated with being a victim and a bully-victim (Lereya, et al., 2013). Another meta-analysis by Cook et al. (2010) reported that a negative family environment that included negative aspects relating to parental conflict, family cohesiveness, parental monitoring, family socioeconomic status or parenting styles, was associated with victim, bully and bully-victim statuses. Similarly, a meta-analysis by Guo (2016) reported that negative a family environment predicted cyberbullying victimization and perpetration. A systematic review of literature assessed characteristics of parents and families and found evidence on the associations between contextual family factors, such as parental mental health and domestic violence, and bullying victimization and perpetration. Furthermore, the study reported evidence of the role of relational family factors, for example, child abuse and neglect, maladaptive parenting, communication, parental involvement and support (Nocentini, et al., 2019). Additionally, being a bully has been linked to the mother being younger than 20 years at the child's birth as well as parental history of criminal offending (Fergusson, et al., 2014).

Family-level protective factors for bullying victimization and perpetration have also been recognized. These include parental support, involvement and supervision, good communication and a warm relationship (Lereya, et al., 2013; Nocentini, et al., 2019).

2.4.3 Peer group, teacher, classroom and school-level factors associated with bullying victimization, perpetration and being a bully-victim

Key points:

- The rate of bullying varies more between classrooms than between schools.
- Peer group dynamics, classroom norms, beliefs and attitudes have been associated with bullying. Harmful classroom factors include low peer support and pro-bullying norms.
- Teachers' attitudes towards bullying have an impact on victimization both at the classroom and at the school level.

Variation in the rates of bullying between classrooms has been found to be larger than variation between schools (Menesini & Salmivalli, 2017; Saarento, et al., 2013). Differences between classrooms can be explained by factors related to teacher characteristics or peer group dynamics (Menesini & Salmivalli, 2017).

Victimization has been found to be more common in classrooms where the students perceived their teachers' attitudes towards bullying to be less disapproving (Menesini & Salmivalli, 2017; Saarento, et al., 2013). Furthermore, victimized students have been found to perceive their teacher as having less judgmental attitudes towards bullying (Saarento, et al., 2013). Classroom norms and beliefs, for example, pro-bullying norms, can also have an impact on victimization (Nocentini, et al., 2013; Saarento, et al., 2013; Williams & Guerra, 2007). Classroom hierarchy has been found to be associated with bullying, namely that there has been more bullying in the more hierarchical classrooms (Menesini & Salmivalli, 2017). Some classroom factors have been found to moderate the effects of individual level predictors of victimization (Saarento, et al., 2013; Salmivalli, 2010). For example, the association between social anxiety and victimization was higher in smaller classrooms and peer rejection was more strongly associated with being bullied in bigger classrooms compared to smaller ones (Saarento, et al., 2013). Moreover, higher levels of teacher support have been found to reduce the probability of depressive and anxiety symptoms in victims of cyberbullying (Hellfeldt, et al., 2020).

Classroom context has been found to explain differences in bullying victimization and perpetration between classrooms, but the effects on bystander behaviors have been found to be even more significant (Salmivalli, 2010). In classes with negative social outcome expectations of defending the victim, victimization has been found to be more common (Saarento, et al., 2013). There have also been findings that the associations between social anxiety and victimization were strongest in classrooms with high levels of reinforcement of the bullies and low

levels of defending the victims by the bystanders. Similar findings were reported for the association between peer rejection and victimization. Thus, bystander behaviors moderated these associations (Kärnä, et al., 2010). Negative peer influence (Guo, 2016) and peer rejection (Baldry, et al., 2015) have been associated with cyberbullying victimization and perpetration. Youth who perceived that they were not supported by peers were at an increased risk of bullying victimization (Baldry, et al., 2015; Kowalski, et al., 2019; 2014; Williams & Guerra, 2007) and perpetration (Baldry, et al., 2015). Peer support has been found to moderate the association between verbal victimization and suicidal ideation, acting as a protective factor (Barzilay, et al., 2017). On the other hand, it has been found that the most rejected victims had the highest probability of engaging in non-suicidal self-injury (Esposito, et al., 2019).

School climate refers to individual perceptions of moral, relational and institutional aspects of school life (Grazia & Molinari, 2021). School climate has been found to correlate with bullying. More specifically, the more students feel respected, supported, accepted and treated fairly, the less bullying there is (Cook, et al., 2010; Juvonen & Graham, 2014; Williams & Guerra, 2007; Zych, et al., 2019), also electronically (Baldry, et al., 2015; Guo, 2016; Kowalski, et al., 2019). School climate includes four domains, namely academic climate, community (interpersonal relationships), institutional environment and safety. Safety refers to the degree of physical and emotional security and the presence of effective, consistent and fair disciplinary practices (Wang & Degol, 2016). Low perceived school safety has been associated with involvement, as victims or bullies, in traditional (Goldweber, et al., 2013; Mori, et al., 2021) and cyberbullying (Baldry, et al., 2015; Goldweber, et al., 2013; Kowalski, et al., 2019; 2014).

2.5 Cross-sectional study findings on outcomes associated with bullying victimization, perpetration and being a bully-victim

Cross-sectional studies have shown associations between bullying and various adverse effects. However, this study design only allows description of associations, not assumption of causality. Cross-sectional studies that have assessed the associations between bullying and different outcomes have usually been based on self-reports and focused on adolescents, and the majority of studies have been carried out in Western countries. Some studies that included very young children have used parent reports (Ilola, et al., 2016; Nordhagen, et al., 2005), and some studies combined two (Thomas, et al., 2017) or three (Ford, et al., 2017; Husky, et al., 2020; Juvonen, et al., 2003) informants. Most population-based studies that have assessed mental health symptoms, have used self-administered symptom scales, and few

studies (Copeland, et al., 2013a; Husky, et al., 2020; Thomas, et al., 2017) have made diagnostic categorizations.

2.5.1 Mental health symptoms

Key points:

- Cross-sectional studies on the associations between bullying victimization, perpetration or being a bully-victim have found the most mental health symptoms among bully-victims.
- Victimization by bullying, in particular, has been associated with increased internalizing symptoms.
- Research findings indicate that victimization by both traditional and cyberbullying is especially associated with mental health symptoms.
- There have been indications that those who have been more frequently victimized, have had the most symptoms.
- Cross-cultural studies have provided similar evidence on associations between bullying victimization, perpetration and being a bully-victim, and mental health, as have studies carried out in just one country.
- Although cross-cultural research has focused on developed countries, the findings suggest that the associations can be found globally.

Population-based studies on the associations between bullying victimization, perpetration and being a bully-victim have been manifold and have shown that all these roles have been associated with various adverse mental health outcomes. Most studies have focused on traditional bullying, but some studies have specifically covered cyberbullying (Hellfeldt, et al., 2020; Kowalski & Limber, 2013; Sourander, et al., 2010). Victimization has been the main study area when the associations between bullying and mental health symptoms have been assessed. However, there have been some population-based studies that have focused on victims of bullying, bullies and bully-victims, and compared them to those who were not involved in bullying either as victims or as bullies or as bully-victims.

Some Finnish population-based studies have reported the associations between traditional bullying and mental health symptoms. Kumpulainen et al. (1998) used three informants to assess bullying and symptoms among eight-year-old children. The symptoms were assessed with the self-administered Children's Depression Inventory (CDI) (Kovacs, 1981) and the Rutter Scales A2 for parents (Rutter, et al., 1970) and B2 for teachers (Rutter, 1967). The most internalizing symptoms were perceived among victims and bully-victims, while externalizing symptoms and

hyperactivity were most common among bully-victims and bullies. Furthermore, the probability of being referred to or considered to be referred to psychiatric consultation was increased among all groups that were involved in bullying, and highest among bully-victims (Kumpulainen, et al., 1998). Based on the School Health Survey among 14–16-year-old adolescents in 1997 in Finland, depressive symptoms, measured with the Beck Depression Inventory (BDI) (e.g. Beck, et al., 1996) were increased among all groups involved in bullying, compared to those who were not involved. The symptoms were highest among bully-victims, followed by victims, who, in turn, were followed by bullies. All groups that were involved in bullying had increased odds for severe suicidal ideation, defined as having chosen one or both of the statements of having definite plans about committing suicide or “killing myself if I had the chance” (Kaltiala-Heino, et al, 1999). Ilola et al. (2016) studied parent-reported bullying and mental health symptoms, measured with the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997) among four-year-old Finnish children. Victims scored high on peer problems and bully-victims on conduct problems, while bullies expressed symptoms included on the conduct problems and prosocial skills scales (Ilola, et al., 2016). One Finnish study also focused on mental health symptoms associated with cyberbullying among adolescents. Victims of cyberbullying and cyberbully-victims reported increased internalizing symptoms and peer problems on the SDQ, while cyberbullies and cyberbully-victims reported increased externalizing (conduct and hyperactivity) symptoms and perceived lower prosocial skills, compared to the non-involved. All groups involved in bullying scored high on the SDQ total score (Sourander, et al., 2010). A Finnish study that was carried out among adolescents who had been admitted to psychiatric inpatient care found that having an externalizing disorder based on the DSM-IV categorization increased the likelihood of being a bully or a bully-victim, whereas having an internalizing disorder increased the likelihood of being a victim among males, but not among females (Luukkonen, et al., 2010). Based on the same sample of adolescents, it was also found that girls who had been victims of bullying or had been bullies themselves had increased odds for suicide attempts. This was not found in boys or bully-victims of either sex, nor was it found for self-mutilation (Luukkonen, et al., 2009).

Some studies have made diagnostic categorizations. Copeland et al. (2013a) used the Child and Adolescent Psychiatric Assessment (CAPA) (Angold & Costello, 2000) to assess psychiatric disorders in a community sample of children and adolescents of 9–16 years of age in the US. Participants were assessed to have a psychiatric disorder if they met full criteria on the DSM-IV. Suicidality was assessed as part of the criteria for a major depressive episode. The odds for depressive disorders were as much as 7.6-fold among bully-victims, while the odds were not significantly increased among victims or bullies. For anxiety disorders and

suicidality, both victims and bully-victims had increased odds. All groups had increased odds for disruptive disorders, with an increase of 87.0-fold among bully-victims and 17.8-fold among bullies, and with a 2.2-fold increase in odds among victims. Substance use disorders were more prevalent among bullies and bully-victims, compared to those who were not involved in bullying (Copeland, et al., 2013a). Furthermore, Thomas et al. (2017) used the Diagnostic Interview Schedule for Children, version 4 (DISC-IV) (Schaffer, et al., 2000) to assess psychiatric diagnoses in a population-based sample of 11–17-year-old Australian adolescents. They implemented the criteria of the DSM-IV to classify major depressive disorder (MDD) based on youth and parent interviews and anxiety disorders (generalised anxiety disorder, social phobia, separation anxiety disorder or obsessive-compulsive disorder) and externalizing disorders (attention-deficit/hyperactivity, oppositional defiant or conduct disorders) based on parent interviews. They also used the self-administered SDQ total score to assess difficulties among adolescents. According to the adolescents, bully-victims had the highest odds (7.4-fold compared to the non-involved) for MDD in the past year, and the odds were also high (5.8-fold) in victims of bullying. On the SDQ, bully-victims scored the highest, followed by bullies and victims of bullying. Based on the interviews of their parents, victims had the highest odds for MDD and any anxiety disorders, and the odds of bullies and bully-victims did not differ from the non-involved. Bullies and bully-victims had the highest odds for any externalizing disorder, followed by victims, who also had increased odds compared to the non-involved adolescents (Thomas, et al., 2017). A Canadian study reported that bullying victimization was associated with non-suicidal self-injury, suicidality and both internalizing and externalizing disorders. Furthermore, the study reported cumulative effects that indicated that those adolescents who had experienced both childhood maltreatment and victimization by peers, had substantially increased odds of non-suicidal self-injury, suicidality and mental health disorders (Salmon, et al., 2022). Additionally, an American study found that victims of bullying had increased odds for anxiety and depression as well as for behavioral and developmental problems. However, the odds were diminished for autism spectrum disorders (Iyanda, 2021).

Several studies have reported the associations between mental health symptoms and being a victim of bullying, a bully or a bully-victim, with the non-involved as the reference group. These studies have found, in general, that being a victim or bully-victim have had the strongest associations with internalizing symptoms. More specifically, depressive symptoms have been strongest among bully-victims and victims (Ford, et al., 2017; Hysing, et al., 2019; Juvonen, et al., 2003; Kowalski & Limber, 2013; Romano, et al., 2020). Similarly, anxiety symptoms have been high among victims (Ford, et al., 2017; Hysing, et al., 2019; Isolan, et al., 2013; Juvonen, et al., 2003; Kowalski & Limber, 2013; Romano, et al., 2020) and bully-victims

(Ford, et al., 2017; Hysing, et al., 2019; Isolan, et al., 2013; Kowalski & Limber, 2013; Romano, et al., 2020). However, the findings on the anxiety symptoms of bullies have differed (Hysing, et al., 2019; Isolan, et al., 2013; Kowalski & Limber, 2013). Symptoms of depression and anxiety have also been reported to differ by sex among adolescents as, compared to the non-involved, these symptoms were stronger among girls but not boys, who bullied others (Ford, et al., 2017). Studies that have focused on cyberbullying have found that cyberbully-victims are the most troubled group, with high levels of anxiety and depressive symptoms. Victims of cyberbullying also have higher anxiety and depressive symptoms compared to the non-involved, whereas cyberbullies have not been found to differ from the non-involved (Hellfeldt, et al., 2020; Kowalski & Limber, 2013). Several studies have reported the associations between the roles in bullying and suicidality, ranging from suicidal ideation to suicide attempts. The findings have shown that bully-victims have the strongest association with suicidality, followed by victims of bullying (Espelage & Holt, 2013; Ford, et al., 2017; Kowalski & Limber, 2013; Kozasa, et al., 2017; Thomas, et al., 2017) and, according to some, but not all studies, bullies (Ford, et al., 2017; Kowalski & Limber, 2013; Thomas, et al., 2017). The most conduct problems (Juvonen, et al., 2003) or hyperactivity (Nordhagen, et al., 2005) have been reported in bully-victims, followed by victims and bullies. ADHD symptoms have been reported in all groups that were involved in bullying, when compared to those who were not involved (Hysing, et al., 2019). Furthermore, all groups involved in traditional bullying (Penning, et al., 2010) have reported increased post-traumatic symptoms, and they were highest among victims (Penning, et al., 2010). Involvement in cyberbullying has also been associated with increased post-traumatic symptoms in victims, cyberbullies and cyberbully-victims (Mateu, et al., 2020). Thomas et al. (2017) reported that the odds for accessing services due to emotional or behavioral problems were increased in all groups involved in bullying. The odds were highest in victims of bullying, followed by bully-victims and bullies. The SDQ total scores have been found to be significantly higher in all the involved groups, compared to those who were not involved (Ford, et al., 2017), as have psychological distress (Thomas, et al., 2017) and problems in psychosocial adjustment (Nansel, et al., 2001).

As described above, it has been popular to study bullying by role, namely if the outcomes or the strengths of the associations vary according to whether victims, bullies or bully-victims were assessed. Another perspective has been to study bullying by the context where it occurs. In these studies, the focus has been on whether face-to-face bullying differs in the severity of outcomes from cyberbullying or from bullying in a combination of both of these contexts, which is often referred to as an overlap of traditional and cyberbullying, the combination of traditional and cyberbullying or combined bullying. In accordance with this, some studies (e.g.

Wolke, et al., 2017) have separately assessed the different types of traditional bullying, cyberbullying and their combinations. Again, most of these studies have focused on victimization (Table 7). Based on these studies, evidence has gathered of the increased severity of the outcomes related to combined bullying victimization. This includes a variety of outcomes, including internalizing symptoms (Bradshaw, et al., 2015; Campbell, et al., 2012; Kessel Schneider, et al., 2012; Merrill & Hanson, 2016; Messias, et al., 2014; Waasdorp & Bradshaw, 2015; Wang, et al., 2010), suicidality (Azami & Tareman, 2020; Islam, et al., 2020; Kessel Schneider, et al., 2012; Merrill & Hanson, 2016; Messias, et al., 2014; Peng, et al., 2019) and externalizing symptoms (Bradshaw, et al., 2015; Waasdorp & Bradshaw, 2015). Some studies have also reported that victims of cyberbullying alone had a greater likelihood of suicidality than victims of traditional bullying alone (Azami & Tareman, 2020; Peng, et al., 2019; Messias, et al., 2014; Kessel Schneider, et al., 2012). Very few studies that have focused on the context of bullying have included bullies and bully-victims (Beckman, et al., 2012; Campbell, et al., 2012; Wang, et al., 2019) (Table 7).

There have also been studies that have concurrently assessed bullying victimization and perpetration in traditional and cyber contexts and the associations of these with mental health symptoms, without assessing combined victimization or perpetration. The majority of such studies have focused on bullying victimization. Studies have reported that both traditional and cyberbullying victimization are significantly associated with mental health symptoms, indicating more symptoms in victims, even when the other type of victimization had been controlled for. Such findings have been reported for emotional problems (Wigderson & Lynch, 2013; Yang, et al., 2021), depressive symptoms (Bonanno & Hymel, 2013; Perren, et al., 2010), social anxiety (Dempsey, et al., 2009; Juvonen & Gross, 2008) and suicidal ideation (Bonanno & Hymel, 2013) or suicidality (Yang, et al., 2021; Zaborskis, et al., 2019). Zaborskis et al. (2019) studied the effects of traditional and cyberbullying victimization on suicidality in three different countries; they reported that in some countries the association was stronger for traditional victimization, and in one country it was stronger for cyberbullying victimization. However, there have also been different study findings. Hase et al. (2015) found that after controlling for cyberbullying victimization, the association between being a victim of traditional bullying and mental health symptoms was significant, but cyberbullying victimization was no longer a predictor of mental health symptoms when traditional victimization was controlled for. Similarly, Dempsey et al. (2009) have reported that cyberbullying victimization was not associated with symptoms of depression after controlling for relational and overt victimization. Bonanno and Hymel (2013) studied the associations between traditional and cyberbullying perpetration and depressive symptoms and suicidal ideation. They categorized traditional bullying by

Table 7. The literature on the associations between traditional, cyber or combined bullying and mental health symptoms. All studies include bullying victimization, and some also include bullying perpetration and being a bully-victim. Only statistically significant findings are presented.

REFERENCE	PARTICIPANTS, COUNTRY	VICTIMIZATION, MENTAL HEALTH OUTCOME, ADJUSTMENT	RESULTS
<p>WANG, ET AL., 2010</p>	<p>N = 7475 Age: M 14.2 (SD 1.42), grades 7–10 Resp: 85% USA</p>	<p>Victimization: Self-report. Any physical or verbal victimization, social exclusion, rumor spreading and cyberbullying victimization in the past couple of months. Three latent classes: 1) All-types: victimization by the four traditional types and by cyberbullying 2) verbal/relational: victimization by verbal, social exclusion, rumor spreading, 3) non-victims. Outcome: Self-report. Depressive symptoms, medicine use for nervousness or sleeping problems. Adjustment: Grade, race/ethnicity.</p>	<p>Depressive symptoms: All-types vs. verbal/relational (girls, boys), $p < 0.05$. All-types vs. non-victims (girls, boys), $p < 0.05$. Verbal/relational vs. non-victims (girls, boys), $p < 0.05$. Medicine use for nervousness and sleeping problems: All-types vs. verbal/relational (girls), $p < 0.05$. All-types vs. non-victims (girls), $p < 0.05$. Verbal/relational vs. non-victims (girls), $p < 0.05$. All-types victims vs. other groups (boys), $p < 0.05$.</p>
<p>CAMPBELL, ET AL., 2012</p>	<p>N = 3112 Age: 9–19, M 13.96 (SD 1.87) Resp: n/a Australia</p>	<p>Victimization/perpetration: Self-report. Any traditional and cyberbullying victimization/perpetration this year. Victimization groups: Seven mutually exclusive groups, including traditional victims only, cyberbullying victims only and victims of combined bullying. Outcome: Self-report. SDQ, DASS-21. Adjustment: n/a.</p>	<p>SDQ and DASS-21: Cyberbullying vs. traditional victims, higher total scores, $p < 0.001$. SDQ and DASS-21 total scores higher in combined victims vs. traditional and cybervictims. SDQ and DASS-21 total scores higher in combined bully-victims vs. traditional bully-victims.</p>
<p>BECKMAN, ET AL., 2012</p>	<p>N = 3820 Age: 13–16 Resp: 83.2% to 90.3% Sweden</p>	<p>Victimization: Self-report. Any traditional and cyberbullying victimization/perpetration in the past couple of months. Victimization/perpetration groups: Ten mutually exclusive groups, traditional/cyberbullying/combined victims/bullies/bully-victims, none. Outcome: Self-report. The PsychoSomatic Problems Scale. Adjustment: Sex, grade, family structure and birth country.</p>	<p>Psychosomatic problems: Combined victims vs. none, RR 13.2. Traditional victims vs. none, RR 6.9. Cybervictims vs. none, RR 14.9. Combined bullies vs. none, RR 4.98. Traditional bullies vs. none, RR 3.58. Cyberbullies vs. none, RR 6.26. Combined bully-victims vs. none, RR 14.29. Traditional bully-victims vs. none, RR 15.67.</p>

REFERENCE	PARTICIPANTS, COUNTRY	VICTIMIZATION, MENTAL HEALTH OUTCOME, ADJUSTMENT	RESULTS
KESSEL SCHNEIDER, ET AL., 2012	N = 20 406 Grades 9–12 Resp: 88.1% USA	Victimization: Self-report. School bullying and cyberbullying victimization in the past 12 months. Victimization groups: Traditional (school) only, cyber only, both, none. Outcome: Self-report. Depressive symptoms, suicidal ideation, self-injury, suicide attempts. Adjustment: Sex, grade, race/ethnicity, sexual orientation, school performance, school attachment, school enrolment size.	All outcomes: Combined victims vs. none, OR 4.4 (depressive symptoms) to OR 5.4 (suicide attempts that required medical treatment). Traditional victims vs. none, OR 1.5 (suicide attempts that required medical treatment) to OR 2.2 (depressive symptoms, suicidal ideation). Cybervictims vs. none, OR 2.6 (depressive symptoms, suicidal ideation) to OR 3.4 (suicide attempts, both any attempts and attempts that required medical treatment).
MESSIAS, ET AL., 2014	N = 15 425 Grades 9–12 Resp: 87% USA	Victimization: Self-report. Any school bullying and cyberbullying victimization in the past 12 months. Victimization groups: Traditional (school) only, cyber only, both, none. Outcome: Self-report. Sadness, suicidal ideation, suicide plan, suicide attempts, suicide attempts that required medical treatment. Adjustment: Age, gender, race.	All outcomes: Combined victims vs. none, OR 4.2 (suicide attempts that required medical treatment) to OR 5.6 (any suicide attempts). Traditional victims vs. none, OR 1.6 (suicide attempts that required medical treatment) to OR 2.7 (suicide plans). Cybervictims vs. none, OR 3.1 (suicide plans) to OR 3.7 (suicide attempts that required medical treatment).
BRADSHAW, ET AL., 2015	N = 24 620 Grades 9–12, M 15.98 (SD 1.32) Resp: n/a USA	Victimization: Self-report. Any relational, verbal, physical and cyberbullying victimization within the last month. Victimization, latent class groups: Multiple (high probability of relational, verbal, physical and cyberbullying), relational (high probability of relational and verbal bullying), physical (high probability of physical and verbal bullying) and low victimization. Outcome: Self-report. Internalizing symptoms (based on the YSR), externalizing symptoms (based on the Aggression Scale). Adjustment: Sex, race/ethnicity, grade, percent minority at school, percent eligible for free and reduced lunch, school suspension rate, school enrolment.	Internalizing symptoms: Multiple vs. relational/physical/low victimization, for each comparison $p < 0.05$. Physical vs. low victimization, $p < 0.05$. Relational vs. low victimization, $p < 0.05$. Externalizing symptoms: Multiple vs. relational/physical/low victimization, for each comparison $p < 0.05$. Physical vs. relational/low victimization, for each comparison $p < 0.05$. Relational vs. low victimization, $p < 0.05$.

REFERENCE	PARTICIPANTS, COUNTRY	VICTIMIZATION, MENTAL HEALTH OUTCOME, ADJUSTMENT	RESULTS
<p>WAASDORP & BRADSHAW, 2015</p>	<p>N = 28 104 Grades 9–12 Resp: n/a USA</p>	<p>Victimization: Self-report. Any relational, verbal, physical and cyberbullying victimization during the past 30 days. Victimization groups: Traditional victims only, victims of overlapping cyber (and traditional bullying). Outcome: Self-report. Internalizing symptoms (based on the YSR), externalizing symptoms (based on the Aggression Scale). Adjustment: Sex, race/ethnicity, grade, classroom, percent minority at school, school suspension rate, school enrolment, student- teacher ratio.</p>	<p>Adolescents who had internalizing or externalizing symptoms, had increased odds for experiencing overlapping cyberbullying victimization, compared to traditional victimization only. Internalizing symptoms, OR 1.3. Externalizing symptoms, OR 1.4.</p>
<p>MERRILL & HANSON, 2016</p>	<p>N = 13 583 Grades 9–12 Resp: 66% USA</p>	<p>Victimization: Self-report. Any school bullying and cyberbullying victimization in the past 12 months. Victimization groups: Traditional (school) only, cyber only, both, none. Outcome: Self-report. Sadness, suicidal ideation, suicide plan, suicide attempts, suicide attempts that required medical treatment. Adjustment: Age, sex, race/ethnicity.</p>	<p>The frequency of mental health issues (0 to 5) was positively associated with both victimization at school and electronically for both girls and boys. Those who experienced victimization both at school and electronically were significantly more likely to experience mental health symptoms compared with those who experienced victimization in just one context or neither.</p>
<p>WOLKE, ET AL., 2017</p>	<p>N = 2745 Age: 11–16, M 13.5 (SD 1.35) Resp: 71.6% UK</p>	<p>Victimization: Self-report. Traditional and cyberbullying victimization at least often or frequently during the last six months. Traditional victimization included physical and verbal (direct) victimization and relational victimization. Victimization groups: Pure direct victims (DV), pure relational victims (RV), pure cyberbullying victims (CV), direct and relational victims, direct and cyberbullying victims, relational and cyberbullying victims, direct, relational and cyberbullying victims, none. Outcome: Self-report. SDQ, the Rosenberg Self-esteem Scale. Adjustment: Sex, ethnicity, parent education, pupil premium status (an indicator of deprivation), percentage attendance, school.</p>	<p>SDQ: All victimization groups had more problems indicated by the SDQ total score compared to the non-involved, $p < 0.001$. Victims of multiple types of victimization (DV+RV+CV) had the most problems according to the SDQ, compared to the not-involved. Self-esteem: All victimization groups had lower self-esteem compared to the non-involved, $p = 0.014$ or smaller. Victims of multiple types of victimization (DV+RV+CV) had the lowest self-esteem, compared to the not-involved.</p>

REFERENCE	PARTICIPANTS, COUNTRY	VICTIMIZATION, MENTAL HEALTH OUTCOME, ADJUSTMENT	RESULTS
<p>PENG, ET AL., 2019</p>	<p>N = 2647 Age: M 13.6 (SD1.1) Resp: n/a China</p>	<p>Victimization: Self-report. Traditional and cyberbullying victimization at least sometimes this year. Victimization groups: Traditional only, cyber only, both, none. Outcome: Self-report. Suicidal ideation only, self-harm only, suicidal ideation plus self-harm, suicide attempts. Adjustment: Sex, age, location (suburban/urban/island) and type of school (public/private), SDQ.</p>	<p>Suicidal ideation only: Combined victims vs. none, OR 3.9. Traditional victims vs. none, OR 1.4. Cybervictims vs. none, OR 2.4. Combined victims vs. traditional victims, OR 2.8. Cybervictims vs. traditional victims, OR 1.7. Self-harm only: Traditional victims vs. none, OR 2.8. Cybervictims vs. none, OR 4.3. Suicidal ideation and self-harm: Combined victims vs. none, OR 4.3. Cybervictims vs. none, OR 2.8. Combined victims vs. traditional victims, OR 3.3. Suicide attempts: Combined victims vs. none, OR 5.1. Combined victims vs. traditional victims, OR 3.2.</p>
<p>WANG, ET AL., 2019</p>	<p>N = 2028 Age: M 16.2 (SD 0.71) Resp: 64.5% Taiwan</p>	<p>Victimization/perpetration: Self-report. Any traditional and cyberbullying victimization/perpetration during the past two months. Victimization/perpetration groups: Traditional, cyber, combined victim, traditional, cyber, combined bully/bully-victim, none. Outcome: Self-report. The Kessler Psychological Distress Scale (short version), suicidal ideation, self-harm. Adjustment: Sex, internet addiction, alcohol use, type of school, school climate.</p>	<p>Psychological distress: Traditional victims vs. none, OR 1.7. Cybervictims vs. none, OR 2.0. Combined bullies/bully-victims vs. none, OR 2.1. Traditional bullies/bully-victims vs. none, OR 1.9. Suicidal ideation: Traditional victims vs. none, OR 2.3. Combined bullies/bully-victims vs. none, OR 2.4. Self-harm: Cybervictims vs. none, OR 3.6. Traditional bullies/bully-victims vs. none, OR 4.0.</p>
<p>AZAMI & TAREMIAN, 2020</p>	<p>N = 400 Age: M 16.61 (SD 0.95) Resp: 94% Iran</p>	<p>Victimization: Self-report. Any traditional and cyberbullying victimization during the past two months. Victimization groups: Traditional, cyber, both, none. Outcome: Self-report. Self-harm, suicide attempt. Adjustment: n/a.</p>	<p>Self-harm: Combined victims vs. none, OR 4.2. Traditional victims vs. none, OR 2.9. Cybervictims vs. none, OR 3.3. Suicide attempts: Combined victims vs. none, OR 5.5. Cybervictims vs. none, OR 2.8.</p>

REFERENCE	PARTICIPANTS, COUNTRY	VICTIMIZATION, MENTAL HEALTH OUTCOME, ADJUSTMENT	RESULTS
<p>ISLAM, ET AL., 2020</p>	<p>N = 2166 Age: 12–17 Resp: n/a Australia</p>	<p>Victimization: Self-report. Any traditional and cyberbullying victimization in the past 12 months. Victimization groups: Traditional, cyber, both, none. Outcome: Self-report. MDD, ADHD, conduct disorder, anxiety disorder based on DISC-IV. Suicidal ideation, plan, and attempt, self-harm. Adjustment: Age, sex, remoteness, parents' education, household income, family type, the time spent on using internet and playing electronic games, substance use by the children.</p>	<p>MDD: Combined victims vs. none, OR 2.1. Traditional victims vs. none, OR 2.6. Cybervictims vs. none, OR 2.0. Conduct disorder: Traditional victims vs. none, OR 2.3. Suicidal plan among ideators: Combined victims vs. none, OR 8.9. Traditional victims vs. none, OR 4.7. Cybervictims vs. none, OR 8.4. Suicidal attempt among ideators: Combined victims vs. none, OR 4.8. Traditional victims vs. none, OR 2.3. Cybervictims vs. none, OR 4.7. Suicidal plan and attempt among ideators: Combined victims vs. none, OR 5.4. Traditional victims vs. none, OR 2.6. Cybervictims vs. none, OR 5.2. Self-harm: Combined victims vs. none, OR 4.0. Traditional victims vs. none, OR 3.3. Cybervictims vs. none, OR 3.9.</p>

Abbreviation: N, number; M, mean; SD, standard deviation; resp., response rate; n/a, not available; SDQ, the Strengths and Difficulties Questionnaire; DASS-21, the Depression Anxiety Stress Scale; MDD, major depressive disorder; ADHD, attention-deficit/hyperactivity disorder; DISC-IV, the Diagnostic Interview Schedule for Children, version IV

type into verbal, physical and relational bullying, and found that verbal bullying and cyberbullying perpetration each had a statistically significant association with depressive symptoms and suicidal ideation, whereas physical and social bullying did not (Bonanno & Hymel, 2013).

