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## **Bullying, violence and mental distress among young people. Cross-sectional population-based studies in Scania, Sweden.**

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Bullying, violence, and mental distress among young people



# Bullying, violence and mental distress among young people

Cross-sectional population-based studies in Scania, Sweden

Maria Fridh



**LUND**  
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DOCTORAL DISSERTATION

By due permission of the Faculty of Medicine, Lund University, Sweden. To be defended at Medelhavet, Wallenberglaboratoriet, Inga Marie Nilssons gata 53, Skåne University Hospital, Malmö. Friday, 1<sup>st</sup> of June 2018 at 9.00.

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Title and subtitle: Bullying, violence and mental distress among young people – cross-sectional population-based studies in Scania, Sweden		
<p>Abstract</p> <p><b>Aim:</b> The overall aim was to investigate associations between bullying, violence and mental health among young people in Sweden. Specific aims were to investigate differences in exposure to peer victimization among disabled and non-disabled adolescents (<i>Paper I</i>), the influence of social support on the relationship between cyber harassment and mental distress among adolescents (<i>Paper II</i>), the association between exposure to physical violence and mental distress among young adults (<i>Paper IV</i>), and furthermore to investigate associations between involvement in different cyberbullying roles and self-injury among mentally distressed adolescents (<i>Paper III</i>).</p> <p><b>Method:</b> Cross-sectional data from the public health surveys in Scania 2008, 2012, and 2016 was used. Logistic regression analysis was the primary method. <i>Paper I</i> (n=7533), <i>Paper II</i> (n=8544) and <i>Paper IV</i> (n=5929) were population-based studies while <i>Paper III</i> investigated self-injury in a study sample of mentally distressed students (n=6841). <b>Results:</b> <i>Paper I:</i> Among 9th grade students in 2012 more boys (24%) than girls (22%) reported some type of disability. Disabled students reported poorer health and were twice as often exposed to traditional bullying and cyber harassment than non-disabled peers. A difference in gender pattern was seen among disabled bullied adolescents as girls had the highest levels of psychological symptoms and boys the highest levels of somatic symptoms. Across six disability groups, students with ADHD/ADD reported the highest levels of mental distress and were also the most often bullied. <i>Paper II:</i> Among 9th grade students in 2012 more girls (20 %) than boys (14%) had been cyber harassed past year. Cyber harassment was associated with higher levels of subjective health complaints with stronger associations for victimization several times than once. Support from parents and friends (measured as easy communication) had a generally beneficial (main) effect for boys and girls, while indications of a stress-buffering effect of parental and friend support were seen among boys only. <i>Paper III:</i> Among adolescents (students in 9th grade compulsory school and 2nd grade upper secondary school in 2016) who affirmed broadly defined mental distress at least 2 weeks in a row past year (33 % of boys and 63 % of girls), past year self-injury was admitted by 12 % of boys and 26 % of girls. Associations between past year self-injury and cyberbullying were increasingly stronger in the order of: bullies; victims; to bully-victims. Statistical significance was lost among male cyberbullies after adjustment for risky life-style (alcohol, smoking, narcotics). <i>Paper IV:</i> Among young adults 18-34 years of age in 2008, exposure to physical violence was twice as often reported by men (10 %) than women (5 %). Mental distress past few weeks was more prevalent among women (28 %) than men (19 %), but while victimized women showed more than doubled odds of mental distress compared with non-exposed women, this pattern was not seen among men. The association found among women was attenuated but remained significant after multiple adjustments. In general men were most often violated in public places while women were most often violated at home. <b>Conclusion:</b> Reducing violence would be beneficial to mental health among young people in Sweden. Interventions focusing on the mechanisms behind peer victimization, aiming at improving the quality of peer and family relationships, might reduce the incidence of peer victimization both in school and online and reduce the level of mental distress. It is vital that those who are still victimized receive adequate help.</p>		
Key words: Bullying, Cyberbullying, Physical Abuse, Self-Injurious Behavior, Mental Distress, Adolescent, Young Adult, Population, Sweden		
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# Bullying, violence and mental distress among young people

Cross-sectional population-based studies in Scania,  
Sweden

Maria Fridh



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*To Bodil and Valle*

*Life must be lived prospectively but can only be understood  
retrospectively (Livet må leves forfra, men kan kun forstås bagfra)*  
Søren Kierkegaard



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Figures 4 and 8 published with due permission from the Research and analysis unit (Samhällsanalys) at Regional Development in Region Skåne (Regional utveckling, Region Skåne).

# List of papers

This thesis is based on the following papers:

- I. Fridh M, Köhler M, Modén B, Lindström M, Rosvall M. *Subjective health complaints and exposure to peer victimization among disabled and non-disabled adolescents: A population-based study in Sweden.*  
Scand J Public Health (2018) Mar; 46(2):262-271. doi: 10.1177/1403494817705558
- II. Fridh M, Lindström M, Rosvall M. *Subjective health complaints in adolescent victims of cyber harassment: moderation through support from parents/friends – a Swedish population-based study.*  
BMC Public Health (2015) Sep 23;15:949. doi: 10.1186/s12889-015-2239-7
- III. Fridh M, Lindström M, Rosvall M. *Associations between self-injury and involvement in cyberbullying among mentally distressed adolescents in Scania, Sweden.*  
Submitted for publication.
- IV. Fridh M, Lindström M, Rosvall M. *Experience of physical violence and mental health among young men and women: a population-based study in Sweden.*  
BMC Public Health (2014) Jan 11;14:29. doi: 10.1186/1471-2458-14-29

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Papers II and IV were published in one of Springer Nature's open access journals and are thus made available under the Creative Commons Attribution (CC-BY) license (which permits unrestricted use, distribution and reproduction in any medium provided the original work is cited).

The papers were written in the temporal order of IV, II, I, and III.

# Abbreviations