A different perspective on bullying victimization has been provided through analyzing associations with mental health outcomes by frequency. These findings have indicated that those who were more frequently victimized had the most symptoms. This has been found for victims of both traditional bullying (Campbell & Morrison, 2007; Eastman, et al., 2018; Koyanagi, et al., 2019; Lataster, et al., 2006; Penning, et al., 2010) and cyberbullying (Elgar, et al., 2014).

Most cross-cultural studies have focused on the associations between traditional bullying victimization and mental health outcomes, with the minority of studies providing information on cyberbullying or bullies and bully-victims (Table 8). The majority of study reports have been based on the HBSC and the GSHS surveys, and the main emphasis has been on high-income economies (The World Bank, 2021a), even though some studies (Aboagye, et al., 2021; Fleming & Jacobsen, 2010; Koyanagi, et al., 2019; Tang, et al., 2020) have included the whole range from low-income to high-income economies (The World Bank, 2021a).

Most cross-cultural studies have reported mental health symptoms, but Husky et al. (2020) formed DSM-IV diagnoses based on child-reported information on their mental health. Importantly, the study included victims, bullies and bully-victims. In the pooled sample of seven countries, all groups had increased odds for any DSM-IV based disorder, and the odds were highest for bully-victims, followed by bullies, and then by victims, compared to those who were not involved in bullying. Victims showed a tendency for internalizing disorders, while bullies had increased odds for both internalizing and externalizing disorders, as did bully-victims (Table 8).

In general, the findings on the associations between traditional bullying and mental health symptoms in cross-cultural samples have been congruent with the findings on studies carried out in single countries, providing evidence on increased symptoms in victims of bullying, bullies and bully-victims. The findings have covered emotional adjustment, which was found to be poorest among victims, followed by bully-victims and bullies, and all these groups differed significantly from the non-involved (Nansel, et al., 2004). The study findings have also covered externalizing symptoms (e.g. Nordhagen, et al., 2005) and suicidality (e.g. Zaborskis, et al., 2019). Similarly, studies that have focused on cyberbullying, have reported increased internalizing or externalizing symptoms (Athanasίου, et al., 2018; Perren, et al., 2010; Tsitsika, et al., 2015) and suicidality (Zaborskis, et al., 2019) (Table 8).

Table 8. The literature on the associations between bullying victimization, perpetration or being a bully-victim and mental health symptoms in cross-cultural, cross-sectional studies. Only statistically significant findings are presented.

REFERENCE, STUDY, YEAR	COUNTRIES (N)	PARTICIPANTS	VICTIMIZATION ITEM, OUTCOME, ADJUSTMENT	RESULTS 1. BY COUNTRY 2. COUNTRIES POOLED
TRADITIONAL BULLYING VICTIMIZATION				
NANSEL, ET AL., 2004 HBSC 1997–1998	25, Europe, North America	N = 113 200 Age: 11.5, 13.5, 15.5 (average) Resp: 74% to 99%	Victimization/perpetration: Self-report. Victimized by bullying/bullied others at school more than twice this term. Outcome: Self-report. Emotional adjustment. Adjustment: Age, sex.	1. Emotional adjustment. Traditional victimization vs. none, poorer adjustment in 25/25 countries. Victimization vs. perpetration, poorer adjustment in 25/25 countries. Perpetration vs. none, poorer adjustment in 21/25 countries. Being a bully-victim vs. none, poorer adjustment in 25/25 countries. Being a bully-victim vs. perpetration, poorer adjustment in 25/25 countries. 2. Emotional adjustment worst in victims, followed by bully-victims, bullies and the non- involved. All groups differed at $p < 0.001$.
DUE, ET AL., 2005 HBSC 1997–1998	28 Europe, North America	N = 123 227 Age: 11, 13, 15; M n/a Resp: n/a	Victimization: Self-report. Victimized by bullying at school this term 1. never/once or twice, 2. sometimes, 3. about every week/all the time. Outcome: Self-report. Sleeping difficulties, feeling tired in the morning, feeling low, irritable/bad temper, feeling nervous, feeling lonely, feeling left out of things, and feeling helpless. Adjustment: Age, family affluence, country.	1. n/a 2. Traditional victimization vs. none. Bullied sometimes, ORs from OR = 1.2 for feeling tired in the morning in girls to OR = 2.7 for feeling left out of things in girls. Bullied weekly, ORs from OR = 1.7 for feeling tired in the morning in boys to OR = 7.5 for feeling left out of things in boys.

REFERENCE, STUDY, YEAR	COUNTRIES (N)	PARTICIPANTS	VICTIMIZATION ITEM, OUTCOME, ADJUSTMENT	RESULTS 1. BY COUNTRY 2. COUNTRIES POOLED
NORDHAGEN, ET AL., 2005	5 Denmark, Iceland, Finland, Norway, Sweden	N = 10 664 Age: 2–17; M n/a Resp: 65–72%	Victimization/perpetration: Parent report. Victimized by bullying/bullied others at least now and then. Outcome: Parent report. Psychiatric/nervous problems, hyperactivity. Adjustment: Country, sex, age, living area, parental education level and family structure.	1. n/a 2. Traditional victimization vs. none. Psychiatric/nervous problems. OR = 9.1. Hyperactivity, OR = 9.6. Traditional bullying perpetration vs. none. Psychiatric/nervous problems, OR = 3.9. Hyperactivity, OR = 3.5. Being a bully-victim vs. none. Psychiatric/nervous problems, OR = 9.6. Hyperactivity, OR = 13.1
FLEMING & JACOBSEN, 2010 GSHS 2003–2006	16/17 Africa, America, Asia, Middle East	N = 104 614 Age: 13–15; M n/a Resp: n/a	Victimization: Self-report. Victimized by bullying at least on one day during the past 30 days. Outcome: Self-report. Suicidal ideation (16 countries), sleeping problems, loneliness, feeling sad/hopeless (17 countries) during the past 12 months. Adjustment: n/a	1. Traditional victimization vs. none. Suicidal ideation, RR > 1 in 16/16 countries (from RR = 1.6 in Morocco, Tanzania to RR = 2.5 in Venezuela). Sleeping problems, RR > 1 in 17/17 countries (from RR = 1.2 in the Philippines to RR = 2.6 in Tajikistan). Loneliness, RR > 1 in 17/17 countries (from RR = 1.2 in the Philippines to RR = 2.2 in Tajikistan). Feeling sad/hopeless, RR > 1 in 16/17 countries (from RR = 1.3 in Zambia to RR = 2.1 in Tajikistan), RR = 0.8 in Jordan. 2. Traditional victimization vs. none. All outcomes more prevalent.
PELTZER & PENGPID, 2017 GSHS 2007–2013	7 Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand, Vietnam	N = 30 284 Age: 13–15; M 14.1 (SD 0.8) Resp: 82% to 96%	Victimization: Self-report. Victimized by bullying at least on one day during the past 30 days. Outcome: Self-report. Suicidal ideation. Adjustment: n/a	1. Traditional victimization vs. none. Suicidal ideation, OR > 1 in 4/7 countries (from OR = 1.6 in the Philippines to OR = 3.0 in Indonesia). 2. Traditional victimization vs. none. Suicidal ideation, OR = 1.5 (girls OR 1.5, boys OR = 1.4).

REFERENCE, STUDY, YEAR	COUNTRIES (N)	PARTICIPANTS	VICTIMIZATION ITEM, OUTCOME, ADJUSTMENT	RESULTS 1. BY COUNTRY 2. COUNTRIES POOLED
BARZILAY, ET AL., 2017 SAVING AND EMPOWERING YOUNG LIVES IN EUROPE	10 Europe	N = 11 110 Age: M 14.9 (SD 0.89) Resp: n/a	Victimization: Self-report. Any physical, verbal, and relational victimization in the last 12 months. Outcome: Self-report. Suicidal ideation during the past 2 weeks, a lifetime history of a suicide attempt. Adjustment: Age, sex, not living with both biological parents, not born in country of residence, parent lost employment in the previous year.	1. n/a 2. Physical victimization vs. none. Suicidal ideation, OR = 1.4. Relational victimization vs. none. Suicide attempts, OR = 1.3.
KOYANAGI, ET AL., 2019 GSHS 2009–2015	48 Africa, Americas, Eastern Mediterranean, Southeast Asia, Western Pacific	N = 134 229 Age: 12–15; M 13.8 (SD 0.95) Resp: 65% to 97%	Victimization: Self-report. Victimized by bullying at least on one day during the past 30 days. Outcome: Self-report. Suicide attempt. Adjustment: Sex, age, food insecurity, loneliness.	1. Traditional victimization vs. none. Suicide attempts, OR > 1 in 47/48 countries (from OR = 1.8 in United Arab Emirates to OR = 13.5 in Samoa). 2. Traditional victimization vs. none. Suicide attempts, OR = 3.1.
TANG, ET AL., 2020 GSHS 2003–2014	82 Africa, Americas, Eastern Mediterranean, Europe, Southeast Asia, Western Pacific	N = 220 310 Age: 12–15; M 13.9 Resp: n/a	Victimization: Self-report. Victimized by bullying at least on one day during the past 30 days. Outcome: Self-report. Suicidal ideation, suicidal plan, suicide attempt during the past 12 months. Adjustment: Age, sex, grade, socioeconomic status, country income classification, survey year, cigarette smoking, alcohol use, number of friends, parental support, loneliness, anxiety, gender specified age-standardized suicide rates.	1. Traditional victimization vs. none. ORs by geographical region. Suicidal ideation, OR = 1.5–2.0. Suicidal plans, OR = 1.6–1.8. Suicide attempts, OR = 1.9–2.7. 2. Traditional victimization vs. none. Suicidal ideation, OR = 1.8. Suicidal plans, OR = 1.7. Suicide attempts, OR = 2.1 (girls OR = 2.0, boys OR = 2.3).

REFERENCE, STUDY, YEAR	COUNTRIES (N)	PARTICIPANTS	VICTIMIZATION ITEM, OUTCOME, ADJUSTMENT	RESULTS 1. BY COUNTRY 2. COUNTRIES POOLED
<p>HUSKY, ET AL., 2020</p>	<p>7 Bulgaria, Germany, Italy, Lithuania, the Netherlands, Romania, Turkey</p>	<p>N = 6298 Age: 6–11; M n/a Resp: n/a</p>	<p>Victimization/perpetration: The SDQ items on victimization/perpetration on the parent or teacher reports somewhat true/certainly true. Outcome: Self-report. Separation anxiety disorder, generalized anxiety disorder, major depressive disorder, phobia, ADHD, conduct disorder, oppositional defiant disorder on the Dominic Interactive. Adjustment: Sex, mother's education level, age, marital status and employment status, N of children in the household, maternal psychological distress, country.</p>	<p>1. n/a 2. Traditional victimization vs. none. Any disorder, OR = 1.3. Any internalizing disorder, OR = 1.4. Generalized anxiety disorder, OR = 1.6. Traditional perpetration vs. none. Any disorder, OR = 1.8. Any internalizing disorder, OR = 1.5. Separation anxiety disorder, OR = 1.4. Any externalizing disorder, OR = 2.7. ADHD, OR = 2.9. Conduct disorder, OR = 4.1. Oppositional defiant disorder, OR = 2.5. Being a bully-victim vs. none. Any disorder, OR = 2.3. Any internalizing disorder, OR = 2.0. Separation anxiety disorder, OR = 1.9. Generalized anxiety disorder, OR = 2.5. Depression, OR = 2.5. Phobia, OR = 1.5. Any externalizing disorder, OR = 3.1. ADHD, OR = 3.5. Conduct disorder, OR = 4.6. Oppositional defiant disorder, OR = 3.2.</p>
<p>ABOAGYE, ET AL., 2021 GSHS 2010–2017</p>	<p>11 Benin, Eswatini, Ghana, Liberia, Mauritania, Mauritius, Mozambique, Namibia, Seychelles, Sierra Leone, Tanzania</p>	<p>N = 25 454 Age: 12–18; M n/a Resp: 55% to 88%</p>	<p>Victimization: Self-report. Victimized by bullying at least on one day during the past 30 days. Explanatory factors: Self-report. Anxiety, suicidal ideation, suicidal plan, suicidal attempt, loneliness, peer support. Adjustment: Age, country, loneliness, anxiety, suicidal ideation/plan/attempt, current marijuana use, truancy, peer support, parental/guardian supervision/connectedness/bonding.</p>	<p>1. n/a 2. Traditional victimization vs. none. Anxiety, OR = 1.5. Suicidal ideation, OR = 1.3. Suicidal attempt, OR = 1.9. Loneliness, OR = 1.7. Peer support, OR = 0.8.</p>

REFERENCE, STUDY, YEAR	COUNTRIES (N)	PARTICIPANTS	VICTIMIZATION ITEM, OUTCOME, ADJUSTMENT	RESULTS 1. BY COUNTRY 2. COUNTRIES POOLED
CYBERBULLYING VICTIMIZATION				
TSITSIKA, ET AL., 2015 EU NET ADB 2011–2012	6 Greece, Iceland, the Netherlands, Poland, Romania, Spain	N = 10 930 Age: 14–17; M 15.8 (SD 0.7) Resp: n/a	Victimization: Self-report. Any cyberbullying victimization in the past 12 months on the internet. Outcome: Self-report. YSR (scales: anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, aggressive behavior, internalizing problems, externalizing problems, total problems). Adjustment: Age, sex, parental education, country, hours of internet use, social media use.	1. Cyberbullying victimization: The effect of bullying on the outcomes at $p < 0.001$ in every country. 2. Cyberbullying victimization was associated ($p < 0.001$) with the YSR anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, aggressive behavior, internalizing problems, externalizing problems, total problems scales.
ATHANASIOU, ET AL., 2018 EU NET ADB 2011–2012	6 Greece, Iceland, the Netherlands, Poland, Romania, Spain	N = 12 372 Age: 14–17; M n/a Resp: 62.9% to 95.0%	Victimization: Self-report. Any cyberbullying victimization in the past 12 months on the internet. Outcome: Self-report. YSR (internalizing problems, externalizing problems). Adjustment: Sex, age, parental educational level, parental family status, age at first internet use, daily use of social media /internet, parents allow to visit every site/limit time on internet, internalizing/externalizing problems.	1. Cyberbullying victimization vs. none. Internalizing problems, OR > 1 in 6/6 countries (from OR = 1.03 in Poland to OR = 1.06 in Spain). Externalizing problems, OR > 1 in 5/6 countries (from OR = 1.03 in the Netherlands to OR = 1.07 in Iceland). 2. n/a

REFERENCE, STUDY, YEAR	COUNTRIES (N)	PARTICIPANTS	VICTIMIZATION ITEM, OUTCOME, ADJUSTMENT	RESULTS 1. BY COUNTRY 2. COUNTRIES POOLED
TRADITIONAL AND CYBERBULLYING VICTIMIZATION				
PERREN, ET AL., 2010	2 Australia, Switzerland	N: Australia n = 1320, Switzerland n = 374 Age: Australia M 13.7 (SD 0.92); Switzerland M 14.3 (SD 1.13) Resp: Australia 73%, Switzerland 98%	Victimization/perpetration: Self-report. Traditional bullying. Victimized by bullying/bullied others at least once a week in the last 3 months, on at least one of the six items of victimization (both countries) Cyberbullying victimization/perpetration: Victimization at least once a week in the last 3 months. Five items in Australia, two in Switzerland. Analysed as linear variables. Outcome: Self-report. Australia: DASS, Switzerland: A validated scale on depressive symptoms (8 items). Both samples: Composite scores were calculated for the depressive symptoms. Adjustment: Age, sex, cyberbullying, cybervictimization.	1. Depressive symptoms: Traditional victimization, cyberbullying victimization, association in 2/2 countries (p < 0.01), indicating higher levels of symptoms in victims. Traditional bullying perpetration, cyberbullying perpetration, association in 2/2 countries (p < 0.01). 2. Depressive symptoms in traditional bullying, symptoms highest in bully-victims, followed by victims, bullies and the non-involved. All groups differed at p < 0.05. Cyberbullying victimization predicted depressive symptoms (p < 0.001).
ZABORSKIS, ET AL., 2019 HBSC 2013–2014	3 Israel, Lithuania, Luxembourg	N = 3814 Age: 15; M 15.67 (SD 0.35) Resp: exceeded 80% in the majority of countries	Victimization/perpetration: Self-report. Traditional/cyberbullying victimization and traditional bullying perpetration at least two or three times a month in the past couple of months. Outcome: Self-report. Suicidal ideation, suicidal plans, suicide attempts. Adjustment: Sex, family affluence and structure, child–parent communication.	1. Suicidal ideation. Traditional victimization vs. none, cyberbullying victimization vs. none, OR > 1 in 3/3 countries. Suicidal plans. Traditional victimization vs. none, OR > 1 in 2/3 countries. Cyberbullying victimization vs. none, OR > 1 in 3/3 countries. Suicide attempts. Traditional victimization vs. none, OR > 1 in 2/3 countries. Cyberbullying victimization vs. none, OR > 1 in 3/3 countries. Traditional bullying perpetration vs. none, OR > 1 in 1/3 countries.

REFERENCE, STUDY, YEAR	COUNTRIES (N)	PARTICIPANTS	VICTIMIZATION ITEM, OUTCOME, ADJUSTMENT	RESULTS 1. BY COUNTRY 2. COUNTRIES POOLED
<p>KIM, ET AL., 2022 HBSC 2017–2018</p>	<p>45 Europe, North America, Middle East</p>	<p>N = 230 757 Age: 11, 13, 15; M n/a Resp: n/a</p>	<p>Victimization/perpetration: Self-report. Victimized by bullying/bullied others at school more than once or twice in the last two months. Any cyberbullying victimization/perpetration in the last two months. Outcome: Self-report. Psychological symptoms over the past 6 months (sleeping difficulties feeling low, irritable/bad temper, feeling nervous). Adjustment: Family affluence, (cyber)bullying perpetration, schools clustered.</p>	<p>2. Suicidal ideation: Traditional victimization vs. none, OR 3.1. Cyberbullying victimization vs. none, OR = 2.7. Suicidal plans: Traditional victimization vs. none, OR 2.3. Cyberbullying victimization vs. none, OR = 3.0. Suicide attempts: Traditional victimization vs. none, OR 2.5. Cyberbullying victimization vs. none, OR = 4.3. Traditional bullying perpetration vs. none, OR = 1.4. 1. Psychological symptoms. Traditional victimization vs. none, girls, RR > 1 in 36/45 countries, boys, RR > 1 in 31/45 countries. Cyberbullying victimization vs. none, girls, RR > 1 in 39/45 countries, boys, RR > 1 in 27/45 countries. No countries with RR < 1. Traditional bullying perpetration vs. none, girls, RR > 1 in 14/45 countries, boys, RR > 1 in 16/45 countries. Cyberbullying perpetration vs. none, girls, RR > 1 in 13/45 countries, boys, RR > 1 in 17/45 countries. No countries with RR < 1. 2. n/a</p>

Abbreviation: N, number; resp., response rate; M, mean; n/a, not available; SD, standard deviation; SDQ, the Strengths and Difficulties Questionnaire; ADHD, attention-deficit/hyperactivity disorder; YSR, the Youth Self-Report; RR risk ratio; DASS, the Depression Anxiety Stress Scale

2.5.2 Findings beyond mental health

Key points:

- When cross-sectional studies assess outcomes beyond mental health, bully-victims appear to be the most disadvantaged group involved in bullying.
- Problems in subjective health or wellbeing as well as social problems have been reported to be most common among victims of bullying and bully-victims.
- Poor school adjustment has been most prevalent in bullies and bully-victims.

Some Finnish population-based studies have reported adversities beyond mental health in children or adolescents. These findings have included somatic symptoms in four-year-old children who were victimized by bullying, and both somatic symptoms and sleeping problems in bully-victims. Bullies, on the other hand, have been found to have diminished prosocial skills (Ilola, et al., 2016). Similarly, adolescent cyberbullies and cyberbully-victims have reported more somatic complaints and problems with falling asleep. They have also used more alcohol and tobacco compared to the non-involved. Victims of cyberbullying and cyberbully-victims have experienced peer problems, while cyberbullies and cyberbully-victims perceived that their prosocial skills were low compared to the non-involved (Sourander, et al., 2010). In an earlier Finnish study that covered traditional bullying, bully-victims had the most problems with school refusal at the age of eight (Kumpulainen, et al., 1998). Another Finnish study reported that chronic somatic diseases were significantly associated with being a victim of bullying among boys who had been hospitalized for psychiatric care (Luukkonen, et al., 2010).

Several studies have assessed subjective wellbeing. Kowalski and Limber (2013) found that subjective health was lowest among victims and bully-victims. In this regard, bullies have not been found to differ from the non-involved, and bullies have had a better perception of their health than victims of bullying have had of theirs. Health problems have also been found to be most common among bully-victims (Nansel, et al., 2001; Schnohr & Niclasen, 2006), followed by victims and bullies. All these groups have been found to differ significantly from non-involved adolescents (Nansel, et al., 2001). Kozasa et al. (2017) found that girls, but not boys, who were bully-victims, had somatic complaints. Some studies have focused solely on cyberbullying. Subjective wellbeing was perceived to be worse among cyberbully-victims (Hellfeldt, et al., 2020; Kowalski & Limber, 2013; Sourander, et al., 2010) and among victims of cyberbullying, compared to the non-involved (Hellfeldt, et al., 2020; Kowalski & Limber, 2013). Wellbeing of cyberbullies has

been found not to differ from that of the non-involved (Hellfeldt, et al., 2020; Kowalski & Limber, 2013).

A meta-analysis found that victims, bullies and bully-victims had a significantly higher tendency for psychosomatic problems compared to those who were not involved in bullying. The largest effect sizes were for victims and bully-victims (Gini & Pozzoli, 2009). Wolke et al. (2001b) had similar findings in a study among children 6–9 years of age. Problems with sleeping have been found especially in victims of bullying, but also in bullies and bully-victims (Hysing, et al., 2019). On the other hand, Schnohr and Niclasen (2006) only found sleeping problems among bully-victims.

Problems in peer relationships (Kozasa, et al., 2017; Nansel, et al., 2004) and loneliness (Juvonen, et al., 2003; Nansel, et al., 2001) have especially been found among victims and bully-victims, even though bullies have also differed from the non-involved, who have been found to be more advantaged in peer relations (Nansel, et al., 2004). Self-esteem has been the lowest among bully-victims, even though bullies also perceived their self-esteem lower than the non-involved (Kowalski & Limber, 2013).

School adjustment has been found to be most troubled among bullies and bully-victims, followed by victims, who also have differed significantly from the non-involved (Juvonen, et al., 2003; Nansel, et al., 2004). Alcohol use has been found to be more common among bullies (Nansel, et al., 2004; 2001; Schnohr & Niclasen, 2006; Thomas, et al., 2017) as has smoking (Nansel, et al., 2004; 2001; Schnohr & Niclasen, 2006; Thomas, et al., 2017). Smoking is also common among bully-victims (Nansel, et al., 2004; 2001) and victims (Thomas, et al., 2017). Substance use has been found to be most common among bullies, followed by bully-victims and victims, who also have had higher odds compared to the non-involved (Thomas, et al., 2017). Two meta-analyses reported that weapon carrying was more common among bully-victims, followed by bullies and then by victims, compared to those who were not involved in bullying (Valdebenito, et al., 2017; van Geel, et al., 2014a).

2.6 Longitudinal study findings on adverse effects associated with bullying victimization, perpetration and being a bully-victim

The connection between being involved in bullying as a victim, a bully or a bully-victim in childhood and later mental health problems has been long known (e.g. Kumpulainen & Räsänen, 2000). However, one of the key questions in assessing long-term outcomes of bullying has been if the observed adverse effects were independently associated with bullying or merely confounded by other adversities that prevailed concurrently with bullying. The findings of a study among

adolescents, with an observation period of 10 months, supported the conclusion that psychopathologic behavior is a consequence of involvement in bullying (Kim, et al., 2006). Similarly, longitudinal cohort studies have shown that bullying victimization, perpetration and being a bully-victim are independently associated with several long-term adverse effects, even after controlling for childhood confounding factors. These have included mental health symptoms at the time bullying was assessed, family hardships, and, in some studies, traumatic experiences. These factors could themselves contribute to the associations, which would leave the question of whether the association between bullying and later adversities is independent unanswered. The follow-up periods have covered several years, reaching to even middle age (Farrington & Ttofi, 2011; Takizawa, et al., 2014), and the studies have been presented in some review articles (e.g. Arseneault, 2018; Brunstein Klomek, et al., 2015; Wolke & Lereya, 2015). Most longitudinal cohort studies have used self-reported outcomes, but some have been register-based (Brunstein-Klomek, et al., 2009; Sourander, et al., 2016a; 2009; 2007b), and some have combined two sources of information (Evans-Lacko, et al., 2017; Ganesan, et al., 2021; Farrington & Ttofi, 2011).

2.6.1 Mental health symptoms in longitudinal studies

Key points:

- Bullying victimization, perpetration and being a bully-victim predict negative long-term outcomes independently, even after controlling for confounding factors.
- The roles of victims, bullies and bully-victims have all been associated with later health problems and socioeconomic disadvantages.
- Victimization has especially been associated with later internalizing problems.

Some Finnish studies have reported longitudinal associations between being a victim of bullying, a bully or a bully-victim at eight years of age, and ICD-10-based psychiatric diagnoses, mental health symptoms or psychiatric treatment up to adulthood, based on the same cohort. Sourander et al. (2016a) obtained psychiatric disorders from a nationwide hospital register, that included the use of specialized services of outpatient and inpatient treatment for psychiatric disorders from 16 to 29 years of age. Involvement in bullying at the age of eight years predicted a higher risk of receiving a diagnosis of any psychiatric disorder, a diagnosis of depression in victims and a diagnosis of any psychiatric disorders in bully-victims, compared to

those who were not involved in bullying. Bullying others in childhood did not predict receiving a diagnosis of a psychiatric disorder, when adjustment included psychiatric symptoms at eight years of age (Sourander, et al., 2016a). Sourander et al. (2007b) included males in the study and found that victims of bullying had increased odds for anxiety disorders, and bullies were more likely to have antisocial personality disorders in young adulthood, when parental education level and childhood psychiatric symptoms were controlled for. Bully-victims, on the other hand, had increased odds for both anxiety disorders and antisocial personality disorders (Sourander, et al., 2007b). Among females, but not males, being a victim of bullying in childhood has predicted psychiatric hospital treatment and psychopharmacologic treatment by 24 years of age, even after childhood psychiatric symptoms have been controlled for. However, being a bully or a bully-victims in childhood have not been associated with psychiatric hospital treatment or psychopharmacologic treatment. These findings were based on a study involving a reference group of those who had not been involved in bullying in childhood (Sourander, et al., 2009). Another study showed the association between traditional bullying victimization and suicide attempts and/or completed suicides. Among females, frequent bullying victimization at the age of eight years was associated with suicide attempts or completed suicides before age 25, even when depressive symptoms and conduct problems in childhood were controlled for. On the other hand, in males who had been frequent bully-victims, the association was significant when either depressive symptoms or conduct problems in childhood were controlled for, but not when both were controlled for. Similarly, being a frequent bully in childhood only predicted suicide attempts or completed suicides when depressive symptoms in childhood were controlled for (Brunstein-Klomek, et al., 2009). Still another study based on the same Finnish cohort assessed depressive symptoms and suicidal ideation among males. This study reported that those who had been frequent bullies or bully-victims in childhood, but not those who had only been victims, had significantly increased odds for depressive symptoms at 18 years of age, when depressive symptoms in childhood were controlled for. However, none of the groups that were involved in bullying were significantly associated with suicidal ideation (Brunstein-Klomek, et al., 2008).

Copeland et al. (2013a) reported psychiatric diagnoses at 19–26 years of age, based on the DSM-IV categorization. They also reported suicidality, which was assessed as part of the criteria for major depressive episodes. When the study controlled for childhood mental health symptoms and family hardships, being a victim of bullying in childhood or in adolescence was significantly associated with anxiety disorders, generalized anxiety disorder, agoraphobia and panic disorder, and the odds were 2.7–4.6-fold compared to those who had not been involved in bullying. Bullies had 4.1-fold increased odds for antisocial personality disorder. Bully-victims, on the other hand, had 14.5-fold increased odds for panic disorder, 26.7-fold

increased odds for agoraphobia in females and 18.5-fold odds for suicidality in males (Copeland, et al., 2013a). Gibb et al. (2011) carried out a study on victims and bullies in New Zealand and used the diagnostic criteria of the DSM-IV. They found that victims of bullying in adolescence had significantly, about two-fold, increased odds for anxiety disorders by 30 years of age. When it came to those who had been bullies in childhood (7–12 years of age), significant associations were found for major depression, anxiety disorders and suicidal ideation and attempts, indicating increased prevalence among former bullies. When bullying others had occurred in adolescence, the odds were increased for suicidal ideation and conduct and antisocial personality disorders. This study controlled for several covariates, but not involvement in bullying as a bully or a victim, when victimization or perpetration, respectively, were assessed. The study did not assess bully-victims, either (Gibb, et al., 2011). Takizawa et al. (2014) reported findings of the British National Child Development Study, that assessed bullying victimization at ages 7 and 11 years, and the outcomes, psychiatric diagnoses based on the ICD-10 and suicidality, between ages 23 and 50 years. Victimization was significantly associated with anxiety disorders, depression and suicidality, when confounding factors were controlled for (Takizawa, et al., 2014).

Some longitudinal studies have assessed the associations between bullying and mental health symptoms. Wolke et al. (2014) studied psychotic experiences at the age of 18 years, and found that victims, bullies and bully-victims had increased odds for these. Copp et al. (2021) focused on cyberbullying victims, and reported that they had increased odds for depressive symptoms over a follow-up period of three years. Ganesan et al. (2021) and Renda et al. (2011) focused on bullies. They reported that bullying perpetration was associated with depressive symptoms (Ganesan, et al., 2021) and antisocial behavior (Ganesan, et al., 2021; Renda, et al., 2011). Evans-Lacko et al. (2017) reported that mental health service use was associated with childhood bullying victimization as long as until 50 years of age. They did not include findings on bullies or bully-victims.

There have also been findings that have indicated that those who were victimized by bullying frequently or chronically were in a more disadvantageous position compared to those who were victimized less frequently. Such findings have been reported for anxiety disorders and suicidality (Takizawa, et al., 2014), for psychotic symptoms (Wolke, et al., 2014) and for mental health service use (Evans-Lacko, et al., 2017).

2.6.2 Longitudinal study findings beyond mental health

Key points:

- Bullying perpetration has been associated with antisocial behavior and criminality, including violent offenses in adulthood.
- Bullying victimization has not been associated with violent offenses in adulthood, but research evidence on the subject is scarce.
- Also, according to longitudinal studies, bully-victims appear to be a disadvantaged group with an increased risk for diminished health, wealth and social relationships in adulthood.
- There have not been any population-based studies on whether being a bully-victim in childhood is associated with violent offenses in adulthood, but one study reported increased risks for violent offenses among males in late adolescence.

Studies that have assessed the outcomes of victims, bullies and bully-victims beyond mental health have been scarce. Wolke et al. (2012) indicated that victims and bully-victims, in particular, were disadvantaged when it came to diminished health, wealth and social relationships in adulthood. Bullies, on the other hand, did not have any significant associations with these outcomes, once childhood mental health symptoms and family hardships were controlled for. The study also indicated that chronic bullying victimization was associated with more negative outcomes on wealth and social relations in adulthood compared to victimization that was not chronic (Wolke, et al., 2013). Sourander et al. (2007a) focused on victims, bullies and bully-victims in a Finnish study among males, and they found that being a frequent bully or a frequent bully-victim in childhood predicted repeated offending. Additionally, being a frequent bully predicted property and violent offenses, while being a frequent bully-victim predicted property offenses (Sourander, et al., 2007a). Based on a Finnish sample of adolescents who had been hospitalized for psychiatric care, it was found that bullying perpetration was significantly associated with violent crimes, but not with non-violent crimes. Among victims of bullying, a decreased likelihood of criminality was found, while no significant findings were found among bully-victims (Luukkonen, et al., 2011).

A recent systematic review found that victimization in early adolescence was associated with poorer school performance and school connectedness over follow-up periods that ranged from 12 months to eight years, compared to those who were not victimized (Halliday, et al., 2021). A study by Wong and Schonlau (2013) suggested that victimization was associated with later delinquency, but the study was based on retrospective assessment of victimization. The findings on the associations

between victimization and property offenses (Gibb, et al., 2011; Sourander, et al., 2011; 2007a; Wong & Schonlau, 2013) and other kinds of risky or illegal behaviors (Wolke, et al., 2013; Wong & Schonlau, 2013) have been mixed. Copp et al. (2021) have reported that cyberbullying victimization was associated with physical aggression and marijuana and alcohol use over a follow-up period of two years. A recent Finnish study found that female bullies or bully-victims had 2.8-fold increased likelihood of being assaulted physically or sexually, while the likelihood was not increased among female victims or males who were involved in bullying. The basic population in this longitudinal study were adolescents who had been hospitalized in adolescent psychiatric wards at the age of 13–17 years (Oulasmaa, et al., 2021).

Some other studies have focused on bullying perpetration, and found that this has been associated with socioeconomic disadvantages (Farrington & Ttofi, 2011) such as academic difficulties (Ganesan, et al., 2021) or low job status and leading an unsuccessful life (Farrington & Ttofi, 2011). Heavy drinking has been associated with being a bully in childhood (Kim, et al., 2011). Bullying perpetration has also been associated with criminality (Ganesan, et al., 2021). This includes being arrested or convicted (Fergusson, et al., 2014; Gibb, et al., 2011), property offenses (Fergusson, et al., 2014; Sourander, et al., 2011; 2007a), traffic offenses and recidivism (Sourander, et al., 2011; 2007a). Substance use has also been reported among former bullies (Bender & Lösel, 2011; Farrington & Ttofi, 2011; Ganesan, et al., 2021; Gibb, et al., 2011). Frequent bullying perpetration in childhood has been reported to have stronger associations with reoffending in young adulthood compared to infrequent bullying (Sourander, et al., 2011).

Longitudinal studies on the association between bullying victimization or perpetration in childhood and violence in adulthood have been scarce. There have only been four studies that have reported bullying perpetration at 12 years of age or younger and violence at more than 20 years of age, and only one of them also included victimization (Sourander, et al., 2011) (Table 9). In these studies, there were some differences in the methodologies: namely, the sources of baseline and follow-up information were different. The attrition rates also varied considerably. Additionally, there have been some studies with a shorter follow-up period and studies that have assessed the association between bullying involvement in adolescence and violent offenses in adulthood. Sexual violence is not included in this section.

The Finnish Nationwide 1981 Birth Cohort Study is the only longitudinal prospective population-based study that has assessed the associations between bullying victimization in childhood and violent offenses in adulthood. In this cohort, bullying was assessed at eight to nine years of age, and violent offenses were assessed at 23–26 years of age. Among males, only being bullied sometimes and being bullied frequently were assessed separately. The associations were statistically

significant, when just parental education levels were controlled for. This pointed to an increased tendency for violent offenses among victims of bullying. However, when the psychopathology of the child was also controlled for, there were no significant findings. Victimization by bullying did not predict violent offenses in females. This is the only study that reported the findings for both males and females separately (Sourander, et al., 2011), although there are differences in both bullying involvement (Juvonen & Graham, 2014) and violent criminality (Pollock, et al., 2006; Statistics Finland, 2020b) among sexes. Another study by Sourander et al. (2007a) included only boys who had participated in the Finnish Nationwide 1981 Birth Cohort Study. This study found no significant association between victimization in childhood and violent offenses at 16–20 years of age.

One population-based longitudinal prospective study assessed the association between victimization in adolescence and violent offenses in adulthood and found no significant associations after controlling for the confounding factors (Gibb, et al., 2011). Bender and Lösel (2011) carried out a school-based survey among adolescents and followed a subsample of males that contained an oversampling of victims and bullies compared to the basic population. They found that bullying victimization was not associated with violent offenses in young adulthood. Wong and Schonlau (2013) found that bullying victimization before the age of 12 years was associated with an increased likelihood of assault in late adolescence or young adulthood. This study was based on retrospective assessment of victimization.

The associations between bullying perpetration in childhood and violent offenses in adulthood have been assessed in three prospective longitudinal population-based cohorts (Table 9). Sourander et al. (2011) assessed both perpetration only sometimes and perpetration frequently among males in the Finnish Nationwide 1981 Birth Cohort Study. Perpetration had significant associations with violent offenses at both frequencies. Among females, there were no significant findings on the association between bullying perpetration and violent offenses (Sourander, et al., 2011). Two study reports were based on the Christchurch Health and Development Study, carried out in New Zealand (Fergusson, et al., 2014; Gibb, et al., 2011), in which the association was not significant based on separate reports on bullying surveying parents or teachers (Gibb, et al., 2011). However, when the reports by parents and teachers were combined, perpetration in childhood was associated with violent offenses until the age of 30 years (Fergusson, et al., 2014; Gibb, et al., 2011). Kim et al. (2011) found significant associations in the Raising Healthy Children project carried out in the US. Another two studies reported significant associations between bullying perpetration at eight to nine years of age and violent offenses at the ages of 16–20 years among males (Sourander, et al., 2007a; 2006). These were based on the Finnish Nationwide 1981 Birth Cohort Study as was the study by Sourander et al. (2011).

Some studies have assessed the association between bullying perpetration in adolescence and violent offenses in adulthood, and they have had mixed findings. Bender and Lösel (2011) reported significant associations after controlling for family problems and internalizing and externalizing problems, indicating an increased tendency for violence among former bullies. Renda et al. (2011) reported significant associations in the unadjusted analyses, but when they controlled for family and peer factors, the association was no longer significant. According to Olweus (2011), the bullies had higher odds for violent convictions in the unadjusted analysis, compared to those who had not been bullies. Bullying perpetration in adolescence predicted violent convictions until middle age but the association with self-reported violence was not significant in adulthood (Farrington & Ttofi, 2011).

There have been no population-based studies on whether being a bully-victim in childhood is associated with violent offenses in adulthood. However, one longitudinal study assessed the association of being a bully-victim in childhood and violent offenses at 16–20 years of age. Compared to those who were not involved in bullying, the odds for bully-victims for violent offenses were increased (OR 2.8, 95% CI 1.4–5.6) (Sourander, et al., 2007a).

Table 9. The literature on prospective longitudinal population-based studies on the association of bullying perpetration at the age of 12 years or younger and violent offenses in adulthood.

REFERENCE, COUNTRY	BASELINE	FOLLOW-UP	CONFOUNDING FACTORS	FINDINGS
GIBB, ET AL., 2011; FERGUSON, ET AL., 2014* NEW ZEALAND	Birth cohort size: 1265 Baseline sample size: n/a Children, age 7–12 years Information on bullying obtained from parents and teachers.	Follow-up sample size: 981–985 Follow-up from 16 to 30 years of age Information on violent offenses obtained from self-reports. Attrition rate: 22% of the birth cohort	Social and family background, family functioning, parental adjustment, child behavioral and personality factors, IQ and academic ability, childhood abuse, peer affiliations, sex (Gibb et al., 2011). Sex, family living standards, maternal age, parental criminal offending, exposure to sexual abuse, conduct problems and attention problems (Fergusson et al., 2014).	The association between bullying and violent offenses: Parent reports, adjusted OR 1.7, 95% CI 1.0–2.7. Teacher reports, ns (Gibb et al., 2011). Combined parent and teacher reports, adjusted OR 1.7, 95% CI 1.1–2.6 (Gibb et al., 2011), adjusted OR 1.66, 95% CI 1.07–2.55 (Fergusson et al., 2014).
KIM, ET AL., 2011 THE USA	Baseline cohort size: 1239 Baseline sample size: 1040 Children in grade 5 (age about 10) Information on bullying obtained from self-reports.	Follow-up sample size: 957 Follow-up at 21 years of age Information on violent offenses obtained from self-reports. Attrition rate: 23% of the baseline cohort	Sex, race/ethnicity, low-income status, impulsivity, family and peer risk factors.	In the adjusted analyses, bullying was significantly associated with violent offenses (standardized regression coefficient β 0.09, SE 0.04, $p \leq 0.05$).
SOURANDER, ET AL., 2011 FINLAND	Birth cohort size: 6017 Baseline sample size: 5813 Children, age 8 years Information on bullying obtained from self-reports, parents and teachers (pooled information was analyzed).	Follow-up sample size: 5351 Follow-up from 23 to 26 years of age Information on violent offenses obtained from the Finnish National Police Register. Attrition rate: 11% of the baseline cohort	Parental education level and childhood total psychopathology score based on the sum score of Rutter parent and teacher scales, excluding the bullying/victim items.	The association between bullying and violent offenses: Males. Bullying sometimes, adjusted OR 2.5, 95% CI 1.6–4.1, $p < 0.001$. Bullying frequently, adjusted OR 3.9, 95% CI 1.9–7.9, $p < 0.001$. Females, ns.

Abbreviation: n/a, not available; OR, odds ratio; 95% CI, 95% confidence interval; ns, not significant; SE, standard error
* Gibb et al. (2011) and Fergusson et al. (2014) are based on the same longitudinal study, the Christchurch Health and Development Study

2.7 Mechanisms underlying the adverse effects of bullying victimization, perpetration and being a bully-victim

Key points:

- Both psychological and biological mechanisms have been suggested, but the literature focuses on bullying victimization.
- Bullying victimization may alter stress-sensitive physiologic systems and increase the long-term risk of psychiatric and somatic disorders.
- Polyvictimization (exposure to multiple forms of victimization) has been found to have the most adverse effects on mental health.

Psychological mechanisms that underlie the poor outcomes associated with bullying victimization, perpetration and being a bully-victim include emotional and social-cognitive processing. For example, negative cognitions related to self (Cook, et al., 2010), cognitive appraisals (i.e. interpretations) of control (Catterson & Hunter, 2010; Hunter, et al., 2007), perceived higher levels of threat (Hunter, et al., 2007) and difficulties in solving social problems (Cook, et al., 2010) have been associated with victimization. Bullies and bully-victims, in particular, have also been found to possess negative cognitions related to self and others and to have difficulties in social problem solving (Cook, et al., 2010). In addition, the roles in bullying have been found to be correlated and dynamic. It has been suggested that victimization may lead to feelings of hostility, which may mediate the pathway from victimization to perpetrating bullying (Walters & Espelage, 2018). Perpetrating bullying may, in turn, lead to victimization (Walters, 2021).

Biological mechanisms that may account for longitudinal adversities of victimization in childhood or adolescence have also been suggested. In their review article, Danese and Baldwin (2017) stated that little is still known about the mechanisms that translate childhood trauma, a well-known risk factor for psychiatric morbidity, into biological risks for psychopathology and later adverse outcomes. *Allostatic load* is a central concept within this research field. This refers to the cumulative burden of chronic stress and life events. *Allostatic overload*, then, refers to a situation when environmental challenges exceed an individual's ability to cope (Guidi, et al., 2021; McEwen, 1998; Zarate-Garza, et al., 2017). Allostatic load and overload may lead to biological "wear and tear" effects that have been associated with poor health outcomes (Guidi, et al., 2021). Bullying victimization has been recognized as the kind of adversity that may alter stress-sensitive physiologic systems, which, in turn, may increase the long-term risk of disease (Schacter, 2021). The hypothalamic-pituitary-adrenal (HPA) axis has been associated with stress

neurobiology. Cortisol is a steroid hormone produced in the adrenal gland, and it has been recognized as a mediator of allostatic load (Guidi, et al., 2021). Several studies have reported dysregulation in the HPA axis function among victims of bullying. However, the findings on the cortisol levels in victims of bullying have been inconsistent, although they have provided evidence of persistent dysregulation of the HPA axis in them (e.g. Ouellet-Morin, et al., 2021; Schacter, 2021).

Inflammation has been proposed to be another biological mechanism that may contribute to the development of adverse health outcomes among victims of bullying. Victims have been found to have low-grade systemic inflammation from childhood to young adulthood (Copeland, et al., 2014; Takizawa, et al., 2015). There have also been findings that victimization predicted greater inflammatory reactivity among cognitively vulnerable adolescents who experienced high levels of hopelessness (Giletta, et al., 2018). Interestingly, bullying perpetration in childhood has predicted lower increases in C-reactive protein (CRP) that is a marker of inflammation, in young adulthood compared with those who had not been involved in bullying. The findings were not significant for bully-victims (Copeland, et al., 2014).

In recent years, epigenetic modifications have been of research interest within the field. These are functionally relevant modifications that alter gene expression but do not involve changes in DNA sequence (Bale, 2015). In other words, while the genetic sequence is determined by inheritance, the epigenetic patterns are dynamic throughout life. Even though they are long-lasting, they are also reversible (McGowan & Szyf, 2010). Epigenetic modifications represent important biological mechanisms that allow social stressors to physiologically contribute to the pathogenetic processes (Zarate-Garza, et al., 2017). Such social stressors include bullying victimization (Guarneri-White, et al., 2018; Manczak & Gotlib, 2020; Ouellet-Morin, et al., 2013). However, future research is needed for a more comprehensive view on the role of epigenetic modifications in the development of health problems related to bullying victimization (Schacter, 2021; Zarate-Garza, et al., 2017).

Interestingly, there have also been findings that chronic bullying victimization during adolescence could affect structural brain development, and that these changes could relate to psychopathology symptoms in late adolescence or early adulthood. More specifically, peer victimization was indirectly associated with anxiety via changes in the volume of the left putamen or the left caudate (Burke Quinlan, et al., 2020). Furthermore, du Plessis et al. (2019) reported that bullying victimization in childhood may have effects on brain development, namely the ventrolateral prefrontal cortex, in adolescent boys who were biologically sensitive to stress.

Longitudinal studies have reported associations between involvement in bullying as a victim, a bully or a bully-victim and mental health symptoms even in adulthood

(e.g. Copeland, et al., 2013a). Arseneault (2018) suggests that the long-term adverse effects associated with bullying victimization may represent persisting symptoms that have developed earlier in life, at the time of victimization. Longitudinal cohort studies have indeed reported the tendency of mental health symptoms to persist from childhood or adolescence to adulthood (Copeland, et al., 2013b; Kim-Cohen, et al., 2003). In addition, it is noteworthy that polyvictimization, in particular, has been found to have a negative impact on mental health (Finkelhor, et al., 2007). For bullying victimization, this was found for the combination of traditional and cyberbullying in a longitudinal study among adolescents (Cross, et al., 2015).

2.8 Antibullying interventions

Key points:

- Meta-analyses have estimated that antibullying programs reduced
 - bullying victimization by 15–20% and perpetration by 19–23%
 - cyberbullying victimization by 14% and perpetration by 10%–15%
- Antibullying interventions usually include various components that target different levels of the socio-ecological context. The components may be preventive or reactive.
- Knowledge on the effectiveness of these interventions in low-income and middle-income countries is scarce.

Several countries have included antibullying laws in their legislation (Espelage & Hong, 2017). For example, in Finland, legislation has made it compulsory since 2003 for schools to have an action plan against violence, bullying and harassment, and to monitor it (Finnish Legislation, 2003). A study from the United States suggests that such antibullying policies are an important part of a comprehensive strategy for preventing bullying. They found that, in states that complied with Department of Education recommended guidelines in their antibullying laws, students had 24% reduced odds of reporting being bullied or 20% reduced odds of reporting being cyberbullied (Hatzenbuehler, et al., 2015).

The first large-scale antibullying program was implemented in Norway in 1983 (Farrington & Ttofi, 2009). Since then, the number of antibullying programs has increased dramatically. A recent systematic review and meta-analysis included as many as 67 different school-based antibullying programs (Gaffney, et al., 2021a). Additionally, there are programs that target cyberbullying (Espelage & Hong, 2017; Gaffney, et al., 2019a). Meta-analyses have reported that antibullying programs reduce bullying victimization by 15–20% and perpetration by 19–23% (Gaffney, et

al., 2021a; Ttofi & Farrington, 2011) and cyberbullying victimization and perpetration by 14% and 10%–15%, respectively (Gaffney, et al., 2019a). Many of the programs that have been evaluated in the context of cyberbullying have also targeted traditional bullying (Espelage & Hong, 2017; Gaffney, et al., 2019a). In fact, in their meta-analysis on the prevalence of bullying across the traditional and cyber contexts, Modecki et al. (2014) suggest that in preventing bullying, the focus should be on bullying itself rather than on the context.

The vast majority of related research has been conducted in Western countries. A systematic review that was carried out on studies conducted in low- and middle-income countries only included three studies. This systematic review concluded that they could not provide evidence of effectiveness for the interventions in low- and middle-income countries (Sivaraman, et al., 2019).

Antibullying interventions usually include various components. These target school level, classroom level or the level of teachers, parents, peer group or individuals in accordance with the socio-ecological understanding of bullying (Farrington & Ttofi, 2009; Gaffney, et al., 2021b; Smith, 2014; Smith, et al., 2003; Ttofi & Farrington, 2011). A recent meta-analysis of 100 primary evaluations of antibullying programs assessed the effectiveness of different components included in antibullying programs. They reported that reductions in school bullying victimization were associated with the presence of information for parents and informal peer involvement, that is, discussions between peers during intervention activities in the programs. The discussions were often led by teachers or facilitators (Gaffney, et al., 2021b). A previous meta-analysis of 44 primary evaluations found that the most important program components to reduce victimization were disciplinary methods, parent training or parent meetings and cooperative group work in which experts worked with children involved in bullying. Interestingly, they found that work with peers was associated with a significant increase in victimization. (Farrington & Ttofi, 2009). This was contradicted by the more recent meta-analysis by Gaffney et al. (2021b), who explained the different findings by methodological differences, namely, the more detailed coding of peer involvement in the latter meta-analysis.

Reductions in bullying perpetration have been associated with the presence of several components. At the school level, these have included the whole-school approach, antibullying policies (Farrington & Ttofi, 2009; Gaffney, et al., 2021b) and improved playground supervision (Farrington & Ttofi, 2009). The whole-school approach actively involves everyone within the school environment in antibullying practices. Antibullying policies typically include clear definitions of bullying behaviors and state that these are not accepted, and they also include strategies for dealing with bullying (Gaffney, et al., 2021b). At the classroom level, the presence of classroom rules and management have been associated with reduced perpetration

(Farrington & Ttofi, 2009; Gaffney, et al., 2021b) as have teacher training and disciplinary methods (Farrington & Ttofi, 2009). Information provided for parents (Farrington & Ttofi, 2009; Gaffney, et al., 2021b) and parent training or parent meetings (Farrington & Ttofi, 2009) and informal peer involvement (Gaffney, et al., 2021b) have also been found to be beneficial. At the individual level, work with victims (Gaffney, et al., 2021b) and co-operative group work (Gaffney, et al., 2021b; Farrington & Ttofi, 2009) have been associated with reduced bullying perpetration.

Program duration and intensity has been associated with reductions in both victimization and perpetration (Farrington & Ttofi, 2009), but no significant relationship has been found between effectiveness and the number of intervention components included in a program (Gaffney, et al., 2021b). Interestingly, the incorporation of cognitive-behavioral techniques or strategies or mental health issues in antibullying programs, although rare, has been significantly associated with a reduction in bullying perpetration (Gaffney, et al., 2021b).

A comprehensive classification of antibullying programs is difficult to make due to the large number of programs and the variety of components included in them. On one hand, antibullying components can be classified in accordance with the socio-ecological theory, as stated above. On the other hand, program components can be classified as preventive and reactive. Preventive actions are aimed to make bullying less likely to happen. These include the whole-school approach, including everyone within the school environment (Smith, 2014). Systemic prevention requires changing the school culture rather than focusing on direct involvement in bullying incidents (Juvonen & Graham, 2014). Actions focused on the situations when bullying has occurred are considered reactive (Smith, 2014). Commonly, antibullying programs include several components that target different levels of the socio-ecological context, and some of them may be preventive and some reactive (Gaffney, et al., 2021b).

The Norwegian Olweus Bullying Prevention Program (OBPP) is the oldest antibullying intervention. It dates back to the 1980s, when the Norwegian Ministry of Education initiated a national campaign against bullying in schools, and the program was developed in this context (Olweus & Limber, 2010). The OBPP is a whole-school program that focuses on making positive changes in the school environment to prevent and reduce bullying and achieve better peer relationships. The OBPP includes school-, classroom-, individual- and community-level components. It focuses on prevention but also includes indicated actions for those students who have been involved in bullying. The OBPP has been widely studied and has been repeatedly found to be effective in reducing bullying (Gaffney, et al., 2019b; Limber, et al., 2018; Olweus & Limber, 2010).

Since the development of the OBPP, several other antibullying programs have been developed. The Finnish KiVa antibullying program is of central interest in this

thesis because it had been implemented in the schools that participated in surveys in Rovaniemi and Salo in 2014 that were included in this thesis. KiVa is a school-based antibullying program that was developed at the University of Turku with funding from the Finnish Ministry of Education and Culture. KiVa was introduced in Finland in 2009. KiVa is an acronym for *kiusaamista vastaan*, which means “against bullying”. KiVa conceptualizes bullying as a group phenomenon and aims to reduce bullying by encouraging bystanders not to condone bullying. It also encourages bystanders to support victims, which reduces the reward for bullies (Salmivalli, et al., 2011). KiVa includes several components targeted at the school, classroom, teacher, peer group, parent and individual levels (Gaffney, et al., 2021b). KiVa includes both universal, preventive actions and indicated actions (Salmivalli, et al., 2011).

Most randomized controlled trials on KiVa have indicated effectiveness on traditional bullying victimization and perpetration among younger students (Kärnä, et al., 2013; 2011a; Nocentini & Menesini, 2016; Salmivalli, et al., 2011), but a study from Wales did not find significant reductions (Axford, et al., 2020). Self-reported victimization or perpetration did not decrease among older students, aged 13 to 15 years (Kärnä, et al., 2013). In these studies, the implementation lasted for one school year. A randomized controlled trial of two years found that victimization and perpetration reduced among younger students more strongly in KiVa schools when compared with control schools. The effect was stronger after two school years of implementation compared to one school year of implementation (Huitsing, et al., 2020). A nonrandomized trial among students ages 8 to 16 years found beneficial effects on bullying victimization and perpetration among younger students, but not among older students (Kärnä, et al., 2011b). Significant reductions in victimization and perpetration among younger students have also been found in uncontrolled pre-post-test designs over a time period of one year (Clarkson, et al., 2019; Green, et al., 2020). In their meta-analysis, Gaffney et al. (2021a) found that KiVa reduced school bullying victimization by approximately 11% and perpetration by approximately 9%. KiVa has also been found to be effective on cybervictimization in randomized controlled trials (Salmivalli, et al., 2011; Williford, et al., 2013) and in an uncontrolled pre-post design study (Green, et al., 2020). However, a study by Williford et al. (2013) suggests that cyberbullying perpetration was reduced for younger students but not for older students.

Natural experiments are cohort studies where participants form the exposed or the unexposed groups due to an event that is beyond their own control (Rutter, 1995; Susser & Schwartz, 2006a). In bullying research, there have not been any studies that fulfilled the criteria of a natural experiment. However, there has been one Finnish study that assessed the prevalence of bullying victimization before and after the introduction of a school-based antibullying program. The study used a time-trend

design with two cross-sectional population-based school surveys in 2005 and 2013, before and after the launch of the KiVa antibullying program in 2009. There was no control group. No significant changes were found in bullying victimization or perpetration of children of age eight to nine years, based on their own, their parents' and their teachers' reports, between the study years (Sourander, et al., 2016b).

2.9 Gaps in the literature addressed by the present study

Even though research on bullying has been intensive, most of the existing literature on the prevalence and impact of bullying victimization covers victimization by traditional bullying or cyberbullying, and there are fewer studies that have focused on the combination of these. This gap in the literature covers time-trend assessments, cross-cultural studies and studies on the association between bullying victimization and mental health. Furthermore, cross-cultural research examining the impact of victimization by cyberbullying only or the combination of traditional and cyberbullying has focused on high-income economies, lacking the perspective of low-income, lower-middle-income or upper-middle-income countries.

The literature has suggested that there are relative age effects in bullying victimization but there have not been any studies on bullying perpetration. The existing studies have varied in their methodologies, and they have not controlled for the psychopathology of the child. Thus, it is unclear whether the relative age effects found in victimization are independent of the psychopathology of the child.

Previous research has described the increased likelihood of those who were bullies in childhood to commit violent acts later in their lives. However, research evidence on whether this is applicable to both sexes is sparse, as is evidence on whether bully-victims have an increased likelihood for violence as well. There is also a gap in the literature concerning whether those with a more frequent bullying involvement in childhood have a stronger association with violent offenses in adulthood.

3 Aims

1. To study changes in the prevalence of self-reported bullying victimization and how Finnish adolescents of 13 to 15 years of age perceived their school context from 2008 to 2014. Changes in traditional victimization, cyberbullying victimization and combined victimization were assessed (Study I).
2. To study the self-reported prevalence of bullying victimization among adolescents of 13 to 15 years of age in 13 Asian and European countries. The prevalence of traditional victimization, cyberbullying victimization and combined victimization, and the degree of the overlap of traditional and cyberbullying victimization, were assessed (Study II).
3. To study the associations of bullying victimization and self-reported mental health in two samples of adolescents of 13 to 15 years of age. Symptoms associated with traditional victimization, cyberbullying victimization and combined victimization were assessed separately (Studies I and II).
4. To study the association of relative age with bullying victimization and perpetration among children at eight to nine years of age (Study III).
5. To study the association of bullying victimization and perpetration and being a bully-victim at the age of eight to nine, and violent offenses by 31 years of age. This was studied separately for women and men (Study IV).

4 Materials and Methods

4.1 Studies on bullying victimization among adolescents (Studies I and II)

There were altogether three samples of adolescents. Two of them were collected in Rovaniemi and Salo, Finland, in 2008 and 2014. The third sample of adolescents was cross-cultural, collected in another four European and eight Asian countries. These samples were used to assess time-trends in bullying victimization and how adolescents perceived their school context in Finland from 2008 to 2014 (Study I) and the prevalence of bullying victimization in thirteen Eurasian countries (Study II). The sample that was collected in Finland in 2014 was included in both the time-trend and the cross-cultural studies.

4.1.1 Participants and procedure in two cross-sectional samples of adolescents of 13 to 15 years of age (Study I)

The study population included adolescents in grades 7 and 9 in secondary schools in two cities, Rovaniemi and Salo, in 2008 and 2014. Because of the time-trend assessment, only the schools that provided data during both study years were included. Rovaniemi is a city in northern Finland and has a population of over 60,000. Salo is in southern Finland, with a population of over 50,000. Each city's population structure, including sex distribution, educational structure, income distribution, ethnic background and the family structure of the inhabitants, were comparable to that of the general population in Finland at the time of the studies (Statistics Finland, 2018). The cities include large geographical areas with both urban and rural communities, which is typical of Finnish cities. A school-based antibullying program, KiVa, was available in the participating schools in 2014. Figure 1 shows the participants and response rates of the cross-sectional surveys.

The procedure and the self-report questionnaires were identical for both study years. All students who were at school on the day of the survey were asked to participate; only classes for adolescents with special needs were excluded. Participation was voluntary, and anonymity was guaranteed. The participants

anonymously filled in the study questionnaires during a school lesson. Teachers asked those who were absent to fill in the questionnaires once they returned to school. However, most of the non-respondents were students who were not present on the actual day of the survey. The teachers returned the study materials to the research group.

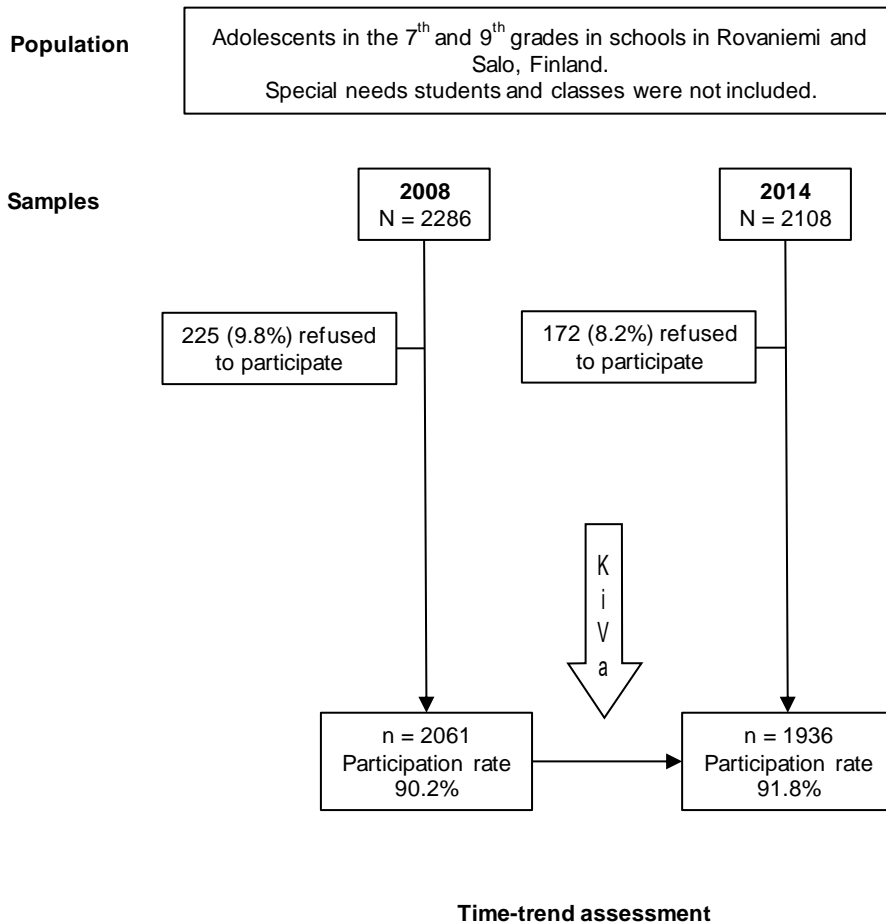


Figure 1. Flow chart showing the participants and participation rates in the study years and the time-trend assessment (Study I).

4.1.2 Participants and procedure in cross-sectional study of adolescents of 13 to 15 years of age in 13 Asian and European countries (Study II)

The Eurasian Child and Adolescent Mental Health Study (EACMHS) is a multi-country epidemiological study conducted in eight Asian and five European countries.

The aim of the EACMHS is to conduct cross-cultural research on the wellbeing and mental health of children and adolescents. The EACMHS network includes child and adolescent mental health professionals in the participating countries (Sourander, et al., 2018).

Cross-sectional samples were collected in the 13 countries in EACMHS: China, Finland, Greece, India, Indonesia, Iran, Israel, Japan, Lithuania, Norway, the Russian Federation (later referred to as Russia), Singapore and Vietnam. At the time of the study, India, Indonesia and Vietnam were lower-middle income economies, China, Iran and Russia were upper-middle income economies, and the rest of the countries were high-income economies (The World Bank, 2021a). The procedure of the study was similar to the procedure that was carried out in the survey studies in Rovaniemi and Salo, in Finland. The EACMHS questionnaire was also based on the questionnaire previously used in epidemiological surveys carried out in Rovaniemi and Salo. The questionnaires were carefully translated into the local languages to ensure uniformity. Consent was obtained according to each country's policies. In Norway and Singapore, the questionnaire was completed electronically.

The data were cross-sectional and collected between 2011 and 2017 (Table 10). The total sample of the 13 countries included 28 427 adolescents. Sample sizes varied from 1118 in Vietnam to 3837 in Lithuania, and the participation rates were from 51.7% in Indonesia to 97.1% in Iran. EACMHS collaborators in each country selected their own schools to provide a mix of urban and rural schools, as well as public and privately funded schools. Altogether, the adolescents were from 200 schools. There were variations in the age ranges in the samples across countries. Thus, to increase comparability across countries, a subsample of 21 688 adolescents of 13 to 15 years of age was included in the Study II sample. In this study sample, the sample sizes were from 943 in Vietnam to 2982 in Finland.

Table 10. Characteristics of the total sample in the Eurasian Child Mental Health Study and the subsample included in Study II.

COUNTRY	TOTAL SAMPLE		SUBSAMPLE OF ADOLESCENTS OF AGE 13 TO 15 YEARS																		
	Year	Rate		Sex		Boys		Age		Residence				Schools							
		n	%	n	%	n	%	Mean	SD	Urban	n	%	Rural	n	%	Public	n	%	Private	n	%
CHINA	2016	2659	96.1	2119	1040	49.1	1079	50.9	13.8	0.8	819	36.8	1408	63.2	10	1779	79.9	448	20.1		
FINLAND	2014	3422	91.9	2982	1493	50.1	1489	49.9	14.1	0.8	2686	89.9	301	10.1	13	2988	100	0	0		
GREECE	2016	1581	about 85	1040	556	53.5	484	46.5*	13.6	0.6	750	72.1	290	27.9	14	1040	100	0	0		
INDIA	2016	2016	93.9	1672	864	51.7	808	48.3	13.6	0.7	1420	84.9	252	15.1	11	209	12.5	1463	87.5		
INDONESIA	2016	1390	51.7	1023	542	53.0	481	47.0	13.5	0.6	1024	100	0	0	5	656	64.1	368	35.9		
IRAN	2016	1456	97.1	1178	557	47.3	621	52.7	14.3	0.8	1178	100	0	0	16	1036	88.0	142	12.1		
ISRAEL	2014	2188	76.6	1277	698	54.7	579	45.3*	14.0	0.8	1101	100	0	0	10	1246	97.4	33	2.6		
JAPAN	2011	1842	92.8	1828	943	51.6	885	48.4	13.9	0.3	833	45.5	998	54.5	17	1831	100	0	0		
LITHUANIA	2016	3837	81.0	2507	1256	50.1	1251	49.9	14.1	0.8	1353	53.8	1162	46.2	17	2515	100	0	0		
NORWAY	2017	2019	n/a	1900	946	49.8	954	50.2	13.9	0.8	1611	84.8	289	15.2	45	1742	99.4	10	0.6		
RUSSIA	2015	1580	82.8	1051	546	52.0	505	48.1	14.1	0.8	1051	100	0	0	20	1051	100	0	0		
SINGAPORE	2014	3319	85.8	2165	1103	51.0	1062	49.1	14.0	0.8	2165	100	0	0	24	2165	100	0	0		
VIETNAM	2016	1118	about 95	946	484	51.2	462	48.8	13.9	0.8	946	100	0	0	3	946	100	0	0		
TOTAL	-	28 427	n/a	21 688	11 028	50.9	10 660	49.2*	13.9	0.8	16 937	78.3	4700	21.7	200	19 204	88.6	2464	11.4		

Abbreviation: rate, response rate; n/a, not available

* Chi-square test for equal proportions was used to analyze sex distribution; statistical significance at least at the $p < 0.05$ level.

4.1.3 Measures and variables on bullying victimization (Studies I and II)

Adolescents were asked about their experiences of bullying victimization during the last six months. Traditional and cyberbullying victimization were considered separately, and a definition was provided for both.

Traditional bullying was defined in the self-report questionnaire: “A student is getting bullied if another student, or a group of students, repeatedly treats him or her negatively or in an insulting manner. It is difficult for the bullied student to defend himself or herself. Bullying can be intermittent or continuous. Bullying can be verbal (e.g. name calling, threatening), physical (e.g. hitting, pushing), or psychological (e.g. rumor spreading, avoiding, excluding). Continuous nasty or insulting teasing is also bullying.” The students were asked how often they had been bullied at school or outside school in the last six months.

Cyberbullying was defined as: “Repeated mocking on the internet, bullying via emails or text messages or spreading insulting material about another person on the internet.” Students were asked how often they had been cyberbullied in the past six months.

The same four-point response scale was used for both traditional and cyberbullying victimization. The options were “never”, “less than once a week”, “more than once a week” and “almost every day”.

In the time-trend study, victimization was analyzed by context using a four-category outcome variable: 1. none, 2. traditional victimization only, 3. cyberbullying victimization only and 4. combined victimization, which included victimization by both traditional and cyberbullying. The first category included the response option “never” and the other categories included the other response options. Victimization was also analyzed by frequency in different settings: at school, outside school and through electronic devices. For these analyses, three-category outcome variables were formed with the categories 1. never, 2. less than once a week and 3. more than once a week, which also included the response option “almost every day”.

In the cross-cultural study, a dichotomic outcome variable was formed for any victimization: 1. none (including the response option “never”) and 2. any (including the other response options). Victimization was analyzed using a four-category outcome variable: 1. none, 2. traditional victimization only, 3. cyberbullying victimization only and 4. combined victimization.

4.1.4 Measures and variables on how adolescents perceived their school context (Study I)

Perceptions about the school environment were studied by asking the adolescents to indicate which statements best represented their experiences or thoughts. The

statements covered whether they felt safe at school and whether their teachers cared for them. It was also asked whether teachers or other adults intervened to stop bullying, and whether other students intervened to stop bullying. The response options were “almost never”, “sometimes”, “often” and “almost always”.

In the time-trend study, three-category outcome variables were formed for the statistical analyses. The categories were 1. often/always, 2. sometimes and 3. never.

4.1.5 Measures and variables on demographic factors (Studies I and II)

In the surveys carried out in Rovaniemi and Salo, the questionnaire requested information on age, sex, school grade, family background and ethnic background (Table 11). In 2008, the mean age of the participants was 14.4 years (SD 1.1) and in 2014 this was 14.3 (SD 1.1). For the statistical analyses in the time-trend study, dichotomic variables of the demographic factors were formed: sex 1. boy and 2. girl; city 1. Rovaniemi, 2. Salo; grade 1. seventh, 2. ninth; family background 1. living with two biological parents, 2. other options shown in Table 11. Regarding ethnic background, the question on whether the adolescent had been born in Finland was used as dichotomic variable: 1. yes, 2. no. The rest of the questions on ethnic background were only used to describe the sample (Table 11).

In the cross-cultural study, the questionnaire requested information on age and sex of the adolescents. A three-category variable for age was created: 1. age 13 years; 2. age 14 years; 3. age 15 years. Sex was a dichotomic variable: 1. boy and 2. girl. Table 10 presents the background characteristics of the participants, including the characteristics of their residence and school.

Table 11. The background characteristics of the participants in studies carried out in Rovaniemi and Salo in 2008 and 2014 (Study I).

	2008		2014	
	n	%	n	%
	n = 2061		n = 1936	
SEX				
GIRLS	1026	50.4	943	48.8
BOYS	1009	49.6	988	51.2
SCHOOL GRADE				
7TH GRADE	1061	51.5	1005	51.9
9TH GRADE	1000	48.5	931	48.1
FAMILY BACKGROUND				
TWO BIOLOGICAL PARENTS	1357	66.8	1346	70.4
SINGLE PARENT	357	17.6	286	15.0
REMARRIED PARENTS	261	12.8	231	12.1
FOSTER PARENTS	16	0.8	19	1.0
ADOPTIVE PARENTS	5	0.3	8	0.4
OTHER	36	1.8	21	1.1
ETHNIC BACKGROUND				
BORN IN FINLAND	195	94.9	1847	95.4
NATIVE LANGUAGE IS FINNISH	196	95.1	1859	96.0
BIOLOGICAL MOTHER BORN IN FINLAND	1917	93.0	1802	93.1
BIOLOGICAL FATHER BORN IN FINLAND	1911	92.7	1798	92.9
CITY				
ROVANIEMI	1330	64.5	1198	61.9
SALO	731	35.5	737	38.1

4.1.6 The Strengths and Difficulties Questionnaire and variables based on it (Studies I and II)

Psychiatric symptoms were assessed with a self-report version of the Strengths and Difficulties Questionnaire (SDQ). The SDQ consists of 25 items divided into five subscales: emotional symptoms, conduct problems, hyperactivity, peer problems and prosocial scales. Each subscale contains five questions. The emotional problems scale includes items on somatic complaints, worrying, unhappiness, anxiousness and

fears. The conduct problems scale includes items on lack of self-control, obedience, fighting or bullying, dishonesty and stealing. The hyperactivity scale includes items on restlessness, impulsivity and attention. The peer problems scale includes items on relations with other children and getting bullied by other children. The prosocial scale includes items on kindness and helpfulness towards other people. The response options for each item are “not true”, “somewhat true” and “certainly true”. The possible values for each item are scored 0, 1 or 2; therefore, scores for each subscale range between 0 and 10. The total difficulties score includes emotional symptoms, conduct problems, hyperactivity and peer problems subscales and ranges from 0 to 40. The prosocial subscale is not included in the total score (Goodman, 1997). The subscales can also be combined to provide an internalizing scale, which brings together the emotional and peer problems subscales, and an externalizing scale, which comprises the conduct problems and hyperactivity subscales (Goodman, et al., 2010). The validity and reliability of the SDQ for self-completion of children or adolescents of 11 to 17 years of age have been found to be satisfactory (Goodman, 2001; 1999; Koskelainen, et al., 2001). The internalizing and externalizing scales have shown good validity with respect to clinical disorders. However, the discriminant validity has been reported to be poorer between the individual emotional symptoms and peer problems subscales and the conduct problems, hyperactivity and prosocial subscales, especially when cohorts have recorded low scores for the individual scales (Goodman, et al., 2010). International findings on the SDQ have been sufficiently consistent to support the applicability for assessing adolescents from diverse backgrounds (Achenbach, et al., 2012). The SDQ has been used in several cross-cultural studies (Achenbach, et al., 2012; 2008; Maezono, et al., 2019; Obel, et al., 2004; Goodman, et al., 2000), and it has been translated into more than 80 languages (Youth in Mind, 2015).

Adolescents who have scored within the highest 10% on the SDQ total score have usually been considered within the clinical range (Goodman, 1997; Koskelainen, 2001). However, it has been recommended that researchers may consider the likely rate of disorder in their sample and the relative importance of false positives and false negatives for the study (Goodman, 1997). In the time-trend study, adolescents who scored among the highest 20% in the total difficulties scale or the emotional symptoms, conduct problems, hyperactivity and peer problems subscales or among the lowest 20% in the prosocial subscale, were considered screen positive. The rest were considered screen negative. The 80th percentile cut-off was chosen to minimize the number of false negatives. For the statistical analyses, dichotomic variables were formed: 1. screen negative and 2. screen positive adolescents. The cut-off points were 15 for total difficulties, 5 for emotional symptoms, 4 for conduct problems, 5 for hyperactivity, 3 for peer problems and 5

for prosocial subscale. The item of getting bullied on the peer problems scale was removed from the analyses before defining the cut-off points.

As stated above, the discriminant validity between the individual emotional symptoms and peer problems subscales and the conduct problems, hyperactivity, and prosocial subscales has been reported to be poorer. This is why researchers have been advised to use the combined internalizing and externalizing scales when analyzing low-risk samples (Goodman, et al., 2010). In the cross-cultural study, the SDQ internalizing and externalizing scales were used. These scales were chosen because the study population represented the general population in each country, with the expectation of them recording rather low scores for the individual subscales. The internalizing and externalizing scales were treated as continuous scales. This was based on an attempt to achieve comparability of “caseness”. Goodman (1997) has stated that the same cut-off as itself does not imply comparability. In different countries, the SDQ total score, which indicates the at or above 90th percentile cut-off, may also slightly vary (Koskelainen, 2008), and the sample in the cross-cultural study included adolescents from 13 countries. The question on bullying was excluded from the internalizing scale.

4.2 Studies on bullying victimization and perpetration among children (Studies III and IV)

Four samples comprised of children were collected in 1989, 1999, 2005 and 2013. These samples were used in two studies in this thesis. All the samples were pooled to form the sample in Study III, and the 1989 sample was the baseline sample in the prospective cohort study (Study IV).

4.2.1 Participants and procedure in the cross-sectional study of children at eight to nine years of age (Study III)

In 1989, 1999, 2005 and 2013, four cross-sectional epidemiological studies were carried out among eight-to-nine-year-old children in Finland. These were designed to assess the prevalence and time-trends in mental wellbeing and associated factors in childhood. The data were collected using similar methodology and questionnaires each study year (Almqvist, et al., 1999; Sourander, et al., 2016b). The four cross-sectional samples were pooled together to form the sample in Study III. Figure 2 presents the study flow and participants each study year and the pooled sample. Because this study aimed to assess the association of relative age with bullying

involvement, only children within the same school grade, the 2nd grade, were included.

The 1989 study was the Finnish 1981 Nationwide Birth Cohort Study, which has been described in detail by Almqvist et al. (1999). The basic population were all Finnish-speaking children born in Finland in 1981 and still alive in 1989 (N = 60 007). In 1990, 93.5% of people who lived in Finland were Finnish-speaking (Statistics Finland, 2020a). A random sample of 10% of these children was drawn from the population cohort that covered the catchment areas of all university hospitals in Finland: Helsinki, Kuopio, Oulu, Tampere and Turku. The 1989 sample was drawn in a representative sample of the communities in the study areas. These were selected according to their degree of urbanization and rural, suburban and urban areas included. In the areas of data collection, every school was included except in the largest cities. In these, a representative subsample was drawn from each school district. All children were included even if they attended school outside their community or registered school district due to parental choice or special education needs. Regarding demographic and socioeconomic factors, the randomly selected sample well represented school-aged children and their families in Finland. The participation rate was 96.6% (Almqvist, et al., 1999). The study was repeated in the Turku University Hospital catchment area in 1999, 2005 and 2013. These studies were carried out in the same communities and school districts as for the 1989 study, with similar principals of sample selection (Sourander, et al., 2016b). The basic population of these studies were children born in 1991, 1997 and 2004, respectively, and still alive in the study years. The participation rates were 92.6%, 90.3% and 86.3%, respectively. However, in 2005 and 2013, three teachers refused to participate, and if the loss of participants due to this was considered, the participation rates were 86.1% in 2005 and 84.6% in 2013.

Each study year, data were collected from the children and their parents and teachers. The study methodology and the wording of the questionnaires were similar each year. In 1989, the parents provided their consent for their child to participate by completing the questionnaires. In 1999, 2005 and 2013, a written informed consent was provided by the parent. The parents returned their completed questionnaires to the teachers in a sealed envelope. After parental consent, the children and teachers filled in their questionnaires. The children completed their questionnaires in the classroom, and the teachers returned all the study material to the research group.

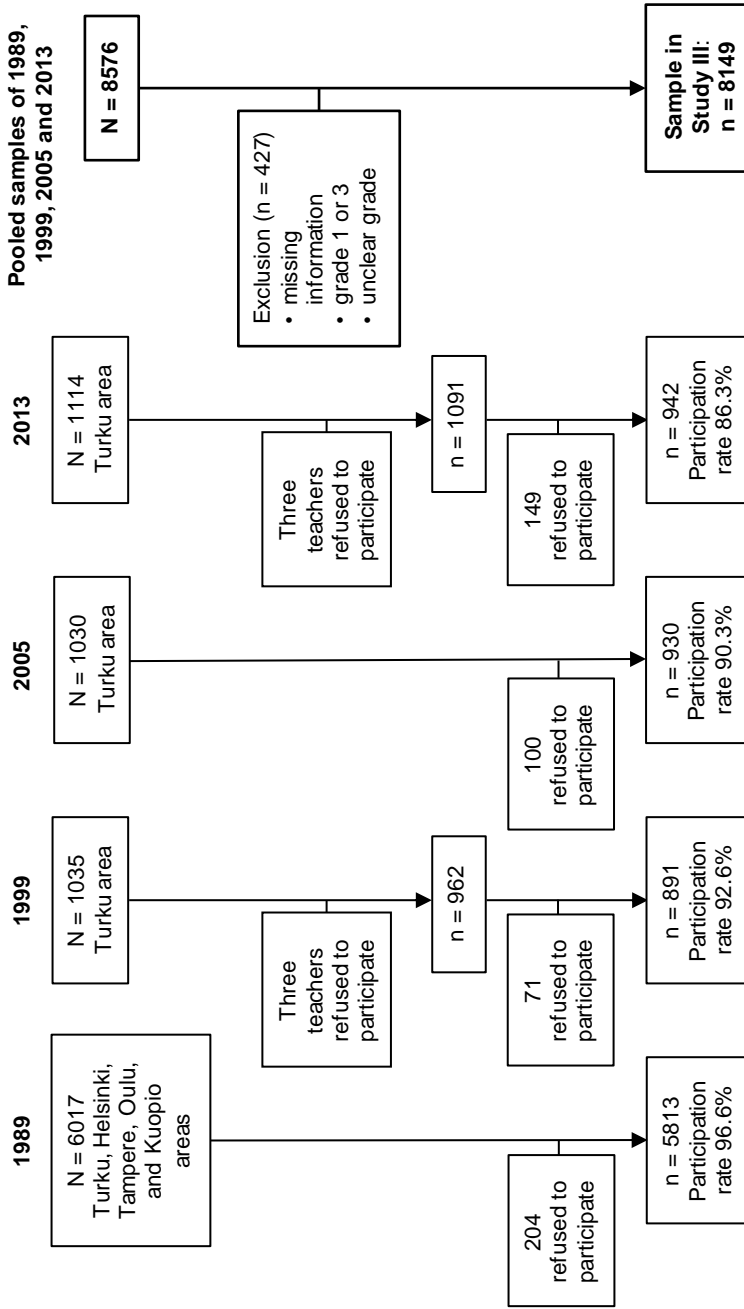


Figure 2. Samples of 1989, 1999, 2005 and 2013 and the study sample in Study III.

4.2.2 Participants and procedure in the prospective study from childhood to adulthood (Study IV)

The prospective cohort study was based on the Finnish 1981 Nationwide Birth Cohort Study (Almqvist, et al., 1999). The attrition rate was 10.2% of the baseline study sample. Of the 5405 subjects, 2718 (50.3%) were men and 2687 (49.7%) were women. At the time of the register data collection, they were 30 (65.5%) or 31 (34.5%) years old. Figure 3 presents the longitudinal study design with the details of attrition.

Criminal responsibility begins at the age of 15 years in Finland, and crimes committed at a younger age are not registered comprehensively. Thus, the observation period of violent offenses began at the age of 15 years. Before reaching this age, seven children in the baseline study sample had died and another four had emigrated.

The data were collected from the Finnish National Police Register on 3 May, 2012. Information on violent offenses was obtained for 5405 subjects. Loss of subjects was due to a non-systematic error in the baseline data collection in which some of the personal identification codes of the participants were not documented. In the longitudinal study, linking baseline data with the register data was based on personal identification codes, and, in cases of missing information on these, the link could not be made. Of the 5405 subjects whose baseline data was successfully linked with register data, 4759 were not registered for violent offenses and were still living in Finland at the time of the follow-up data collection. There were 515 individuals who were registered for violent offenses. Additionally, 36 subjects had died, and 95 subjects had emigrated during the follow-up period. None of them had been registered for violent offenses.

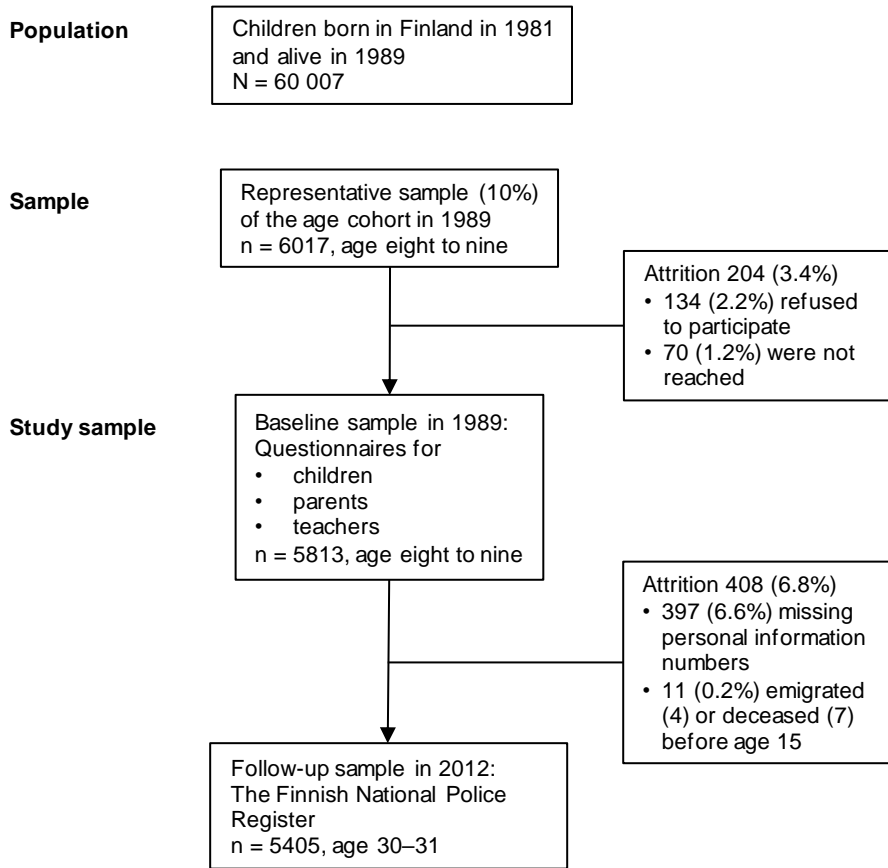


Figure 3. Flow chart showing the baseline sample of the Nationwide Finnish 1989 Birth Cohort Study and the longitudinal study flow and attrition in Study IV.

4.2.3 Measures and variables on bullying victimization, bullying perpetration and concurrent bullying perpetration and victimization (bully-victims) at eight to nine years of age (Studies III and IV)

Questionnaires for children, their parents and teachers included items on bullying victimization and perpetration. The children were asked about victimization and perpetration over the past two weeks. The response options for victimization were “other children bully me almost every day”, “other children sometimes bully me” or “other children do not usually bully me”. Regarding perpetration, the item for children included the options “I do not usually bully other children”, “I sometimes bully other children” or “I bully other children almost every day”. The parents and the teachers were asked if the child had been a victim of bullying or a bully over the

last 12 months. The response options were whether these statements certainly, somewhat or did not apply to the child.

In the pooled sample of Study III, victimization was indicated if the child responded that they were bullied almost every day or sometimes, and if the parents or teachers responded that victimization certainly or somewhat applied to the child. Correspondingly, dichotomic outcome variables were formed separately for children, their parents and teachers: 1. bullied and 2. not bullied. The perpetration variables were formed similarly.

In the prospective cohort study (Study IV), information from the three informants were pooled for the statistical analyses. The classification of the victim status was based on the highest rating of frequency of victimization from any of these informants. A three-category victimization variable was formed based on the frequency of victimization: 1. never, 2. sometimes and 3. frequently. The perpetration variables were formed similarly.

In the prospective cohort study, after pooling the information from the informants, a three-category variable was formed to analyze whether the associations between bullying and any violent offenses were different for bullies and bully-victims. Perpetrating bullying sometimes or frequently was recorded as being a bully or a bully-victim, and this depended on whether the perpetrator had also been a victim of bullying. The categories of the variable were 1. not a bully or a bully-victim (in this group, there were those who had not been involved in bullying as perpetrators but may have been just victims), 2. only a bully and 3. a bully-victim.

4.2.4 Measures and variables on demographic factors at eight to nine years of age (Studies III and IV)

In the pooled sample of Study III, the demographic variables were based on the parental questionnaire (Table 12). These included the child's sex (1. boy or 2. girl) and exact birth date. Birth date was divided into three blocks of four birth months: January to April, May to August and September to December. Consequently, a three-category explanatory variable was formed for the analyses (1. oldest, 2. middle and 3. youngest).

The questionnaire for parents also requested information on parental education and family structure. In the prospective cohort study (Study IV), these and the child's sex were used as demographic variables (Table 13). The response options for parental educational level were elementary school (six to eight years of education), comprehensive school (nine years of education), upper secondary school (12 years of education) and not completing elementary or comprehensive school. A dichotomic variable was formed based on whether or not at least one of the parents

Table 12. Distribution of the participants in the pooled sample (Study III) to the three relative age groups, by sex and study year.

	TOTAL		RELATIVE AGE					
	n	%	Oldest		Middle		Youngest	
			n	%	n	%	n	%
SEX								
GIRLS	4068	49.9	1381	48.4	1393	50.5	1294	51.1
BOYS	4081	50.1	1478	51.6	1367	49.5	1240	48.9
TOTAL	8149	100%	2859	100%	2760	100%	2534	100%
YEAR								
1989	5616	68.9	1956	68.5	1921	69.6	1739	68.6
1999	786	9.7	287	10.1	254	9.2	245	9.7
2005	858	10.5	303	10.6	293	10.6	262	10.3
2013	889	10.9	309	10.8	292	10.6	288	11.4
TOTAL	8149	100%	2855	100%	2760	100%	2534	100%

had completed upper secondary school: 1. yes and 2. no. The response options for family structure were that the child lived with two biological parents, a biological mother, a biological father, a biological mother and a step-parent, a biological father and a step-parent, foster parents, adoptive parents or any other family structure. A dichotomic variable was formed: 1. two biological parents and 2. other (which combined the rest of the response options).

Table 13. Characteristics of the baseline sample of children in the prospective cohort study.

	N	%
SEX		
GIRLS	2687	49.7
BOYS	2718	50.3
MOTHER COMPLETED UPPER SECONDARY SCHOOL		
YES	1501	29.7
NO	3558	70.3
FATHER COMPLETED UPPER SECONDARY SCHOOL		
YES	1008	21.7
NO	3628	78.3

FAMILY BACKGROUND		
TWO BIOLOGICAL PARENTS	4339	83.7
SINGLE PARENT	517	10.0
REMARRIED PARENTS	272	5.2
FOSTER PARENTS	21	0.4
ADOPTIVE PARENTS	14	0.3
OTHER	20	0.4
PSYCHOPATHOLOGY OF THE CHILD^A		
SCREEN NEGATIVE	4642	87.6
SCREEN POSITIVE	642	12.2

^a The child was considered screen negative if the total score on the Rutter Teacher Questionnaire was eight points at most, and screen positive, if the score was at least nine points.

4.2.5 Rutter Teacher Questionnaire and related variables (Studies III and IV)

Information on psychopathology of the child was measured with the Rutter Teacher Questionnaire (Rutter B2 Scale). The questionnaire was developed to differentiate between potentially healthy and disturbed children in a general population. It includes 26 brief statements on the child's behavior, habits and problems over the past 12 months. In addition to the total score, there are three subscales. The antisocial, neuroticism and hyperkinetic subscales are later referred to as conduct, emotional and hyperactive problems scales, respectively. The conduct problems scale consists of six items, and addresses behaviors such as disobedience, aggression, destroying things, stealing and lying. The emotional problems scale of four items inquires about worrying, low mood, anxiety and withdrawal. The hyperactive problems scale includes three questions on restlessness and inattention. There are three response options that indicate whether the statement: 0 = does not apply, 1 = applies somewhat or 2 = certainly applies to the child. Thus, the total score ranges from 0 to 52 (Rutter, 1967). Children who have a total score of at least nine points are considered to have a potential mental disturbance (Kresanov, et al., 1998; Rutter, 1967).

The Rutter Teacher Questionnaire has been reported to have good test-retest reliability over a two-month interval. The inter-rater reliability of the questionnaire has also been reported to be satisfactory (Rutter, 1967). The questionnaire has been found to be more valid than the Rutter Parent Questionnaire in screening and discriminating psychiatric disturbances in the baseline sample of the nationwide Finnish 1981 Birth Cohort Study (Kresanov, et al., 1998).

In Study III, the psychopathology of the child was measured with the Rutter Teacher Questionnaire total score and analyzed as a continuous variable in which the item on bullying was not included. Because the vastest evidence on relative age effects have been found regarding ADHD, a complementary analysis was conducted in which the hyperactive problems scale score was used as a continuous variable.

In the prospective study (Study IV), children who scored at least nine points on the Rutter Teacher Questionnaire total score were considered screen positive (Kresanov, et al., 1998; Rutter, 1967), and those who scored eight points at most were screen negative. Based on this, a dichotomic variable was formed: 1. screen negative and 2. screen positive. The bullying item was first removed. Because the bullying item was excluded, the analyses were also conducted using eight points as a cut-off point to validate the results.

4.2.6 Follow-up information and variables based on the Finnish Police Register (Study IV)

Information on the cohort's violent offenses was obtained from the Finnish National Police Register. This is a nationwide well-maintained electronic database that has been kept by the Finnish Police Administration since 1997. The register includes all suspected violent offenses that have come to the notice of the police. If multiple crimes are committed by the same person at the same event, they all are registered.

The final data collection was on 3 May, 2012, when the study participants were 30–31 years old. The data in the register are archived after the window of time for prosecution has elapsed. Both the police register and the archive were examined to get comprehensive data that covered the follow-up period.

The data obtained from the police register included both the exact dates of occurrence of the violent incidents and the crime labels. Violent crime was defined as overt aggressive behavior towards another person. Based on the crime labels and their characterization in the Criminal Code of Finland, it was possible to categorize violent offenses for the purposes of this study. The categorization was carried out by three professionals, two of whom were jurists (Professor Ari-Matti Nuutila and Master of Laws, later PhD and Adjunct professor Henrik Elonheimo) and one of whom was a child and adolescent psychiatrist (Professor Andre Sourander).

Violent offenses were categorized into minor violent offenses and severe violent offenses. The aim was to securely distinguish the most severe forms of violent offenses for the purposes of the study. Thus, the categorization does not imply that violent offenses defined as minor in this study would be minor from the moral or victims' perspective. Attempted crimes were included in the respective groups. Robbery was considered a minor violent offense, as it involves violence or a threat of violence. Aggravated robbery was also categorized as a minor offense because it

may only involve showing a weapon and not otherwise using it against another person. Violent sexual offenses were not included in the study.

The register data included 1301 minor and 86 severe violent offenses (N = 1387). The crime labels in the categories of minor and severe violent offenses, and their distribution within the category and within all violent offenses, are presented in Tables 14 and 15, respectively.

Table 14. The crime labels of minor violent offenses and their proportion of any minor violent offenses (n = 1301) and any violent offenses (N = 1387) which also included severe violent offenses.

CRIME LABEL	N	% OF ANY MINOR VIOLENT OFFENSES	% OF ANY VIOLENT OFFENSES
ABANDONMENT	1	0.08	0.07
ASSAULT, ATTEMPTED	11	0.8	7.9
ASSAULT, BASIC	677	52.0	48.8
ASSAULT, MINOR	235	18.1	16.9
COERCION	7	0.5	0.5
DEPRIVATION OF LIBERTY	7	0.5	0.5
RESISTANCE TO A PERSON MAINTAINING PUBLIC ORDER	86	6.6	6.2
RESISTANCE TO A PUBLIC OFFICIAL	25	1.9	1.8
RESISTANCE TO A PUBLIC OFFICIAL, VIOLENT	17	1.3	1.2
ROBBERY, ATTEMPTED	10	0.8	0.7
ROBBERY, BASIC	68	5.2	4.9
ROBBERY, ATTEMPTED AGGRAVATED	3	0.2	0.2
ROBBERY, AGGRAVATED	9	0.7	0.6
TAKING PART IN A FIGHT	1	0.08	0.07
THREATENING A PERSON TO BE HEARD IN THE ADMINISTRATION OF JUSTICE	3	0.2	0.2
VIOLENT BEHAVIOR IN A PUBLIC VEHICLE	1	0.08	0.07
VIOLENT BEHAVIOR TOWARDS A GUARD	2	0.2	0.1
VIOLENT THREATENING	138	10.6	9.9

Assault was the most common violent offense that was registered. Attempted, basic and minor assault (n = 923) accounted for 70.9% of all minor violent offenses and 66.5% of any violent offenses. Severe violent offenses included homicide. There were altogether 12 cases of homicide, including manslaughter, attempted manslaughter or attempted murder. There were no cases of murder.

The same subject could have been registered for multiple offenses. A violent offense was the event of interest and categorized by severity (any severity or severe) of the first violent offense. Violent offenses were also categorized as three-category outcome variables: 1. no violent offenses, 2. minor violent offenses only and 3. severe violent offenses.

Table 15. The crime labels of severe violent offenses and their proportion of any severe violent offenses (n = 86) and any violent offenses (N = 1387).

CRIME LABEL	N	% OF ANY SEVERE VIOLENT OFFENSES	% OF ANY VIOLENT OFFENSES
AGGRAVATED ASSAULT, ATTEMPTED	7	8.1	0.5
AGGRAVATED ASSAULT	6	77.9	4.8
MANSLAUGHTER, ATTEMPTED	5	5.8	0.4
MANSLAUGHTER	3	3.5	0.2
MURDER, ATTEMPTED	4	4.7	0.3
MURDER	0	0	0

4.3 Ethical Considerations

The Ethics Committee of Turku University Hospital in 2008, the Ethics Committee of the University of Turku in 2014 and the local school authorities in both study years approved the research plans of the studies included in the time-trend study (Study I). Participation was voluntary.

The research plan of the cross-cultural study (Study II) requested ethical approval in each country according to the country's policies. In Finland, the Ethics Committee of the University of Turku approved the research plan. In each country, the research plans were also approved by the local school authorities. Participation was voluntary.

The research plan of the cross-sectional study of 1989 (Studies III and IV) was approved by the Ethics Committees of the university hospitals in Helsinki, Kuopio, Oulu, Tampere and Turku. The research plans of 1999, 2005 and 2013 (Study III) were approved by the Ethics Committee of the Turku University Hospital. The

research plans were also approved by the local school authorities. Participation was voluntary.

The permission to obtain information from the Finnish National Police Register in the prospective cohort study (Study IV) was granted by the National Police Board. The Data Protection Ombudsman was contacted regarding the linking of baseline and register information in this study.

In all studies, the information was analyzed in such a way that the subjects could not be identified.

4.4 Statistical Methods

Statistical methods were used to analyze associations between the explanatory factors and outcomes (Table 16). Logistic regression analyses were conducted to estimate odds ratios (OR) and their corresponding 95% confidence intervals (95% CI) in Studies I and III. The generalized estimating equation (GEE) method was used to estimate the odds ratios and 95% CIs for the association between the prevalence of bullying victimization and different countries, and the generalized linear mixed model (GLMM) was used to estimate ORs and 95% CIs for the association between internalizing and externalizing mental health symptoms and bullying victimization in Study II. Cox regression methods were used to estimate the hazard ratios (HR) and 95% CIs in Study IV. Two-sided *p* values were calculated, and their values of less than 0.05 were interpreted as statistically significant, except in the interaction analyses, where the threshold was 0.1. All the statistical analyses were conducted using SAS 9.4 for Windows (SAS Institute Inc. Cary, NC, USA, 2012).

The time-trend assessment of victimization and how adolescents perceived their school context were conducted with year as the explanatory factor in Study I. Sex \times year interactions for victimization were tested. Single predictor and multivariable logistic regression analyses were conducted separately for sexes. In the multivariable models, adjustment for city, grade, family structure and ethnic background was made. Associations between the SDQ scales as the explanatory factors and the context of victimization as the outcome were examined in the pooled data for both years and sexes. Three-way and two-way interactions between the SDQ, sex and year were included. For further single predictor and multivariable logistic regression analyses, the data for both sexes and years were pooled. In the multivariable models adjustment for year, sex, city, grade, family background and ethnic background was made.

In Study II, sex \times country interaction for victimization was tested. Further analyses were conducted separately for each sex. School-wise clusters were included in the statistical models, and age was included as a covariate. When the GEE models were carried out, the reference category chosen *a priori* was the country with the

lowest prevalence of victimization. The association between psychiatric symptoms and the context of victimization was analyzed for the total sample and by country. The outcome was the four-category victimization, and the explanatory factors were the continuous SDQ internalizing and externalizing scales. For the total sample, sex \times internalizing scale interaction and sex \times externalizing scale interaction for victimization were tested. The GLMM included school-wise random intercepts, and the data were adjusted for age and country and externalizing symptoms when the internalizing symptoms were analyzed, and vice-versa. When the data were assessed by country, the outcome variable was any victimization, and the explanatory variables were the continuous SDQ internalizing and externalizing scales. GEE models were carried out, with school-wise clusters included. Internalizing symptoms were adjusted for age and the externalizing SDQ scale. Externalizing symptoms were adjusted for age and the internalizing SDQ scale. Adjustment was also made for sex when the pooled sample of girls and boys was analyzed.

In Study III, the associations between relative age (the explanatory factor) and bullying victimization and perpetration (outcomes) were assessed separately for the three informants: children, parents and teachers. The interactions for relative age \times sex and relative age \times study year were tested. Multivariable logistic regression analyses were conducted for the total sample. Adjustments were made for sex, study year, bullying victimization or perpetration (when perpetration or victimization, respectively, were analyzed, and the information on victimization and perpetration was acquired from the same informant), and psychopathology was measured with the Rutter Teacher Questionnaire total score or hyperactivity problems score.

Associations between childhood bullying variables and violent offenses were examined in Study IV. Adjustment was made for victimization or perpetration (when perpetration or victimization, respectively, were analyzed), parental education level, family structure and child psychopathology. Survival time was defined as the amount of days elapsed from 15 years of age to the first violent offense. The subjects were censored at the time of death, emigration or entering the end of the study period if they had not committed any violent offenses. Logistic regression models were used to assess whether the OR for violent offenses in adulthood increased as the frequency of bullying perpetration increased. ORs and 95% CIs were estimated. If an individual had committed a number of offenses, the most serious offense was recorded for this analysis.

The calculation of the level of agreement, an attrition analysis and a sensitivity analysis were also carried out in Study IV. Cohen's kappa coefficient (κ) was used to calculate the level of agreement about bullying and victimization between the parents and children, the parents and teachers and the children and teachers. This was tested for the total sample that included both females and males. Attrition analysis was carried out to compare the characteristics of the study sample and the

1989 attrition group. This included bullying perpetration and victimization, sex, whether or not the parents had completed upper secondary school education, the family structure and child psychopathology. Pearson's chi-square test was used to carry out the attrition analysis for bullying victimization and perpetration. Fisher's exact test was used to conduct the rest of the attrition analyses. Sensitivity analyses using logistic regression models were carried out to separately estimate the associations between bullying victimization or perpetration, as reported by the children, their parents and teachers, and any violent offenses.

Table 16. Summary of the outcomes and explanatory factors used in Studies I-IV.

STUDY	OUTCOMES	EXPLANATORY FACTORS	COUNFOUNDING FACTORS
I	Context of bullying victimization 0 = none 1 = traditional only 2 = cyberbullying only 3 = combined traditional and cyberbullying	Year	City Grade Family structure Ethnic background
I	Context of bullying victimization 0 = none 1 = traditional only 2 = cyberbullying only 3 = combined traditional and cyberbullying	SDQ total difficulties scale SDQ emotional problems scale SDQ conduct problems scale SDQ hyperactivity scale SDQ peer problems scale SDQ prosocial scale	Year Sex City Grade Family structure Ethnic background
I	Traditional bullying victimization at school 0 = never 1 = less than once a week 2 = more than once a week	Year	City Grade Family structure Ethnic background
I	Traditional bullying victimization outside school 0 = never 1 = less than once a week 2 = more than once a week	Year	City Grade Family structure Ethnic background
I	Cyberbullying victimization 0 = never 1 = less than once a week 2 = more than once a week	Year	City Grade Family structure Ethnic background

STUDY	OUTCOMES	EXPLANATORY FACTORS	COUNFOUNDING FACTORS
I	Feeling safe at school 0 = always/usually 1 = sometimes 2 = never	Year	City Grade Family structure Ethnic background
I	Teachers care 0 = always/usually 1 = sometimes 2 = never	Year	City Grade Family structure Ethnic background
I	Teachers or other adults try to stop bullying 0 = always/usually 1 = sometimes 2 = never	Year	City Grade Family structure Ethnic background
I	Students try to stop bullying 0 = always/usually 1 = sometimes 2 = never	Year	City Grade Family structure Ethnic background
II	Any bullying victimization 0 = no 1 = yes	Country	Age School
II	Any bullying victimization 0 = no 1 = yes	SDQ internalizing scale SDQ externalizing scale	Age School The externalizing SDQ scale for internalizing symptoms and vice versa Sex
II	Context of bullying victimization 0 = none 1 = traditional only 2 = cyberbullying only 3 = combined traditional and cyberbullying	SDQ internalizing scale SDQ externalizing scale	Age School The externalizing SDQ scale for internalizing symptoms and vice versa Country
III	Bullying victimization 0 = yes 1 = no	Relative age	Sex Study year Bullying perpetration Rutter Teacher Questionnaire total score or hyperactivity score

STUDY	OUTCOMES	EXPLANATORY FACTORS	COUNFOUNDING FACTORS
III	Bullying perpetration 0 = yes 1 = no	Relative age	Sex Study year Bullying victimization Rutter Teacher Questionnaire total score or hyperactivity score
IV	The first violent offense (minor or severe)	Bullying perpetration Bullying victimization	Bullying victimization for perpetration and vice versa Parental education level Family structure Child psychopathology
IV	The first violent offense (minor or severe)	Perpetration and victimization (bully-victim)	-
IV	The first severe violent offense	Bullying perpetration Bullying victimization	Bullying victimization for perpetration and vice versa Parental education level Family structure Child psychopathology
IV	Violent offense 1 = none 2 = minor only 3 = severe, including homicide	Bullying perpetration	Bullying victimization Parental education level Family structure Child psychopathology

5 Results

5.1 Changes in the prevalence of bullying victimization among adolescents and how adolescents perceived their school context from 2008 to 2014 (Study I)

Prevalence of bullying victimization in 2008 and 2014 is shown in Tables 17 and 18, and changes in victimization from 2008 to 2014 are shown in Figure 4. There were no statistically significant time effects in the proportions of girls and boys or grade, family structure, ethnic background or city from 2008 to 2014. Sex × year interaction for victimization (categorized as no victimization, traditional victimization only, cybervictimization only and combined victimization) were tested and proved significant ($p = 0.093$).

Changes in traditional victimization only, cyberbullying victimization only and combined victimization were assessed, compared to those who were not victimized. Furthermore, changes in traditional victimization at school, traditional victimization outside school and cyberbullying victimization were assessed by the frequency of victimization (Tables 17 and 18).

Table 17. The proportion of girls and boys who were not victimized by bullying and who were victimized by traditional bullying only, cyberbullying only or combined victimization in 2008 and 2014. Self-reported victimization.

	YEAR	TOTAL	VICTIMIZATION							
			None		Traditional only		Cyber only		Combined	
			n	%	n	%	n	%	n	%
GIRLS	2008	1010	673	66.6	234	23.2	27	2.7	76	7.5
	2014	926	665	71.8	161	17.4	38	4.1	62	6.7
BOYS	2008	958	591	61.7	277	28.9	32	3.3	58	6.1
	2014	934	692	74.1	178	19.1	28	3.0	36	3.9

Victimization by traditional bullying only reduced from 23.2% to 17.4% (adjusted OR 0.70, 95% CI 0.56–0.88, $p = 0.0025$) among girls and from 28.9% to 19.1% (adjusted OR 0.55, 95% CI 0.44–0.68, $p < 0.0001$) among boys. The prevalence of cyberbullying victimization only was 2.7% in 2008 and 4.1% in 2014 among girls, and 3.3% and 3.0% among boys. The prevalence of combined victimization was 7.5% in 2008 and 6.7% in 2014 among girls while among boys this reduced from 6.1% to 3.9% (adjusted OR 0.55, 95% CI 0.35–0.85, $p = 0.0068$) (Table 17, Figure 4).

When the changes in victimization were assessed by frequency of victimization (Table 18, Figure 4), statistically significant changes were found for traditional victimization both at school and outside school at both frequencies, and for frequent victimization by cyberbullying among boys. Among girls, the only statistically significant finding when the frequency of victimization was considered was for traditional victimization at school with a frequency of less than once a week.

Table 18. The prevalence of traditional victimization at school, traditional victimization outside school, and cybervictimization among girls and boys in 2008 and 2014, by frequency. Self-reported victimization.

	SEX	YEAR	TOTAL	VICTIMIZATION					
				None		Less than once a week		More than once a week	
				n	%	n	%	n	%
TRADITIONAL AT SCHOOL	Girls	2008	1013	729	72.0	219	21.6	65	6.4
		2014	930	738	79.4	138	14.8	54	5.8
	Boys	2008	963	646	67.1	239	24.8	78	8.1
		2014	941	747	79.4	146	15.5	48	5.1
TRADITIONAL OUTSIDE SCHOOL	Girls	2008	1013	870	85.9	116	11.5	27	2.7
		2014	931	821	88.2	86	9.2	24	2.6
	Boys	2008	963	828	86.0	109	11.3	26	2.7
		2014	941	858	91.2	76	8.1	7	0.7
CYBER VICTIMIZATION	Girls	2008	1011	907	89.7	96	9.5	8	0.8
		2014	928	828	89.2	86	9.3	14	1.5
	Boys	2008	964	874	90.1	67	7.0	23	2.4
		2014	935	871	93.2	54	5.8	10	1.1

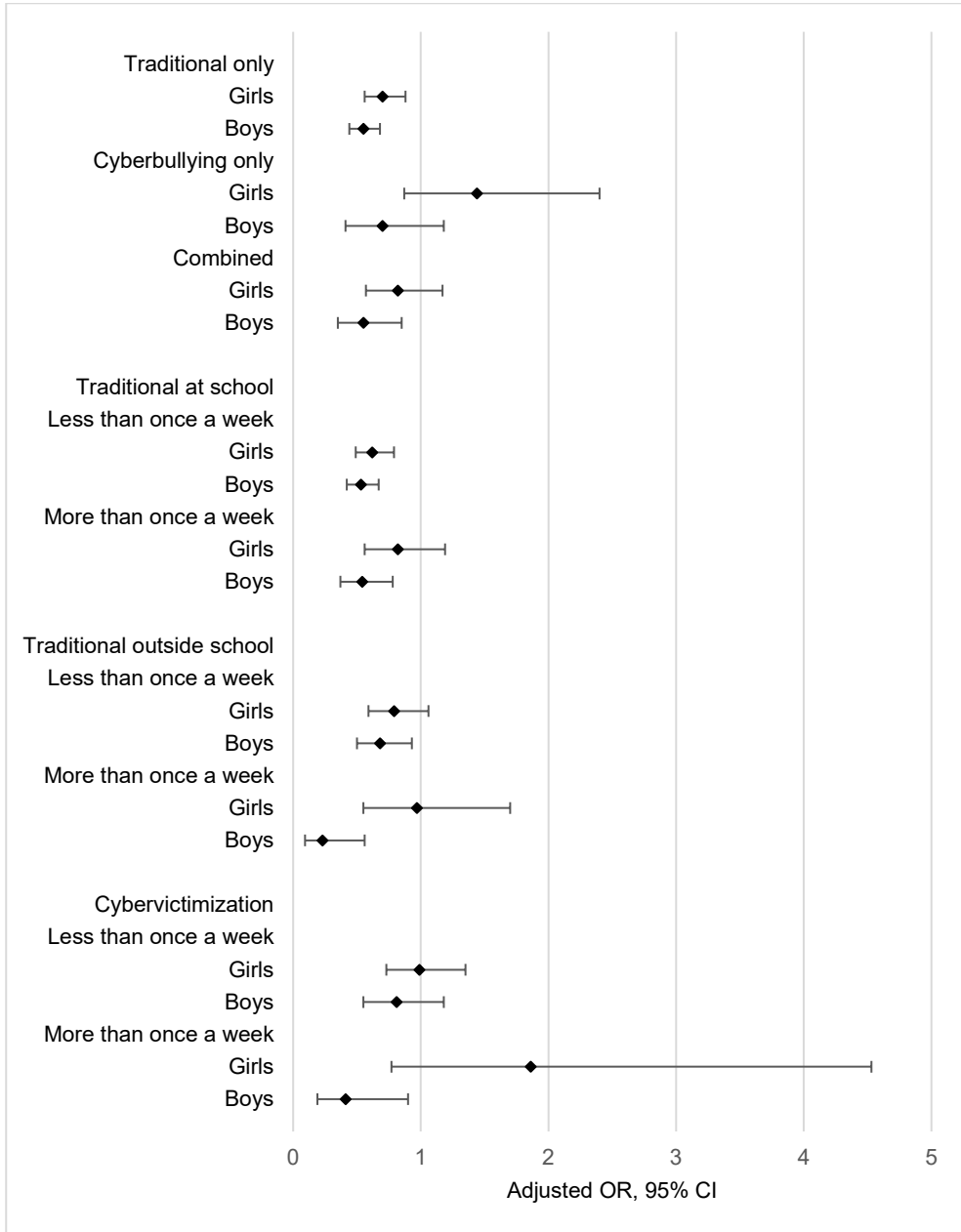


Figure 4. Changes in traditional victimization only, cyberbullying victimization only and combined victimization, as well as in traditional victimization at school and outside school and cyberbullying victimization by frequency among girls and boys, when year 2014 was compared with year 2008. Self-reported victimization. Multivariable logistic regression models in which the reference group was those who were not victimized in the context of bullying in question. Adjustment for city, grade, family background and ethnic background.

Changes in how adolescents perceived their school context, by frequency, are shown in Tables 19 and 20. Sex \times year interactions for school perceptions were tested, and for feeling safe at school this proved significant ($p = 0.036$). There were no statistically significant changes in the proportion of girls who never felt safe at school, but the proportion of boys halved. All of the other items about how the students perceived school improved, especially teachers or other adults and students trying to stop bullying. In 2008, 52.6% of girls perceived that teachers or other adults always or usually tried to stop bullying, and in 2014 the rate was 71.1%. Among boys, the change was from 54.6% to 69.7%. The proportion of girls who perceived that students always or usually tried to stop bullying increased from 22.3% to 34.1% among girls and from 19.9% to 29.2% among boys.

Table 19. The prevalence of school perceptions among girls and boys in 2008 and 2014.

	SEX	YEAR	TOTAL	ALWAYS/ USUALLY		SOMETIMES		NEVER	
				n	%	n	%	n	%
FEELING SAFE AT SCHOOL	Girls	2008	1022	910	89.0	98	9.6	14	1.4
		2014	937	832	88.8	87	9.3	18	1.9
	Boys	2008	1000	853	85.3	82	8.2	65	6.5
		2014	973	861	88.5	81	8.3	31	3.2
TEACHERS CARE	Girls	2008	1021	567	55.5	332	32.5	122	12.0
		2014	930	573	61.6	305	32.8	52	5.6
	Boys	2008	998	513	51.4	288	28.9	197	19.7
		2014	968	558	57.6	292	30.2	118	12.2
ADULTS TRY TO STOP BULLYING	Girls	2008	1017	535	52.6	404	39.7	78	7.7
		2014	930	661	71.1	224	24.1	45	4.8
	Boys	2008	998	545	54.6	329	33.0	124	12.4
		2014	963	671	69.7	198	20.6	94	9.8
STUDENTS TRY TO STOP BULLYING	Girls	2008	1020	227	22.3	578	56.7	215	21.1
		2014	930	317	34.1	461	49.6	152	16.3
	Boys	2008	997	198	19.9	520	52.2	279	28.0
		2014	962	281	29.2	485	50.4	196	20.4

Table 20. Changes in how adolescents perceived their school context among girls and boys from 2008 to 2014. Odds ratios and their corresponding 95% confidence intervals and p values. The reference group were those who responded always/usually.

	SOMETIMES		NEVER	
	Adjusted OR (95% CI)	p value	Adjusted OR (95% CI)	p value
FEELING SAFE AT SCHOOL				
GIRLS	0.96 (0.71–1.30)	0.79	1.34 (0.65–2.74)	0.43
BOYS	1.00 (0.72–1.38)	0.98	0.49 (0.31–0.77)	0.0020
TEACHERS CARE				
GIRLS	0.93 (0.77–1.13)	0.49	0.44 (0.31–0.62)	<0.0001
BOYS	0.93 (0.75–1.14)	0.46	0.56 (0.43–0.73)	<0.0001
ADULTS TRY TO STOP BULLYING				
GIRLS	0.45 (0.37–0.55)	<0.0001	0.48 (0.32–0.70)	0.0002
BOYS	0.48 (0.39–0.59)	<0.0001	0.65 (0.48–0.87)	0.0041
STUDENTS TRY TO STOP BULLYING				
GIRLS	0.57 (0.46–0.70)	<0.0001	0.50 (0.38–0.66)	<0.0001
BOYS	0.63 (0.52–0.82)	0.0002	0.50 (0.38–0.65)	<0.0001

Adjusted for city, grade, family background and ethnic background.

5.2 The prevalence of bullying victimization among adolescents in 13 Asian and European countries (Study II)

When the sample that included all countries and both girls and boys was analyzed, it was found that the prevalence of any bullying victimization was 28.1%, the prevalence of traditional victimization only was 17.5%, the prevalence of cyberbullying victimization only was 4.7% and the prevalence of combined victimization was 5.8%. When the sample was analyzed by country and both girls and boys were included, the prevalence of any victimization was lowest in Japan (16.1%). As decided *a priori*, this was the reference category in the statistical analyses. Sex × country interaction for victimization was significant ($p < 0.001$).

Table 21 presents the rates of any victimization, traditional victimization only, cyberbullying victimization only and combined victimization by country and by sex, and Figure 5 presents the results of the statistical analysis on any victimization. In the total sample of all countries, the prevalence of any victimization among girls was

26.6% (range from 14.6% in Greece to 42.4% in Indonesia). Among boys, this was 29.6% (range from 16.7% in Japan to 45.7% in Indonesia). In most countries, any victimization was more common among boys than girls. However, in Finland and Norway, any victimization was more common among girls, and in Lithuania, the prevalence of any victimization was almost the same among girls and boys.

In the total sample of all countries, the prevalence of traditional victimization only among girls was 15.6% (range from 6.8% in Norway to 26.0% in Lithuania). Among boys, this was 19.4% (range from 8.3% in Norway to 27.0% in Indonesia). When it came to victimization by cyberbullying only, the prevalence in the total sample of all countries was 5.0% among girls (range from 0.9% in India to 11.4% in Iran) and 4.5% among boys (range from 0.8% in Japan to 17.1% in Russia). Correspondingly, the prevalence of combined victimization in girls was 6.1% (range from 1.0% in Japan to 14.9% in Indonesia). In boys, this was 5.6% (range from 1.5% in Japan to 12.7% in Indonesia).

Table 21. The prevalence of any victimization, traditional victimization only, cyberbullying victimization only and combined victimization by sex and by country. Self-reported victimization.

		VICTIMIZATION								
		Total	Any		Traditional only		Cyber only		Combined	
		n	n	%	n	%	n	%	n	%
CHINA	Girls	1012	189	18.7	105	10.4	49	4.9	30	3.0
	Boys	1040	275	26.4	153	14.9	67	6.5	40	3.9
FINLAND	Girls	1471	419	28.5	251	17.1	63	4.3	101	6.9
	Boys	1426	381	26.7	293	20.6	37	2.6	47	3.3
GREECE	Girls	556	81	14.6	54	9.7	15	2.7	11	2.0
	Boys	482	88	18.3	65	13.5	13	2.7	10	2.1
INDIA	Girls	803	146	18.2	126	15.8	7	0.9	9	1.1
	Boys	747	232	31.1	175	24.1	12	1.7	25	3.4
INDONESIA	Girls	542	230	42.4	111	20.5	38	7.0	81	14.9
	Boys	481	220	45.7	130	27.0	29	6.0	61	12.7
IRAN	Girls	533	162	30.4	67	12.7	60	11.4	28	5.3
	Boys	621	262	42.2	147	23.7	46	7.4	68	11.0
ISRAEL	Girls	692	229	33.1	120	17.5	51	7.4	53	7.7
	Boys	573	222	38.7	138	24.2	27	4.7	54	9.5
JAPAN	Girls	925	149	16.1	127	13.8	10	1.1	9	1.0

	Boys	846	141	16.7	118	14.0	7	0.8	13	1.5
LITHUANIA	Girls	1222	467	38.2	314	26.0	64	5.3	76	6.3
	Boys	1198	457	38.1	302	25.8	46	3.9	82	7.0
NORWAY	Girls	946	213	22.5	64	6.8	80	8.5	69	7.3
	Boys	954	163	17.1	79	8.3	43	4.5	41	4.3
RUSSIA	Girls	543	203	37.4	106	19.6	44	8.1	52	9.6
	Boys	480	197	41.0	75	15.7	82	17.1	39	8.1
SINGAPORE	Girls	1102	308	28.0	144	13.1	44	4.0	120	10.9
	Boys	1058	316	29.9	202	19.2	39	3.7	72	6.8
VIETNAM	Girls	483	125	25.9	97	20.1	13	2.7	15	3.1
	Boys	462	165	35.7	123	26.6	13	2.8	29	6.3

Across countries, the proportion of those who reported just cyberbullying of all who were exposed to cyberbullying (i.e., in combination with traditional bullying or not) varied substantially (Table 22). This also varied between the sexes within countries. In the total sample of all countries, this proportion was 44.8% (range from 30.2% in Singapore to 62.6% in China). Among girls, this was 45.1% (range from 26.8% in Singapore to 68.2% in Iran), and among boys, this was 44.2% (range from 31.0% in Vietnam to 67.8% in Russia).

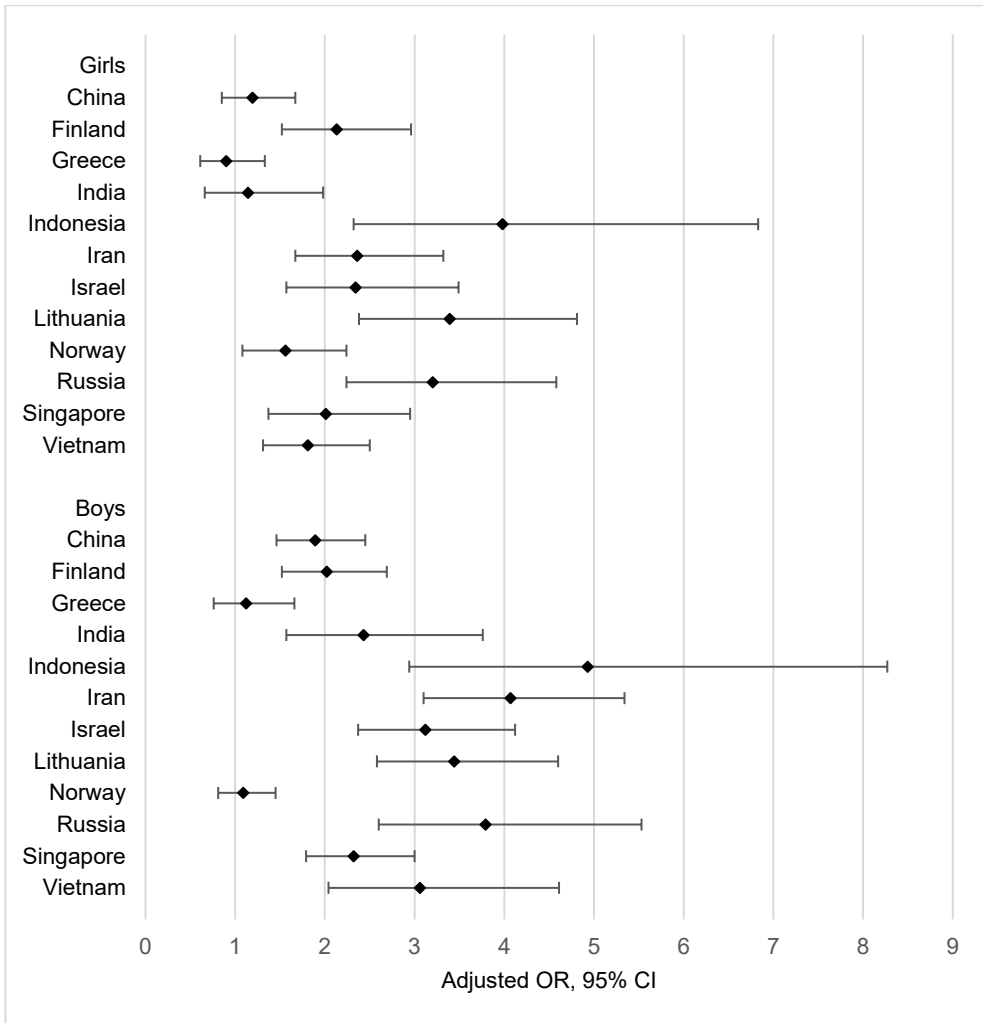


Figure 5. Odds ratios and their corresponding 95% confidence intervals for any bullying victimization among girls and boys by country, with Japan as the reference category. Self-reported victimization. GEE models with school-wise clusters included, adjusted for age.

Table 22. The proportion of those who reported just cyberbullying of all who were exposed to cyberbullying in the total sample and among girls and boys, by country. Self-reported victimization.

	TOTAL (%)	GIRLS (%)	BOYS (%)
CHINA	62.6	62.0	62.6
FINLAND	40.3	38.4	44.0
GREECE	57.1	57.7	56.5
INDIA	35.8	43.8	32.4
INDONESIA	32.1	31.9	32.2
IRAN	52.5	68.2	41.4
ISRAEL	43.1	49.0	33.3
JAPAN	43.6	52.6	35.0
LITHUANIA	41.0	45.7	35.9
NORWAY	52.8	53.7	51.2
RUSSIA	58.1	45.8	67.8
SINGAPORE	30.2	26.8	35.1
VIETNAM	37.1	46.4	31.0

5.3 Associations between mental health and bullying victimization (Studies I and II)

In the Finnish sample (the pooled data for both sexes in 2008 and 2014), those adolescents who had experienced combined victimization reported the highest levels of mental health symptoms, with 50.2% (adjusted OR 8.67, 95% CI 6.42–11.70, $p < 0.0001$) exceeding the 80% cut-off point on the total SDQ scale. Of those who were victims of traditional bullying only, 28.0% (adjusted OR 3.55, 95% CI 2.90–4.35, $p < 0.0001$) exceeded the cut-off point, as did 24.6% (adjusted OR 2.60, 95% CI 1.67–4.03, $p < 0.0001$) of cyberbullying victims and 10.7% of non-victims (the reference category) (Table 23, Figure 6).

Three-way and two-way interactions between the SDQ, sex and year were tested. Only the SDQ prosocial scale \times sex \times year interaction was significant ($p = 0.061$), and this indicated *post hoc* analyses. They showed some differences in the odds for weak prosocial skills, namely that the girls who were victimized by combined victimization in 2014 had the highest odds (unadjusted OR 5.12, 95% CI 2.32–11.27, $p < 0.0001$), followed by the girls who were victimized by cyberbullying only in 2014 (unadjusted OR 4.01, 95% CI 1.44–11.23, $p = 0.0077$). Furthermore,

Table 23. The number and rate of Finnish adolescents who exceeded the 80% cut-off point on the emotional problems, conduct problems, hyperactivity, peer problems and total SDQ scale or scored below the 20% cut-off on the prosocial skills scale. Self-reported victimization and mental health problems.

	VICTIMIZATION							
	None		Traditional only		Cyberbullying only		Combined	
	n	%	n	%	n	%	n	%
EMOTIONAL PROBLEMS	238	9.1	216	25.2	30	23.8	102	43.6
CONDUCT PROBLEMS	231	8.8	134	15.7	17	13.5	68	29.1
HYPERACTIVITY	337	12.9	162	18.9	25	19.8	77	32.9
PEER PROBLEMS	232	8.9	202	23.6	18	14.3	79	33.9
PROSOCIAL SKILLS	264	10.1	114	13.3	18	14.3	41	17.6
TOTAL	281	10.7	239	28.0	31	24.6	117	50.2

in 2008, boys who were victims of combined victimization (unadjusted OR 2.13, 95% CI 1.17–3.86, $p = 0.013$), and girls who were victims of traditional victimization only (unadjusted OR 1.73, 95% CI 1.06–2.83, $p = 0.028$), had higher odds for weak prosocial skills compared to the non-victims, who were the reference group.

Table 24 shows the associations between internalizing and externalizing symptoms and victimization in the cross-cultural total sample collected in 13 Asian and European countries. Sex \times externalizing scale interaction for victimization was found significant ($p = 0.0013$). Both internalizing and externalizing symptoms were significantly associated with traditional victimization only, cybervictimization only and the combination of these, in girls and boys, when they were compared to those who were not victimized. When different victimization groups were compared, combined victimization had a significantly stronger association with internalizing symptoms in girls and boys than traditional victimization only or cybervictimization only. Similarly, combined victimization had a significantly stronger association with externalizing symptoms, when compared with traditional victimization only in girls and boys, but not when compared with cybervictimization only. When traditional victimization only and cybervictimization only were compared, both the girls and boys in the traditional victimization only groups reported higher levels of internalizing symptoms. When it came to comparing these groups regarding externalizing symptoms, only girls had significant findings. These findings indicated that victims of traditional bullying only reported less mental health symptoms than victims of cyberbullying only.

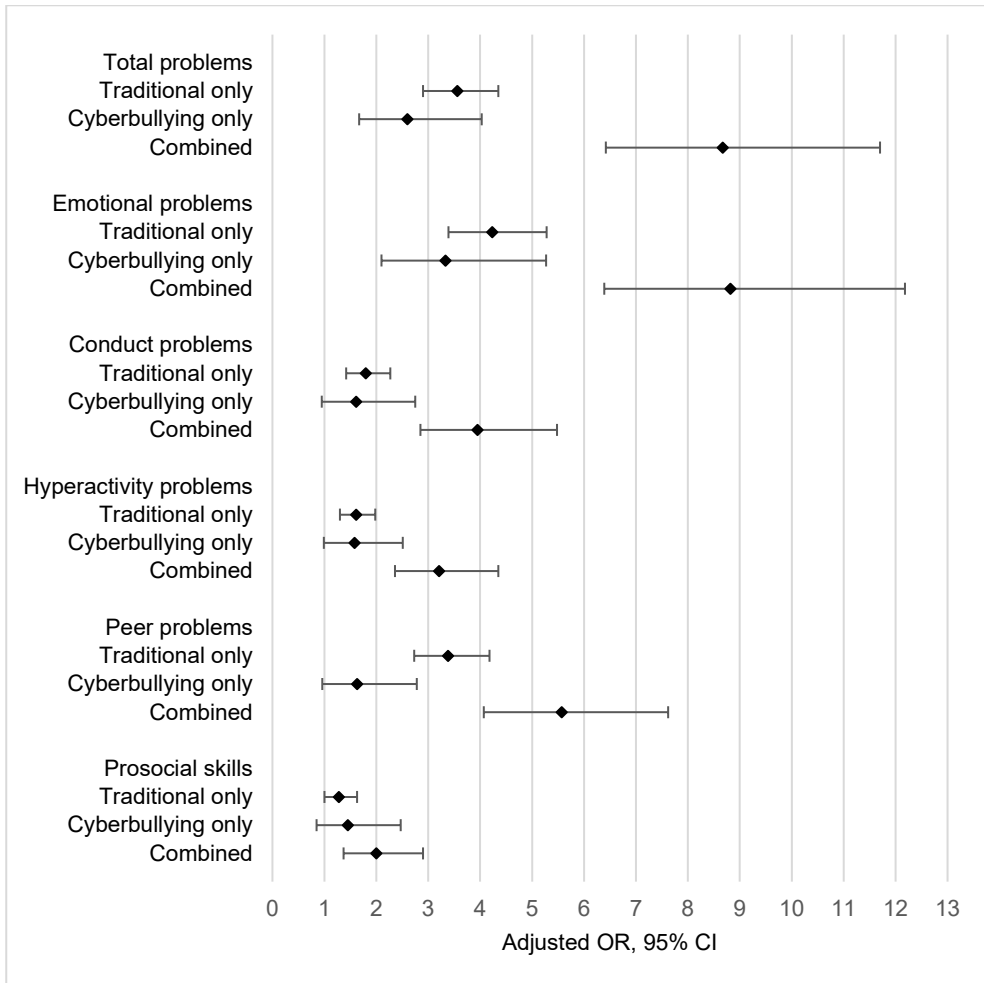


Figure 6. Association between mental health and traditional bullying victimization only, cyberbullying victimization only and the combination of these among Finnish adolescents. Self-reported victimization and mental health problems. The results of multivariable logistic regression models. The reference group were those who were not victimized by any bullying. Adjustment for year, sex, city, grade, family background and ethnic background.

The associations between internalizing and externalizing symptoms and any victimization by country were analyzed in the cross-cultural sample. These analyses were carried out separately for each sex in Greece, India, Indonesia, Finland, Lithuania and Norway because in these countries sex \times internalizing scale or externalizing scale interaction for victimization was found to be significant. The analyses were also carried out separately for each sex in Iran because the statistical model did not converge there. Internalizing and externalizing symptoms were significantly associated with any victimization among adolescents in most countries.

Table 24. Associations between internalizing and externalizing mental health symptoms and victimization in different contexts in girls and boys in the total sample of 13 Asian and European countries. Self-reported victimization and mental health problems. Odds ratios and their corresponding 95% confidence intervals and p values.

	GIRLS			BOYS		
	Adjusted OR (95% CI)	p value	Adjusted OR (95% CI)	Adjusted OR (95% CI)	p value	Adjusted OR (95% CI)
INTERNALIZING						
Traditional only vs. none	1.21 (1.19–1.23)	<0.0001		1.19 (1.17–1.22)	<0.0001	
Cyber only vs. none	1.09 (1.06–1.13)	<0.0001		1.07 (1.03–1.11)	0.0002	
Combined vs. none	1.25 (1.22–1.29)	<0.0001		1.29 (1.25–1.33)	<0.0001	
Combined vs. traditional only	1.05 (1.02–1.08)	0.0021		1.09 (1.06–1.13)	<0.0001	
Combined vs. cyber only	1.16 (1.11–1.20)	<0.0001		1.20 (1.15–1.26)	<0.0001	
Traditional only vs. cyber only	1.10 (1.06–1.14)	<0.0001		1.11 (1.06–1.16)	<0.0001	
EXTERNALIZING						
Traditional only vs. none	1.05 (1.03–1.08)	<0.0001		1.04 (1.02–1.06)	<0.0001	
Cyber only vs. none	1.14 (1.11–1.18)	<0.0001		1.08 (1.04–1.11)	<0.0001	
Combined vs. none	1.17 (1.14–1.21)	<0.0001		1.10 (1.06–1.13)	<0.0001	
Combined vs. traditional only	1.12 (1.09–1.16)	<0.0001		1.06 (1.03–1.10)	0.0003	
Combined vs. cyber only	1.03 (0.99–1.08)	0.11		1.04 (0.99–1.09)	0.091	
Traditional only vs. cyber only	0.93 (0.88–0.95)	<0.0001		0.98 (0.94–1.02)	0.24	

Note: GLMM model with school-wise random intercepts. The odds ratios have been estimated for a one-point rise in the symptom scales. Internalizing symptoms were adjusted for age, country and the externalizing SDQ scale. Externalizing symptoms were adjusted for age, country and the internalizing SDQ scale.

The associations between any victimization and internalizing symptoms did not reach statistical significance in girls in Indonesia or in boys in Greece. Similarly, the associations between any victimization and externalizing symptoms were not statistically significant in the pooled sample in Japan, or in boys in Greece, Lithuania and Norway.

5.4 Associations between relative age and bullying (Study III)

In the total sample, victimization by bullying was reported by 33.3% of the children, 20.6% of their parents and 10.1% of their teachers. When it came to perpetration, 19.0% of children, 15.5% of their parents and 17.8% of teachers reported that the child bullied others. Table 25 presents the proportions of victims and perpetrators of bullying in each relative age group by informant, and the results of the statistical analyses. The interactions for relative age \times sex and relative age \times study year were not significant.

The relatively youngest children had 1.2-fold increased odds for victimization according to both child and parent reports. When reported by teachers, the odds were increased for both the middle and the youngest relative age group, when controlled for sex, study year and bullying perpetration. However, when the psychopathology of the child was included as a covariate, the findings were no longer significant. When the hyperactivity symptoms of the child were included as a covariate instead of the psychopathology of the child, measured with the Rutter Teacher Questionnaire total score, the findings were very similar. The only difference was that, in the teacher reports, the relatively youngest children had significantly increased odds (adjusted OR 1.25, 95% CI 1.02–1.53, $p = 0.032$) for being bullied, when hyperactivity was included.

The relatively youngest group had decreased odds for perpetrating bullying when reported by children. Based on the parents' reports, there were no relative age effects for perpetration. Teachers' reports showed no significant findings when controlled for sex, study year and bullying victimization, but when psychopathology was also controlled for, both middle and the youngest groups had decreased odds for bullying others. There were no relevant changes when hyperactivity was controlled for instead of the psychopathology of the child.

Table 25. The proportion of children who were victims or perpetrators of bullying, by relative age group and by informant, and the results of multivariable logistic regression models with the oldest within the school grade as the reference group. Odds ratios and their corresponding 95% confidence intervals and p values. Victimization and perpetration reported by the children, their parents and teachers.

	OLDEST			MIDDLE			YOUNGEST						
	n	%	OR	n	%	Adjusted ^a OR (95% CI)	p value	Adjusted ^b OR (95% CI)	p value	Adjusted ^b OR (95% CI)	p value		
VICTIMIZATION													
CHILD	841	31.4	Ref	868	33.4	1.12 (0.996– 1.27)	0.058	1.09 (0.97– 1.24)	0.14	1.24 (1.10– 1.40)	0.0005	1.21 (1.07– 1.36)	0.0027
PARENT	532	19.3	Ref	552	20.8	1.12 (0.97– 1.30)	0.13	1.08 (0.93– 1.26)	0.32	1.23 (1.06– 1.43)	0.0077	1.18 (1.01– 1.37)	0.039
TEACHER	249	8.9	Ref	286	10.6	1.30 (1.07– 1.58)	0.0096	1.13 (0.91– 1.39)	0.28	1.37 (1.12– 1.67)	0.0022	1.21 (0.97– 1.50)	0.090
PERPETRATION													
CHILD	535	20.0	Ref	490	18.8	0.92 (0.80– 1.07)	0.28	0.90 (0.78– 1.04)	0.16	0.85 (0.73– 0.98)	0.028	0.83 (0.71– 0.96)	0.012
PARENT	433	15.7	Ref	419	15.8	0.96 (0.82– 1.14)	0.66	0.95 (0.80– 1.13)	0.57	0.89 (0.75– 1.06)	0.20	0.87 (0.73– 1.04)	0.12
TEACHER	510	18.2	Ref	476	17.6	0.90 (0.77– 1.05)	0.18	0.76 (0.64– 0.91)	0.0030	0.92 (0.78– 1.08)	0.31	0.79 (0.66– 0.95)	0.012

Abbreviation: Ref., reference group

^a Adjusted for sex, study year and bullying perpetration

^b Adjusted for sex, study year, bullying perpetration and psychopathology of the child

5.5 Associations between bullying in childhood and violent offenses in adulthood (Study IV)

The frequencies of bullying victimization and perpetration and violent offenses by the age of 31 years are presented in Table 26. In childhood, 40.0% of women were victims of bullying, and among men this was 57.2%. When it came to perpetration, these were 24.2% and 56.2%, respectively. These findings are based on pooled information from three informants, namely the children and their parents and teachers. Bullying involvement was classified according to the highest rating of frequency of victimization or perpetration from any of the three informants, yielding relatively high rates. Out of the 81 women with violent offenses, 33 (40.7%) had been bullies in childhood. Correspondingly, out of the 405 men with violent offenses, 297 (73.3%) had been bullies in childhood. The distribution of violent offenses was also analyzed by the frequency of bullying perpetration in childhood. Among women, the 0.9% who were frequent bullies, committed 5.3% of all violent offenses by 31 years of age; among men, the 9.0% who were frequent bullies, committed 25.1% of all violent offenses.

Agreement on bullying victimization and perpetration between the parents and children, the parents and teachers and the children and teachers was rather low for both victimization (κ ranged from 0.12 to 0.23) and perpetration (κ ranged from 0.19 to 0.26). The interactions of sex \times bully and sex \times victim for violent offenses were not significant. The results of the attrition analysis were statistically significant for family structure ($p = 0.0050$) and child psychopathology ($p = 0.0063$), and this indicated that a significantly larger proportion of children in the study sample lived with two biological parents and screened negative for psychopathology, compared to the attrition group.

The association between bullying victimization in childhood and any violent offenses in adulthood were analyzed. Among women, there were no significant findings. Frequent male victims showed increased hazard for any violent offenses in the unadjusted analysis (unadjusted HR 1.82, 95% CI 1.34–2.47, $p = 0.0001$), but the results were not statistically significant in the adjusted analysis. The association between victimization and severe violent offenses in men was also analyzed (Table 27). In the unadjusted analyses, the findings were statistically significant for those who had been bullied only sometimes or frequently, but when the data were controlled for, the findings were no longer significant. Among women, the number of severe cases was too low for analyzing severe violent offenses separately.

Table 28 shows the association between bullying perpetration in childhood and any violent offenses in adulthood. Both women and men who had been bullies in childhood had an increased hazard for any violent offenses, whether they had bullied only sometimes or frequently in childhood, when they were compared to those who

Table 26. The frequency of women and men who were victims or perpetrators of bullying at eight to nine years of age and violent offenses by severity by 31. Victimization and perpetration based on pooled information reported by the participants at the age of eight to nine years, their parents and teachers.

		VIOLENT OFFENSES											
		None		Minor		Severe		Homicide					
		n	%	n	%	n	%	n	%	n	%	n	%
VICTIMIZATION	Women	1508	60.0	1464	97.1	42	2.8	2	0.1	0	0.0	0	0.0
	Sometimes	909	36.2	87	96.0	35	3.9	0	0	1	0.1		
	Frequently	95	3.8	9	99.0	1	1.1	0	0	0	0.0	0	0.0
	Men	1097	42.8	946	86.2	135	12.3	14	1.3	2	0.2		
PERPETRATION	Women	1224	47.7	1025	83.7	166	13.6	26	2.1	7	0.6		
	Frequently	243	9.5	186	76.5	46	18.9	8	3.3	3	1.2		
	No	1911	75.8	1863	97.5	46	2.4	2	0.1	0	0.0	0	0.0
	Men	589	23.4	560	95.1	28	4.8	0	0.0	1	0.2		
	Frequently	22	0.9	18	81.8	4	18.2	0	0.0	0	0.0	0	0.0
	No	1124	43.8	1016	90.4	97	8.6	9	0.8	2	0.2		
	Sometimes	1213	47.2	996	82.1	182	15.0	28	2.3	7	0.6		
	Frequently	231	9.0	151	65.4	67	29.0	10	4.3	3	1.3		

had not been bullies. When it came to severe violent offenses among men (Table 27), the hazard was significantly increased whether perpetration had occurred only sometimes or frequently.

Table 27. The association between bullying victimization or perpetration and severe violent offenses in men. The results of Cox regression models with hazard ratios and their corresponding 95% confidence intervals and p values. Victimization and perpetration based on pooled information reported by the participants at the age of eight to nine years, their parents and teachers.

		SEVERE VIOLENT OFFENSES			
		Unadjusted HR (95% CI)	p value	Adjusted ^a HR (95% CI)	p value
VICTIMIZATION	No	Ref.		Ref.	
	Sometimes	1.87 (1.03–3.39)	0.041	1.12 (0.60–2.09)	0.73
	Frequently	2.88 (1.31–6.34)	0.0088	1.11 (0.46–2.70)	0.82
PERPETRATION	No	Ref.		Ref.	
	Sometimes	3.28 (1.62–6.62)	0.0009	2.50 (1.20–5.21)	0.015
	Frequently	6.55 (2.87–14.94)	<0.0001	2.86 (1.07–7.59)	0.035

Abbreviation: Ref., reference group

^a Adjusted for bullying perpetration (for victimization) or victimization (for perpetration), parental education level, family structure and child psychopathology

Because the bullying item was excluded on the Rutter Teacher Questionnaire total score, the analyses were also conducted using a cut-off point of eight points (instead of nine points) to validate the results. This did not cause any relevant changes. Sensitivity analyses on the association between bullying victimization and perpetration in childhood and any violent offenses by 31 years of age were carried out separately for the children, their parents and their teachers. Their findings for victimization were not statistically significant. For perpetration, the findings were significant, even though the significance of the finding of the self-reports by female bullies was marginal ($p = 0.050$).

Among both women and men, the association between being a bully-victim in childhood and violent offenses by 31 years of age was significant when the reference category was those who had not been bullies (women, unadjusted HR 2.09, 95% CI 1.25–3.49, $p = 0.0051$; men, unadjusted HR 2.34, 95% CI 1.85–2.96, $p < 0.0001$). However, when bully-victims were compared to pure bullies, there were no significant associations in women or in men.

Table 28. The association between bullying perpetration and any violent offenses. The results of Cox regression models with hazard ratios and their corresponding 95% confidence intervals and p values. Perpetration based on pooled information reported by the participants at the age of eight to nine years, their parents and teachers.

	PERPETRATION	ANY VIOLENT OFFENSES			
		Unadjusted HR (95% CI)	p value	Adjusted ^a HR (95% CI)	p value
WOMEN	No	Ref.		Ref.	
	Sometimes	1.99 (1.25–3.15)	0.0036	1.73 (1.05–2.86)	0.031
	Frequently	7.88 (2.84–21.86)	<0.0001	5.27 (1.51–18.40)	0.0091
MEN	No	Ref.		Ref.	
	Sometimes	1.95 (1.55–2.45)	<0.0001	1.84 (1.44–2.35)	<0.0001
	Frequently	4.33 (3.24–5.78)	<0.0001	3.01 (2.10–4.33)	<0.0001

Abbreviation: Ref., reference group

^a Adjusted for bullying victimization, parental education level, family structure and child psychopathology

The more frequent bullying perpetration was in childhood, the larger the odds were for minor violent offenses in men, even when the data were controlled for bullying victimization, parental education level, family structure and child psychopathology. Odds were increased for those who had bullied only sometimes (adjusted OR 1.86, 95% CI 1.40–2.47, $p < 0.0001$) or frequently (adjusted OR 3.43, 95% CI 2.20–5.36, $p < 0.0001$), when compared to those who had not been bullies. When frequent bullies were compared to those who had bullied only sometimes, their odds were increased for minor violent offenses (adjusted OR 1.85, 95% CI 1.25–2.73, $p = 0.0020$). The effect of the frequency of bullying perpetration that was found for minor violent offenses was less clear for severe violent offenses. Those who had been bullies only sometimes (adjusted OR 2.42, 95% CI 1.18–4.96, $p = 0.016$) or frequently (adjusted OR 3.06, 95% CI 1.15–8.13, $p = 0.025$) had increased odds for severe violent offenses when compared to those who had not been bullies. When frequent bullies were compared to those who had been bullies only sometimes, the finding was significant in the unadjusted model (unadjusted OR 2.45, 95% CI 1.27–4.74, $p = 0.0077$), but this did not persist in the adjusted model.

6 Discussion

6.1 Main findings

1. Traditional bullying victimization reduced among both girls and boys aged 13 to 15 years in Finland from 2008 to 2014. The findings were more prominent among boys. Cyberbullying victimization showed no significant changes. Combined victimization reduced among boys while there were no significant findings among girls. Concurrently, the proportion of adolescents who perceived that teachers and other adults and students tried to intervene in bullying increased (Study I).
2. The prevalence of traditional, cyberbullying and combined victimization among adolescents and the proportion of those who reported overlapping traditional and cyberbullying victimization varied widely across the 13 Asian and European countries (Study II).
3. Bullying victimization was associated with mental health symptoms in both the Finnish and the cross-cultural samples of adolescents of 13 to 15 years of age, as well as in most countries in the cross-cultural sample. Combined victimization was associated with the most mental health symptoms, but traditional victimization and cyberbullying victimization were also associated with more mental health symptoms than among those who were not bullied. The associations were found for both internalizing and externalizing symptoms (Studies I and II).
4. Relative age effects were found for both bullying victimization and perpetration. The relatively youngest children were most predisposed to victimization and the oldest were most likely to bully other children (Study III).
6. Perpetrating bullying and being a bully-victim in childhood were associated with violent offenses among women and men. Among men, there was an association for both any violent offenses and severe violent offenses. Victimization by bullying in childhood was not associated with violent offenses in adulthood among either sex (Study IV).

6.2 Methodological considerations

6.2.1 Study designs

The time-trend study (Study I), the cross-cultural study (Study II) and the study that assessed relative age effects in the pooled sample of children (Study III) included in this thesis were based on cross-sectional study designs. The prospective cohort study (Study IV) used both cross-sectional and longitudinal cohort study designs.

In cross-sectional studies, a random sample of a general population is taken at a specific moment in time to assess the study question. Cross-sectional studies have been a mainstay of psychiatric epidemiology due to their usability in estimating prevalence of psychiatric problems in community surveys (Schwartz & Susser, 2006). Cross-sectional studies “slice” through the population to observe prevalent cases and exposures of interest. Thus, the prevalence of diseases or other outcomes can be observed and described, and the association between the exposure and prevalent cases can be examined. These are assessed simultaneously, which leads to the limitations of the study design. Causal inference cannot be drawn in cross-sectional studies due to the impossibility to determine whether the exposure or the outcome occurred first (Celentano & Szklo, 2019; Schwartz & Susser, 2006). Due to the snapshotlike observation of the population at a specific time, cross-sectional studies do not well capture exposures or outcomes of short duration, neither can they describe the natural course of the outcome or changes in its prevalence over time.

In this thesis, cross-sectional samples were either compared to assess time-trends in Study I or pooled in Studies II and III. This emphasized the importance of minimizing methodological differences to increase the comparability between the samples. In Studies I and III, similar methodologies and procedures were used when the data were collected at different time points. In the cross-cultural Study II, similar study methodologies were used to create comparable samples across countries. However, in most countries, the data were collected with paper questionnaires, but in Norway and Singapore, the questionnaires were completed electronically. Offline questionnaires can be adapted for online use (Smith, 2014), but considering the recognized challenges in the methodologies of cross-cultural research (van de Vijver & Matsumoto, 2011), it is possible that this had an impact on the comparability of the findings.

Changes in prevalence can be described with time-trend assessments. In time-trend assessments, consecutive cross-sectional studies of prevalence are compared to understand the change in prevalence over time (Roberts, et al., 1998; Smith & Rutter, 1995). Using similar sampling frames increases the reliability of the time-trend assessment (Collishaw, 2015; Collishaw, et al., 2004; Modecki, et al., 2014). This was a strength of Study I, which used similar procedures and methodology to

compare two samples of adolescents. The equivalence of the response rates also increases the reliability of the time-trend assessment (Collishaw, 2015; Collishaw, et al., 2004). In Study I, the rates were 90.2% in 2008 and 91.8% in 2014.

In the prospective cohort study (Study IV), both cross-sectional and longitudinal cohort study designs were used. In a cohort study, groups of the exposed and unexposed individuals are selected and followed over time to compare the incidence of the outcome. In Study IV, the exposure was involvement in bullying, and the event of interest was a violent offense. The study design is longitudinal (also called prospective) if the exposure is identified at the beginning of the study and the cohort is followed through time until the outcome is determined. For comparison, in a retrospective cohort design, the exposure is ascertained from past records while the outcome is determined when the study begins (Celentano & Szklo, 2019). Obviously, a major challenge in longitudinal cohort studies is that they are time-consuming (Celentano & Szklo, 2019; Schwartz & Susser, 2006), expensive and not suitable for very rare outcomes. In longitudinal cohort studies, major bias may result from the selection of the study participants. This includes both nonparticipation at the beginning of the study and nonresponse while the study is ongoing, if those who do not participate or are lost to follow-up differ from the participants or those not lost to follow-up in their rates of exposure or incidence of the outcome (Celentano & Szklo, 201). The rate of nonrespondents was very low in 1989, as only 3.4% of the representative sample did not respond. Although the nonparticipants could not be analyzed, there was such a small number of them that it is unlikely this caused a major bias. Attrition from the baseline study sample was low, 6.8%. Attrition analysis showed that a significantly larger proportion of children in the study sample lived with two biological parents and screened negative for psychopathology, compared to the attrition group. However, due to the low attrition rate, this probably did not cause a major bias either. Further, it is essential that the quality of the information is similar between the exposed and the non-exposed groups (Celentano & Szklo, 201), as was the case in the longitudinal cohort study included in this thesis.

6.2.2 Study samples

This thesis included four study samples. The sample in the time-trend study (Study I) consisted of altogether 3997 adolescents, and the cross-cultural study (Study II) included 21 688 adolescents. Study III consisted of 8149 children, and the longitudinal cohort study (Study IV) included 5405 participants.

In the time-trend study (Study I), two cities were included, and these had population structures comparable to the general population in Finland at the time of the study years. This included sex distribution, educational structure, income distribution, ethnic background and the family structure of the inhabitants (Statistics

Finland, 2018). Both cities included urban and rural communities, which is typical of Finnish cities. However, the representativeness of the samples compared to the whole country may have been affected because the most urban and rural areas in Finland were not included. Representativeness was also sought by selecting a target population that covered adolescents in junior high school, which is included in compulsory education in Finland. However, special needs students and classes were excluded. This may have reduced the representativeness of the samples, although it is reasonable to assume that the number of the excluded adolescents was low.

Unselected representative samples as well as using similar sampling frames is important in carrying out time-trend studies (Collishaw, 2015). In the study included in this thesis, only the schools and grades that provided information both study years were included in the time-trend assessment. This yielded two samples of comparable sizes and comparable mean ages of the participants, with no statistically significant time effects in the proportions of girls and boys or grade, family structure, ethnic background or city from 2008 to 2014. Additionally, these background factors were controlled for to improve the time-trend assessment (Collishaw, et al., 2010; 2004). Approximately 10% of students did not participate in both study years, because they were absent from school on the survey days or because they were unwilling to participate. It was not possible to assess whether those who did not participate differed from the participants. This created a possibility of bias (Collishaw, 2015), as school absenteeism has been associated with both bullying victimization (Grinshteyn & Yang, 2017; Steiner & Rasberry, 2015) and increased mental health problems (Wood, et al., 2012). However, the direction of the possible bias would have been similar both years and the equivalence of the response rates increased the reliability of the time-trend assessment (Collishaw, et al., 2004).

The cross-cultural study (Study II) sample included adolescents in 13 countries, with mean ages varying from 13.5 (SD 0.6) in Indonesia to 14.3 (SD 0.8) in Iran. In the total sample and in Greece and Israel, there were more girls than boys, but because the analyses were carried out by sex, it is not likely that this was a major source of bias. However, there were some differences between the sociodemographic background factors across countries, and these may have decreased the comparability between the samples in each country. The rate of adolescents who lived in urban areas ranged from 36.8% to 100%, and the rate of those attending public schools ranged from 12.5% to 100%. Altogether, there were 200 schools, and the number of schools included in each country ranged from three to 45. This may have had an impact on the comparability of the samples across countries, because school climate has been found to correlate with bullying (Baldry, et al., 2015; Cook, et al., 2010; Guo, 2016; Juvonen & Graham, 2014; Kowalski, et al., 2019; Zych, et al., 2019). In all countries but Japan, the data were collected between 2014 and 2017. In Japan, this was done in 2011. It is possible that the different study years had an

impact on the comparability across countries. Awareness on bullying has increased over time (Smith, et al., 2016), which may have affected the findings on the prevalence of bullying across countries. It is also possible that the availability of technology was different in different countries in the various years. Data on internet accessibility or the availability of smartphones among adolescents was not available and could not be controlled for when cybervictimization was assessed.

The cross-cultural study was school-based. The percentage of adolescents who attend school varies worldwide (The World Bank, 2021b), which restricts the generalizability of the findings. The response rates varied from 51.7% in Indonesia to 97.1% in Iran, with a median of 88.9%. The nonparticipants could not be analyzed, and this may have reduced the representativeness of the samples and the reliability of the study. The data were collected in certain parts of the participating countries, which means that the samples may not represent the countries as a whole. This needs to be considered especially in large countries with wide within-country differences, like China and India.

Study III's sample consisted of four subsamples that were pooled. In the 1989 sample, the basic population were all Finnish-speaking children born in Finland in 1981 and still alive in 1989, living in the catchment areas of all of the five university hospitals in Finland. The participation rate in a random sample of the population cohort that covered 10% of these children was high, 96.6% (Almqvist, et al., 1999). In 1999, 2005 and 2013, the study was repeated in the Turku University Hospital catchment area. The participation rates were 92.6%, 90.3% and 86.3%, respectively. The participation rates in the subsamples deteriorated over time. This has been widely found in surveys over the last decades (Baruch, 1999; Gerrits, et al., 2001; Groves, 2011). In the study included in this thesis, this may have been a potential source of bias, because it was not possible to analyze whether the nonparticipants differed from the participants. Representativeness may have also been affected by refusals of some teachers to participate the study. It was not possible to analyze whether these children differed from the participants. This study assessed relative age effects, and this is why only children in the second grade were included. The grade of some of the excluded children was unclear, and this may have been a source of bias.

The 1989 subsample well represented school-aged children and their families in Finland regarding demographic and socioeconomic factors (Almqvist, et al., 1999). The area of sampling covered the whole country, and a representative sample of the communities was drawn according to their degree of urbanization. Rural, suburban and urban areas were included. All children in the areas of data collection were included. Even though only Finnish-speaking children were included, in 1990, as many as 93.5% of people who lived in Finland were Finnish-speaking (Statistics Finland, 2020a). The subsamples of 1999, 2005 and 2013 were collected in the Turku

University Hospital catchment area. These studies were carried out in the same communities and school districts with similar principals of sample selection as in the 1989 study. These samples were originally collected to study time-trends in the wellbeing of children, and their representativeness compared to the sample of 1989 may have been affected by the fact that they were collected in Southwest Finland. However, when it was studied whether the study year moderated the effect of relative age on bullying victimization or perpetration, there were no significant findings.

The longitudinal cohort in Study IV comprised the children in the 1989 sample of Study III. Due to a non-systematic error, personal identification codes of 6.6% of the children were missing, and these would have been needed to link the baseline information with the follow-up information. Furthermore, 0.2% of the children had emigrated or died before age 15, when the observation period for committing violent offenses began. Thus, the attrition rate was 6.8%, which was rather low (Susser & Schwartz, 2006b). As discussed earlier, it is unlikely that attrition caused a major bias.

6.2.3 Data sources

All studies that were included in this thesis used data obtained from self-reported questionnaires, and the time-trend and cross-cultural studies (Studies I and II) consisted of self-administered information only. Self-reported bullying involvement is most commonly used in bullying research, but reports by parents, teachers or peers have also been used. Self-reports are susceptible to bias due to cognitive processes such as recalling, and social desirability, for example. Self-report bias has particularly been found to occur when sensitive questions are asked, such as question about mental health (Bauhoff, 2013; 2011). Questions about involvement in bullying could be considered sensitive. Generally, agreement between different informants on bullying victimization and perpetration has been found to be quite low (Ladd & Kochenderfer-Ladd, 2002; Smith, 2014). Informants' perceptions may vary, and some informants may not be present in situations where bullying occurs. Parents, for example, are not present at school, and their children do not always tell them about bullying. Similarly, teachers are not necessarily aware of what is happening in the group of children. Social interactions may be perceived differently, and this may result in different interpretations, and consequently reports, of bullying by the participants. Peer reports are usually gathered on a class basis. Their reliability appears to be age-dependent, becoming more reliable as the children get older (Ladd & Kochenderfer-Ladd, 2002). In the studies among children of eight to nine years of age (Studies III and IV), self-reports of children and reports by their parents and teachers were used. The rather low agreement between different informants was found among boys in the 1989 sample (Rønning, et al., 2009) of these studies.

Furthermore, agreement between the parents and children, the parents and teachers and the children and teachers was examined in the baseline sample of Study IV, and this was rather low for both bullying victimization and perpetration. Still, the reliability of a study can be increased by using multiple informants (Ladd & Kochenderfer-Ladd, 2002; Smith, 2014).

In Study III, the data on bullying involvement obtained from the informants were analyzed separately to find if relative age effects differed by informant. In study IV, the information obtained from these informants were pooled for the statistical analyses. Aggregating the information on bullying obtained from the child and the parent and the teacher of the child was based on previous research, including previous research on criminality in the Finnish Nationwide 1981 Birth Cohort Study (Sourander, et al., 2011; 2007a; 2007b). Furthermore, a previous study reported that using a composite multi-informant measure constructed from cross-informant data was more reliable in recognizing victimization. It was also the best predictor of the child's relational adjustment, compared to measures from single informants, at least in middle childhood (Ladd & Kochenderfer-Ladd, 2002). In Study IV, the findings of the sensitivity analysis using data from the three informants separately were comparable to the findings of the analyses that were conducted with pooled information from the informants.

Bullying involvement was the main interest in all studies included in this thesis. The scales that were used to inquire about bullying victimization and school perceptions in this thesis were not validated, but in the studies conducted among adolescents, definitions of both traditional bullying and cyberbullying were provided prior to asking whether the adolescents were involved in them. On the other hand, studies that were carried out among children only asked whether the child had been involved in bullying, and gave no definition or examples of bullying incidents. Giving a definition standardizes the responses, at least if the definition is read through and kept in mind (Smith, 2014), while the latter approach assumes that the respondents will know what bullying is. This approach contains a supposition that the respondents can distinguish between bullying and general aggression, meaning that the dynamic nature of bullying is captured (Juvonen & Graham, 2014). This may leave the question of whether bullying is measured or just aggression in general, without the key elements of bullying, namely repetition, intention and the imbalance of power (Smith, 2014). One study reported that eight-year-olds can see the difference between aggressive and nonaggressive behavior, but do not distinguish between forms of aggression as clearly as adolescents (Smith, et al., 2002). In Studies III and IV, with no definition or examples of different types of bullying behaviors, it is possible that general aggression was reported instead of bullying. This may have yielded higher rates of bullying. Another approach to assessing bullying involvement would have been by giving examples of bullying incidents and surveying if the

respondents have been involved in them, rather than inquiring if the respondents had been involved in bullying in general.

In bullying research, a lack of a well-established definition of cyberbullying has been a particular issue (Kowalski, et al., 2014; Smith, et al., 2008; Livingstone & Smith, 2014), making the distinction between cyberbullying and cyberaggression particularly common (Berne, et al., 2013). In cross-cultural study settings, the issue of defining bullying is even more complex, because “caseness” needs to be defined in relation to a particular society at a particular time (Smith & Rutter, 1995). Furthermore, linguistic factors may complicate methodology. The comparability of the terms of bullying may be difficult in cross-cultural bullying research. Not all languages, such as Italian or Arabic, have words which are equivocal to the English word bullying (Samara, et al., 2019). The words used for bullying may also have different connotations (Smith, et al., 2002). *Ijime* and *wang-ta*, for example, have a connotation of social exclusion with less physical violence, compared to bullying. In the existing cross-cultural bullying studies, it has been common practice to use similar definitions across countries, with an emphasis on interpreting the findings.

Despite the complexity of measuring bullying involvement, the strengths of the studies included in this thesis are that they used similar methodologies when the samples in each study were collected (Collishaw, 2015). In Studies I, II and III, the samples were collected over a period of time, which may have increased the awareness of bullying among the participants (Smith, et al., 2016). Sensitization could have resulted in increased reporting of bullying over time.

When the associations between self-reported bullying victimization and mental health symptoms were studied (Studies I and II), common method variance may have caused a source of bias. This refers to a possibility of a biased assessment or interpretation of a relationship between the scale scores if both scores were collected using single methods from a single source at a single time (Podsakoff, et al., 2003; Williams & Brown, 1994). However, experiences on victimization and mental health can be considered an individual’s perceptions, and using self-administered questionnaires can be rationalized by this (Conway & Lance, 2010). The SDQ, which has been found to have satisfactory validity (Goodman, 2001; 1999; Koskelainen, et al., 2001), was used to measure mental health symptoms in Studies I and II. This has been likely to reduce the possibility of common method variance. Likewise, removing the item on bullying victimization in the SDQ before the analyses were carried out aimed to reduce the bias (Conway & Lance, 2010).

In this thesis, the SDQ and the Rutter Teacher Questionnaire were used to assess psychopathology. The advantage of using established and psychometrically sound questionnaires to assess mental health is that, since they have been used for several decades (Collishaw, et al., 2010), the comparability of the findings over a lengthy period of time is increased. Furthermore, the SDQ has been translated into many

languages (Youth in Mind, 2015). It has been widely used in international studies (Achenbach, et al., 2012; 2008; Maezono, et al., 2019; Obel, et al., 2004; Goodman, et al., 2000), and the findings of studies in which it has been used have been sufficiently consistent to support the applicability for assessing children and adolescents from diverse backgrounds (Achenbach, et al., 2012). On the other hand, self-administered questionnaires do not allow diagnostic categorization. This would require a structured assessment of symptoms and the classification of diagnoses in accordance with the diagnostic classifications, the ICD or the DSM. In other words, diagnostic assessment for research purposes would mean that internationally accepted concepts of disorder were used. However, universal definitions cannot be given on what comprises a disorder in any healthy domain. Thus, defining a disease is an iterative process, meaning that diagnostic classifications are not unchangeable but rather need reconstructing over time (Susser & Schwartz, 2006c). This complicates defining “caseness” in psychiatry, when relying on diagnostic classifications, and could have relevance in, for example, time-trend studies that cover long periods of time. At the population level, where it can be assumed that the range of symptomology is wide, using symptom assessment and diagnostic classifications gives a different perspective on psychiatric morbidity. Another perspective would be offered from measuring the impact of the psychiatric symptoms or disorder, for example, functional disability (Susser & Schwartz, 2006c).

The Finnish National Police Register is part of the information systems of the Finnish police, established for operational purposes. This is an electronic database that includes all cases where the police have suspected someone of an offense. The register is also suitable for research purposes, and it was used to obtain the information on violent offenses in the prospective cohort study (Study IV). In criminological research, it has been customary to obtain information on offenses through self-reports or convictions. Self-reports tend to capture a large amount of crime (Elonheimo, et al., 2017), although self-reported information is susceptible to bias due to subjective recalling and the sensitivity of the subject (Bauhoff, 2013; 2011). Court data on convictions, on the other hand, represent just a minority of offenses (Elonheimo, et al., 2017) and are likely to be selected. It has been stated that court data most likely emphasize serious crimes, while self-reports may emphasize less serious mass crimes (Elonheimo, et al., 2014). The legislative control over the police is strict in Finland, which likely increases the reliability of the register, by standardizing police actions in the country. On the other hand, the Finnish National Police Register includes suspected crimes, and not all those who have been registered were convicted. Data on this was not available. This may have caused a source of bias. Furthermore, the police provide an initial label for the suspected offense in the register, and these may change when official charges are

brought to court. There are hardly any unbiased sources of information on criminal offenses, and using multiple sources would be beneficial. However, the Finnish National Police Register gives a broader perspective of criminal offenses than court registers, and can be considered more objective than self-reported information on criminality (Elonheimo, 2010).

6.3 Discussion of the findings

6.3.1 Changes in the prevalence of bullying victimization and school perceptions among adolescents

In this thesis, the changes in prevalence of bullying victimization and school perceptions among adolescents from 2008 to 2014 were examined. Importantly, it was found that the proportion of those adolescents who were not victimized at all increased among both girls (from 66.6% to 71.8%) and boys (from 61.7% to 74.1%). Victimization by traditional bullying only decreased among both sexes. There were no changes in victimization by cyberbullying only among either sex. Victimization by both traditional and cyberbullying decreased among boys but not among girls. There were also positive changes in how adolescents perceived their school context. In 2014, a larger proportion of adolescents perceived that their teachers, other adults or students tried to stop bullying compared to the situation in 2008. Furthermore, there were fewer boys who perceived that they never felt safe at school, and fewer girls and boys who felt that their teacher did not care for them.

The existing literature on time-trends in traditional victimization has provided mixed results, although most studies have suggested decreases (e.g. Chester, et al., 2015; Cosma, et al., 2020; 2015; Molcho, et al., 2009; Waasdorp, et al., 2017; Zaborskis, et al., 2005) or no changes (e.g. Chester, et al., 2015; Clark, et al., 2013; Molcho, et al., 2009; Peltzer & Pengpid, 2021; Pengpid & Peltzer, 2021) in victimization. It is possible that the findings in different countries indicate culture-specific trends (Collishaw, et al., 2004). However, Collishaw (2015) concluded in his review article that the vastest evidence pointed towards a decreasing trend. On the other hand, a recent meta-regression study on bullying trends in the United States found that traditional victimization did not show any significant time-trends *per se*. When the data were stratified by sex, victimization among girls was increasing but among boys there was a declining trend (Kennedy, 2021). In this thesis, a decrease in victimization by traditional bullying only (without concurrent cyberbullying victimization) was evident among both girls and boys. However, when victimization at school and outside school was examined by frequency, the decreasing trend was found for boys, but girls only reported decreases in infrequent school bullying. Previous literature has reported that boys have typically been more involved in

physical bullying than girls (Barzilay, et al., 2017; Waasdorp & Bradshaw, 2015; Juvonen & Graham, 2014; Silva, et al., 2013), while relational bullying has been more typical of girls (Juvonen & Graham, 2014). It is possible that bullying boys were more easily noticed and stopped by adults, compared to the more subtle relational bullying. Interestingly, although bullying decreased among both sexes in this study, the proportion of girls who reported any bullying (28.2%) in 2014 was larger than the proportion of bullied boys (25.9%), while this was the opposite in 2008 (girls, 33.4%; boys, 38.3%). This finding was similar to that of the meta-regression study by Kennedy (2021), namely that the rate of traditional victimization among girls exceeded that of boys over time. An increasing convergence between rates for females and males in several adolescent problem behaviors, such as crime and substance use, has previously been described (Smith & Rutter, 1995).

Victimization by cyberbullying only showed no changes in this thesis. Previous literature has provided mixed results, with indications of increases (Kessel Schneider, et al., 2015; Jones, et al., 2013; 2012), decreases (Waasdorp, et al., 2017) or no changes (Li, et al., 2020; Pontes, et al., 2018) in cyberbullying victimization. Time-trends have mostly been similar across sexes (Li, et al., 2020; Pontes, et al., 2018; Kessel Schneider, et al., 2015; Rivers & Noret, 2010). However, Jones et al. (2012) reported significant increases in girls only, and Rivers and Noret (2010) described that infrequent cyberbullying victimization increased in girls and decreased in boys, while frequent victimization did not show any significant associations. When the data included in this thesis was analyzed by the frequency of cyberbullying, the only significant change that was found in cyberbullying victimization was that frequent victimization decreased among boys. However, the findings in frequent cyberbullying victimization need to be interpreted with caution due to the low number of subjects.

In this study, combined victimization by both traditional and cyberbullying decreased among boys but showed no significant changes among girls. This finding was somewhat different from the two previous studies that have reported time-trends of combined victimization in the United States (Kessel Schneider, et al., 2015; Li, et al., 2020). They indicated increases, although Kessel Schneider et al. (2015) only found this among girls, not boys. Considering the decreases found in traditional bullying in this study, the finding on combined victimization is not surprising. In other words, the reductions that were found in traditional victimization could also be reflected in the decrease of the rate of those who were concurrently victimized by traditional and cyberbullying. A decline in combined victimization, in particular, would be important, because the most adverse effects have been associated with it (Campbell, et al., 2012; Islam, et al., 2020; Kessel Schneider, et al., 2012; Merrill & Hanson, 2016; Messias, et al., 2014; Peng, et al., 2019; Wolke, et al., 2017).

Before the first assessment of bullying in this study in 2008, Finnish legislation had made it compulsory to have an action plan against violence, bullying and harassment at schools and to monitor it. A school-based antibullying program, KiVa, was introduced in Finland in 2009 and an extensive implementation was carried out after this. Consequently, KiVa was available in the participating schools in 2014, when the second assessment of bullying was carried out. There have been several randomized controlled trials on KiVa that have shown beneficial effects (Kärnä, et al., 2013; 2011a; Nocentini & Menesini, 2016; Salmivalli, et al., 2011), and a recent meta-analysis found that the reduction in school bullying victimization that was associated with KiVa was approximately 11% (Gaffney, et al., 2021a). On the other hand, there have been studies that described effectiveness among younger students but not among adolescents (Kärnä, et al., 2013; 2011b). In this thesis, decreases in traditional bullying victimization after real-life implementation of KiVa were observed among adolescents. The decreases were especially found in victimization by school bullying. Previously, one study assessed traditional victimization before and after real-life implementation of KiVa, and found no changes among eight-year-olds (Sourander, et al., 2016b). In this study, the students were in the second grade. Considering that KiVa is a school-based antibullying program, it is possible that the reductions found in this thesis were linked to the adolescents having attended schools with active implementation of KiVa for a longer time than the children in the study by Sourander et al. (2016b). Even though the study included in this thesis did not have a control group, and causal inference cannot be proven in the findings, the results of this study could still suggest that a lengthier implementation of an antibullying program, from the students' perspective, could be more effective. This has been found in a Dutch randomized controlled trial that described stronger beneficial effects after the implementation of KiVa had lasted for two school years, compared to one school year of implementation (Huitsing, et al., 2020). Previous literature on KiVa has also reported beneficial effects on cyberbullying victimization both among younger students (Green, et al., 2020; Salmivalli, et al., 2011; Williford, et al., 2013) and among adolescents (Williford, et al., 2013).

Period effects are the effects of contemporary societal change on temporal trends (Schwartz, et al., 2006). Changes in social norms between different study points may result in reporting artefacts (Collishaw, 2015; Collishaw, et al., 2010; 2004; Smith & Rutter, 1995), even if the sampling and study procedures were carried out with care. There were only six years between the study surveys, but it is possible that some societal changes influenced the data. In addition to the wide implementation of KiVa in Finland, there has been media coverage on bullying and the adversities associated with it. This may have had an impact on the acceptability of bullying, and consequently, reduced it. On the other hand, increased awareness of bullying could increase the rates by enhancing the study participants' ability to identify and

report victimization (Smith, et al., 2003). Other changes in society may also impact time-trend assessments. These include changes in material resources, family life, values and lifestyles (Collishaw, et al., 2004; Rutter & Smith, 1995). The information on the availability of smart phones and other electronic devices among the study participants was not available. This could have had an impact on the findings on cyberbullying victimization (Guo, 2016; Kowalski, et al., 2019; Ybarra, et al., 2007). However, the use of computers and mobile phones or smartphones has been common among adolescents in Finland in this century (Statistics Finland, 2019). Changes in the ethnic composition of the general population may also have an impact on time-trend assessments (Collishaw, et al., 2010). In the present study, the ethnic background of the participants was controlled for. Furthermore, the 2008 economic crisis affected Finland. The population structures in the participating cities were comparable to the general population in Finland in the study years (Statistics Finland, 2018). Nevertheless, it still is possible that the economic situation could have influenced the findings (Collishaw, 2015), considering that being a victim of bullying has been associated with low socioeconomic status (Tippett & Wolke, 2014).

The findings of this thesis reported a contemporary decrease in victimization at school and an increase in positive perceptions of the school context. Even though this thesis did not assess if victimization and school perceptions were associated with each other, the contemporary time-trend findings were not surprising, considering the social-ecological understanding of bullying (Espelage & De La Rue, 2011) and previous research findings. Previous literature has reported associations between school climate and bullying at school (Juvonen & Graham, 2014). There have been associations between the safety domain of school climate and bullying victimization, namely that a greater feeling of safety has been associated with less victimization at school (e.g. Kowalski, et al., 2019; Mori, et al., 2021). The community domain of school climate focuses on interpersonal relationships (Wang & Degol, 2016). Teachers' attitudes and classroom norms have been associated with victimization by bullying, namely that less disapproval of bullying has been associated with more bullying victimization (e. g. Menesini & Salmivalli, 2017; Saarento, et al., 2013). On the other hand, teacher involvement and enforcing school rules in a fair, clear and consistent manner have been associated with a greater feeling of safety of students at school (Hong & Eamon, 2012). KiVa is a school-based antibullying program, with emphasis on bystander actions against bullying (Salmivalli, et al., 2011) and components that target different levels of the socio-ecological context of school (Gaffney, et al., 2021b), with an active role of teachers. Even though causality cannot be inferred, it is possible that the positive findings of this thesis in how the adolescents perceived their school context were linked to the introduction of KiVa. Previously, the effects of KiVa have been reported to be mediated by perceptions

regarding peers' defending behaviors and teacher attitudes towards bullying, for example (Saarento, et al., 2015).

6.3.2 The prevalence of bullying victimization among adolescents in a cross-cultural context

This study found that the prevalence of bullying victimization varied widely across countries. The variation covered victimization by any bullying as well as victimization by traditional bullying only, by cyberbullying only and by the combination of these, and was wide in both girls and boys. Another finding in this study was that the proportion of those who were only cyberbullied among all those who were cyberbullied was substantial, and showed wide variations across countries and in both girls and boys.

The findings in this thesis were congruent with previous literature that has reported wide variations in the prevalence of traditional bullying victimization (e.g. Cosma, et al., 2020; Elgar, et al., 2015; Görzig, et al., 2017; Koyanagi, et al., 2019; Nansel, et al., 2004; Pengpid & Peltzer, 2016; Tang, et al., 2020) and cyberbullying victimization (e.g. Athanasiou, et al., 2018; Cosma, et al., 2020; Craig et al., 2020; Görzig, et al., 2017) in cross-cultural samples. However, only two studies have previously reported the prevalence of combined victimization in a cross-cultural sample. Their samples consisted of European and North American countries, and they reported somewhat lower rates among both girls and boys compared to the findings in this thesis (Arnarsson, et al., 2020; Cosma, et al., 2020). The methodologies of these two studies were somewhat different from the study included in this thesis; they covered bullying experiences in the past couple of months (Arnarsson, et al., 2020; Cosma, et al., 2020) while the study included in this thesis covered the past six months.

Previously, Cosma et al. (2020) reported the overlap of traditional and cyberbullying victimization in a cross-cultural sample. Their study focused on the rate of those who reported cyberbullying and traditional victimization of all who reported cyberbullying victimization. They also reported wide variations (Cosma, et al., 2020). Even though the existing cross-cultural literature on combined traditional and cyberbullying victimization is scarce (Arnarsson, et al., 2020; Cosma, et al., 2020), there have been studies that have been carried out in single countries that have shown substantial overlap in traditional and cyberbullying victimization (e.g. Juvonen & Gross, 2008; Li, et al., 2020; Smith, et al., 2008; Sumter, et al., 2012; Waasdorp & Bradshaw, 2015; Wang, et al., 2019; Ybarra, et al., 2007). Furthermore, a meta-analysis of 80 studies on traditional and cyberbullying victimization among adolescents has reported that these were highly correlated (Modecki, et al., 2014).

Interpreting cross-cultural bullying research requires cautiousness (Samara, et al., 2019; Smith, et al., 2016). It has even been stated that the easier it is to find differences in cross-cultural studies, the more difficult it is to explain and interpret them. The larger the cultural distance is between the cultural groups included in a study, the more susceptible the findings are to bias and misinterpretation. One of the factors behind this is that cross-cultural research often uses quasi-experimental designs, i.e. samples that have not been randomly selected from a population, considering that study subjects cannot be randomly assigned to a culture (van de Vijver & Matsumoto, 2011).

There are factors that vary across countries and may have an impact on studies. Socioeconomic inequalities at the national level have been found to be associated with an increased prevalence of bullying victimization (Due, et al., 2009) and perpetration (Elgar, et al., 2009). The economic level of the country, however, has not been associated with bullying victimization (Due, et al., 2009). Differences in the availability of internet accessibility or smartphones across countries may have an impact on cross-cultural study findings because being electronically active has been linked to cyberbullying involvement (Kowalski, et al., 2019; Guo, 2016).

Bullying has been suggested to possibly be more susceptible to cultural and environmental influences compared to other violent behaviors like fighting and weapon carrying (Smith-Khuri, et al., 2004). The structural aspects of bullying may vary across countries, and this may have an impact on study findings. An example of this regarding bullying is the ratio of bullies to victims. In Japan and Korea, the ratio is higher than in Western countries (Koo, et al., 2008; Smith, 2014).

Cultures may vary in their characteristics, which can affect interpersonal relationships. Cultural dimensions are aspects of cultures that can be measured relatively to other cultures (Hofstede, et al., 2010). Among these dimensions, collectivism versus individualism and power distance may be especially relevant in considering cultural differences in bullying (Smith, 2014), although such constructs are likely to be just a part of the complex picture of bullying in a cross-cultural context (Smith & Robinson, 2019). Collectivism refers to societies in which people are integrated into cohesive groups, which protect them and to which people are loyal. Individualism refers to the opposite, i.e. societies with looser ties between individuals (Hofstede, et al., 2010). In collectivistic cultures, like in Japan and South Korea, social exclusion may be an effective way to harm someone (Smith, 2014; Strohmeier, et al., 2013). Both *ijime* (Smith, 2014) and *wang-ta* (Lee, et al., 2012; Koo, et al., 2008) are considered to be based on collectivism, where pupils tend to act as a group and follow the decisions of the majority rather than their own opinions on the bullied individuals. In the more individualistic Western countries, individual attacks against a victim may be considered an effective way of bullying (Smith, 2014; Strohmeier, et al., 2013). Power distance means the extent to which the less

powerful members of institutions, such as schools, expect and accept that power is unequally distributed (Smith, 2014). Individuals in cultures with a high power distance generally accept an unequal distribution of power, while in cultures with a low power distance the opposite prevails. Power distance reflects the values of the less powerful members of the society and refers to their relationship to the authority (Hofstede, et al., 2010). In countries with a small power distance, the less and more powerful members of institutions are interdependent, while in countries with a larger power distance, the less powerful are dependent on the more powerful (Hofstede, et al., 2010). In *ijime*, power imbalance has its origins in a group-interaction process (Strohmeier, et al., 2013). Power distance may also be relevant in understanding bullying in countries that are considered hierarchical. In these countries, hierarchically imposed behaviors, like misuse of power by older students, may not be seen unjust. Thus, cultures may vary in what is considered to be and reported as unjust (Smith, 2014).

6.3.3 Associations between bullying victimization and mental health

This study found that mental health symptoms were associated with bullying victimization, whether it was traditional victimization, cyberbullying victimization or the combination of these. However, the findings emphasized the impact of combined victimization. In the Finnish sample in Study I, as many as half of the adolescents who fell into this category of victims, exceeded the 80% cut-off point on the total SDQ scale. The finding was most profound for the total SDQ scale and for the emotional symptoms scale. In the cross-cultural total sample in Study II, the findings were similar, emphasizing the impact of combined victimization. This was especially found for internalizing symptoms, compared to victimization in just one context. When it came to externalizing symptoms, they were more significantly associated with combined victimization compared to traditional victimization, but there was no significant difference between combined and cyberbullying victimization. Furthermore, in the cross-cultural sample, the findings were not only significant in the total sample that included all countries but also in most countries, when victims of any bullying were compared to those who were not victimized.

These findings were congruent with previous literature. The harms associated with bullying victimization on mental health have been widely established and the literature has included both internalizing and externalizing symptoms. Study reports have covered traditional victimization (e.g. Copeland, et al., 2013a) and cyberbullying victimization (e.g. Kowalski, et al., 2019; Sourander, et al., 2010). Combined victimization has previously been recognized to have stronger associations with mental health symptoms compared to bullying victimization in

only one context (Table 7). There have also been studies that have reported the association between bullying victimization and mental health symptoms in cross-cultural contexts, but the number of cross-cultural studies that have reported cyberbullying victimization is low, and no studies have focused on combined victimization in cross-cultural contexts (Table 8).

One explanation for the findings related to combined victimization could be that victimization in both face-to-face and cyber contexts reduces the victim's possibility to escape bullying, because it is not limited to a physical place, for example, school grounds. Even though combined victimization does not necessarily imply chronicity or high frequency of victimization, there have been several studies that have reported that the outcomes tend to be more severe when victimization is chronic or frequent (Campbell & Morrison, 2007; Eastman, et al., 2018; Elgar, et al., 2014; Koyanagi, et al., 2019; Lataster, et al., 2006; Nordhagen, et al., 2005; Penning, et al., 2010; Takizawa, et al., 2014; Wolke, et al., 2014; 2013). Furthermore, studies on polyvictimization—exposure to multiple forms of victimization—have reported particularly deleterious outcomes on the victims (e.g. Copp, et al., 2021; Finkelhor, et al., 2007).

Even if the study findings were uniform when it came to the associations between bullying victimization *per se* and mental health symptoms, the findings in the pooled cross-cultural sample were diverse, when traditional victimization only was compared to cyberbullying victimization only. Victims of traditional bullying only had higher odds for internalizing symptoms compared to victims of just cyberbullying, regardless of whether they were girls or boys. When it came to externalizing symptoms, only girls had a significant association, and this indicated fewer symptoms among victims of traditional bullying only compared to cyberbullying victims. Previously, Campbell et al. (2012) reported that cyberbullying victims had significantly higher SDQ and DASS total scores than traditional victims. Furthermore, there have been indications that suicidality is more strongly related to cyberbullying compared to traditional bullying (Peng, et al., 2019; Messias, et al., 2014; Kessel Schneider, et al., 2012; van Geel, et al., 2014b). On the other hand, there have been studies that have reported that, after controlling for traditional victimization, cyberbullying victimization was no longer a significant predictor for mental health symptoms (Dempsey, et al., 2009; Hase, et al., 2015). Nevertheless, both traditional and cyberbullying include the key elements of bullying, namely repetition, intentional harm and an imbalance of power. Cyberbullying, however, may expose the victim to an unlimited audience and repetition of the harmful acts, and limited possibilities to escape bullying compared to traditional bullying. A cyberbully can also be unknown to the victim, which may reduce the possibilities of the victim to defend themselves.

The cross-cultural sample of 13 Asian and European countries showed significant associations between any bullying victimization (traditional victimization, cyberbullying victimization or both) and internalizing and externalizing symptoms in most countries. Importantly, the study sample included countries with lower-middle to high economies. Together with previous literature (e.g. Athanasiou, et al., 2018; Elgar, et al., 2014; Fleming & Jacobsen, 2010; Peltzer & Pengpid, 2017; Perren, et al., 2010; Tsitsika, et al., 2015; Zaborskis, et al., 2019), the findings of this study suggest that the adverse association between victimization and mental health can be found in different countries and cultures. However, as is the case for any research on bullying, some aspects need to be considered when assessing mental health in cross-cultural contexts. These include possible cultural variations in experience and expression of illness and concepts of mental disorder and mental health literacy (Kirmayer & Ban, 2013). This study used the SDQ. The psychometric properties of the SDQ have been supported in a range of studies carried out worldwide (Achenbach, et al., 2012; 2008; Woerner, et al., 2004), and it has previously been used in several cross-cultural studies (Achenbach, et al., 2012; 2008; Maezono, et al., 2019; Obel, et al., 2004; Goodman, et al., 2000).

6.3.4 Relative age effects in bullying

Relative age effects were found in both bullying victimization and perpetration. The relatively youngest children within the school grade were more likely to be bullied than their oldest peers according to the children and their parents, and the oldest children were more likely to bully others according to the children's and teachers' reports.

These findings support previous findings on relative age effects in bullying victimization. However, the existing literature on the subject has been scarce and has provided mixed results. Previous studies have suggested that the relatively youngest children would be more prone to being bullied than their older peers, even though not all reports have found such relative age effects (Crawford, et al., 2011; Department for Education, 2010; Mühlenweg, 2010). Relative age effects in bullying other children have not been reported in previous literature.

The findings of this study were mixed regarding the group of informants. Relative age effects were found in victimization based on the children's and parents' reports and in perpetration based on the children's and teachers' reports. Similarly, Crawford et al. (2011) found relative age effects in bullying victimization reported by children but not by their parents. Cross-informant agreement on bullying (Rønning, et al., 2009; Schreier, et al., 2009; Wolke, et al., 2013) and behavioral and emotional functioning of children (Achenbach, et al., 1987) between different informants has been found to be low. In the study included in this thesis, the

proportions of children, their parents and teachers who reported victimization varied substantially. This was not surprising because relational bullying especially may be subtle and unseen by adults. Considering the differences in the rates of informants who reported victimization and relative age effects that were found, it is important to encourage children to reveal bullying experiences and to increase the awareness among adults so they can better recognize bullying.

Unlike previous literature on relative age effects on bullying, it was possible to control the data included in this thesis for the child's psychopathology. Previous research has shown that the association of peer victimization and psychiatric symptoms has been bi-directional. Both internalizing (Christina, et al., 2021; Hodges & Perry, 1999; Kaltiala-Heino, et al., 2010; Reijntjes, et al., 2010) and externalizing (Reijntjes, et al., 2011) symptoms can function both as antecedents and consequences of victimization. Despite this interplay between psychiatric symptoms and bullying involvement, relative age effects found in the present study were independent of the child's psychopathology. This suggests that relative age is an independent risk factor for victimization among the youngest and for perpetration among the oldest children within the school grade.

In this study, the relatively youngest children had approximately 20% larger odds of being bullied and approximately 20% smaller odds of being a bully compared to the oldest. These effect sizes are comparable to previous studies on child and adolescent mental health. Goodman et al. (2003) estimated that the relatively youngest children had a 14% higher risk for psychiatric disorders than their relatively older peers. Similarly, their risk of receiving ADHD medication has been estimated to be 27% higher (Holland & Sayal, 2019). At the population level, reducing any involvement in bullying could reduce mental health problems and other adverse long-term sequelae of bullying (Arseneault, 2018). Thus, relative age effects found in bullying may have some implications. It would be important to increase awareness of parents, teachers and other professionals on relative age effects on bullying.

To date, research has provided findings on relative age effects concerning psychiatric problems (e.g. Goodman, et al., 2003; Kuntsi, et al., 2022; Patalay, et al., 2015; Price, et al., 2017; Root et al., 2019), ADHD (e.g. Caye, et al., 2020; Holland & Sayal, 2019; Whitely, et al., 2019) and learning (e.g. Gledhill, et al., 2002; Kuntsi, et al., 2022; Martin, et al., 2004; Zoëga, et al., 2012). Previous literature has explained their findings by relative age-related differences in physical growth and maturity (Bonati, et al., 2018; Sayal, et al., 2017; Whitely, et al., 2019) and cognitive and social skills (Patalay, et al., 2015). Age-related differences in development in a fixed age-based group may also explain relative age effects in bullying involvement. Different developmental stages may manifest in physical size, maturity, self-regulation and cognitive and social skills. When the characteristics of the subgroups involved in bullying have been assessed, victims have been characterized as

submissive and insecure (Cook, et al., 2010; Juvonen, et al., 2003; Juvonen & Graham, 2014; Menesini & Salmivalli, 2017). They have also been reported to have interpersonal difficulties (e.g. Gini, 2008; Juvonen, et al., 2003; Nansel, et al., 2004; 2001; Sourander, et al., 2010) and to be physically weaker than their peers (Hodges & Perry, 1999). Bullies, on the other hand, have been characterized by social dominance and proactive aggression (Juvonen & Graham, 2014; Menesini & Salmivalli, 2017). It is possible that these characteristics of victims and bullies can be enhanced by individual relative age-related differences in development, predisposing children to bullying involvement, and manifesting as relative age effects.

On the other hand, the concept of relative age is bound to grouping children based on age, and probably the most important context with age-based grouping in children's lives is school. Unlike most studies on relative age effects on ADHD or ADHD medication use, some Danish studies did not find any relative age effects (Dalsgaard, et al., 2014; Pottgård, et al., 2014). One of the explanations they provide, along with the Danish clear diagnostic and medication guidelines, is the relatively large proportion of the relatively youngest Danish children held back one year in the school system (Pottgård, et al., 2014). This has recently been supported by Kuntsi et al. (2022), who demonstrated that the relatively youngest children with ADHD had increased risks for lower educational achievement and receiving a diagnosis of substance use disorder when compared to their relatively older peers with ADHD. These findings emphasize highly professional diagnostic and treatment practices and a more flexible approach to school starting age. Importantly, this broadens the understanding of relative age effects beyond the features of individual children.

6.3.5 Violent offenses as a long-term outcome of bullying in childhood

In this study, being a bully in childhood was associated with any violent offenses by women and men at the age of 31 years, and with severe violent offenses by men, even after adjusting for victimization by bullying, parental education level, family structure and child psychopathology. Furthermore, the hazard of bully-victims did not differ from that of pure bullies, and victimization in childhood was not associated with violent offenses by women or men.

This study found that as many as 40.7% of women with violent offenses had been bullies in childhood. In men, this was even higher, 73.3%. These findings are in line with previous literature. Longitudinal population-based studies have reported that bullying perpetration in childhood is associated with violent offenses in adulthood (Fergusson, et al., 2014; Gibb, et al., 2011; Kim, et al., 2011; Sourander,

et al., 2011) or in late adolescence (Sourander, et al., 2007a; 2006) in men. However, studies that assessed the effects of being a bully in adolescence on later violent outcomes in men have reported mixed findings (Bender & Lösel, 2011; Farrington & Ttofi, 2011; Olweus, 2011; Renda, et al., 2011). On the other hand, there has been just one study on women, and this did not find any associations between bullying perpetration in girls in childhood and later violent offenses by women at the age of 23–26 (Sourander, et al., 2011). Renda et al. (2011) studied the association between bullying perpetration in adolescence and antisocial behavior in young adulthood, and found significant associations in men but not in women.

In their systematic review and meta-analysis of longitudinal studies on the associations between bullying and later violence, Ttofi et al. (2012) suggest that the younger the children were when they were perpetrators of bullying, the more likely it was that they were violent later in life. In the data that were in Study IV in this thesis, bullying was surveyed when the children were eight to nine years old. A previous study on the longitudinal association between bullying and violent offenses in young adulthood had a shorter follow-up-period, and, consequently, a smaller number of violent offenses. This could explain the lack of significant association in women, although the study was based on the same data as Study IV (Sourander, et al., 2011). Bullies have been found to demonstrate externalizing behavior (Guo, 2016; Cook, et al., 2010) such as proactive aggression (Juvonen & Graham, 2014). Direct aggression, and physical aggression in particular, is more common among males than females from early childhood into adulthood (Archer, 2004). Even though the same risk factors have been found to predict antisocial behavior in both sexes, these risk factors seem to be fewer among girls (Moffitt, et al., 2001). Furthermore, although chronic physical aggression in childhood has been shown to increase the risk for continued physical violence during adolescence, chronically aggressive girls have not been found to have a similar risk for delinquency in adolescence as boys (Broidy, et al., 2003). This may be linked to girls having fewer risk factors (Moffitt, et al., 2001) or having some protective factors (Broidy, et al., 2003).

Bullying and violent offenses may be different behavioral manifestations of the same underlying antisocial or violent dispositions, displayed differently during development. Bullying in childhood has been found to be associated with aggressive or violent behavior (Brunstein Klomek, et al., 2015; Fergusson, et al., 2014; Gibb, et al., 2011; Kim, et al., 2011; Sourander, et al., 2011) and antisocial personality disorder (Copeland, et al., 2013a) in adulthood, and the latter, in itself, is associated with aggressive behavior. Cyberbullying perpetration has also been associated with antisocial personality traits (Kowalski, et al., 2019; Guo, 2016). Bullies have shown low cognitive and affective empathy and high levels of callous-unemotional traits (Zych, et al., 2019). These are characterized by low empathy and guilt, a lack of concern regarding performance in tasks, and deficient affect. The presence of

significant levels of these traits have been described to designate a group of young people with a particularly severe, aggressive and stable pattern of antisocial behavior (Frick, et al., 2014; Frick & White, 2008).

This study found that men who had frequently bullied others were more likely to be involved in violent offenses as adults. Previous literature on whether chronic or more frequent bullying involvement has been associated with more adverse longitudinal effects has been scarce. Frequent bullying perpetration in childhood has been reported to have stronger associations with repeated offending in young adulthood compared to infrequent bullying (Sourander, et al., 2011). When the distribution of violent offenses by the frequency of bullying perpetration in childhood was assessed, it was found that the 0.9% of women who had been frequent bullies had committed 5.3% of all violent offenses in adulthood. Correspondingly, the 9.0% of men who had been frequent bullies had committed 25.1% of all violent offenses in adulthood. It is possible that some frequent bullies have traits and risk factors that predispose them to continuing childhood aggression into adulthood, such as callous-unemotional traits (Zych, et al., 2019).

Victimization in childhood was not associated with violent offenses by women or men. This finding is consistent with previous literature that has not demonstrated significant associations between being bullied in childhood and violent offenses in adulthood (Sourander, et al., 2011) or in late adolescence (Sourander, et al., 2007a). Furthermore, victimization in adolescence has not been associated with violent offenses in adulthood (Bender & Lösel, 2011; Gibb, et al., 2011). There has been one study that described an association between bullying victimization before 12 years of age and committing an assault in late adolescence or young adulthood, but this study was based on retrospective assessment of victimization (Wong & Schonlau, 2013). Findings on other kinds of risky or illegal behaviors have been mixed (Gibb, et al., 2011; Sourander, et al., 2011; 2007a; Wolke, et al., 2013; Wong & Schonlau, 2013).

Previously, there have been suggestions that some school attacks have been violent retaliation by people who had been bullied. School homicide perpetrators have indeed been found to be more likely than their victims to have been bullied by peers (Anderson, et al., 2001). They have been suggested to have represented provocative aggression, and have been described as “provocative” or “aggressive” victims, who have reacted in an aggressive manner in response to being bullied (Anderson, et al., 2001). In earlier literature on bullying, these “aggressive” victims were also described to be unpopular children who tended to react to bullying aggressively (Pellegrini, 1998; Pellegrini, et al., 1999; Schwartz, et al., 1997), expressing dysregulation or a “hot temper”. Even though the aggression expressed by “aggressive” victims does not necessarily fulfill the criteria of bullying, there are similarities in how they and bully-victims are described. Bully-victims are

characterized by high maladjustment, dysregulation and both proactive and reactive aggression (Juvonen & Graham, 2014; Menesini & Salmivalli, 2017). In this data, bully-victims had an increased hazard for violent offenses by the age of 31 years, when they were compared to those who had not bullied others. Interestingly, their hazard did not differ from that of pure bullies. There have not been any previous longitudinal population-based studies that have reported whether being a bully-victim in childhood is associated with violent offenses in adulthood. Overall, studies on the criminal outcomes of bully-victims have been scarce (Sourander, et al., 2007a; Wolke, et al., 2013). However, they can be regarded as an especially vulnerable group of children, considering that their risk of negative long-term mental health outcomes has been reported to be particularly prominent, even compared to pure bullies (Brunstein-Klomek, et al., 2009; 2008; Copeland, et al., 2013a; Sourander, et al., 2007b; Wolke & Lereya, 2015).

7 Conclusions

The findings of this thesis emphasize the diversity of bullying victimization. First, there were wide variations in the prevalence of bullying in different contexts both over time, across sexes and across countries. The degree of the overlap of traditional and cyberbullying victimization varied. Importantly, this thesis also found that bullying victimization, especially by traditional bullying at school, decreased after the real-life implementation of the KiVa antibullying program. Contemporaneously, adolescents' perceptions of the attempts by teachers and other adults or students to intervene in bullying increased. Even though causal inference cannot be drawn from the epidemiological study settings that were used, it appears reasonable to suggest that KiVa could have had a positive impact on the rates of bullying victimization among adolescents and how they experienced their school context. These encouraging findings support further development and implementation of antibullying interventions. However, considering the heterogeneity of the findings in this study, it appears that effectively tackling bullying would mean including both traditional and cyber contexts or focusing on bullying behavior *per se*. Future research could aim to develop the understanding of the relationship between traditional and cyberbullying. Should they be conceptualized as two facets of one phenomenon or distinct phenomena—or something in between? Furthermore, studying trends in bullying over recent global crises, such as the COVID-19 pandemic with its vast lockdowns, may increase understanding on the phenomenon, possibly giving new ideas on the relationship between traditional and cyberbullying victimization.

Second, both traditional and cyberbullying victimization have been recognized as being associated with various mental health symptoms, as was also found in this thesis. Importantly, it was found that the association between bullying victimization and mental health symptoms was most profound among those who were victimized by both traditional and cyberbullying. Even though causality cannot be proven, including mental health promotion in antibullying actions could be beneficial. Clinicians need to be aware of these associations so that they can better detect the need for mental health support. The vast majority of the current literature on the association between bullying victimization and mental health symptoms has focused

on internalizing, externalizing or somatic symptoms. Future research could focus more clearly on symptoms of trauma. Bullying has been defined to be a form of youth violence (Gladden, et al., 2014), and it is quite surprising that the perspective of bullying victimization as a trauma has not been widely studied.

Third, relative age effects were found in bullying victimization, and these represented the “typical” relative age effects with the youngest within the school grade being in a disadvantaged position compared to their older peers. However, the opposite was found for bullying perpetration. Increasing awareness on these effects among teachers, school health personnel and parents would be important. This could provide another perspective to protecting children from bullying—not just from being victimized but also from being perpetrators.

Fourth, concerning the long-term detrimental outcomes associated with bullying perpetration, it was found that childhood bullies had a greater likelihood for violent offenses during late adolescence and young adulthood. Even though causal inference cannot be drawn due to the study setting, this finding warrants future research to reveal possible causal pathways, because of the harmfulness of violence affecting all those involved. If bullying perpetration is an antecedent of violence, preventing bullying could provide a possible way of preventing future violence.

Lastly, bullying affects children and adolescents globally, yet surprisingly little is known on bullying in developing countries. It would also be important to gain knowledge on bullying and bullying prevention in these countries.

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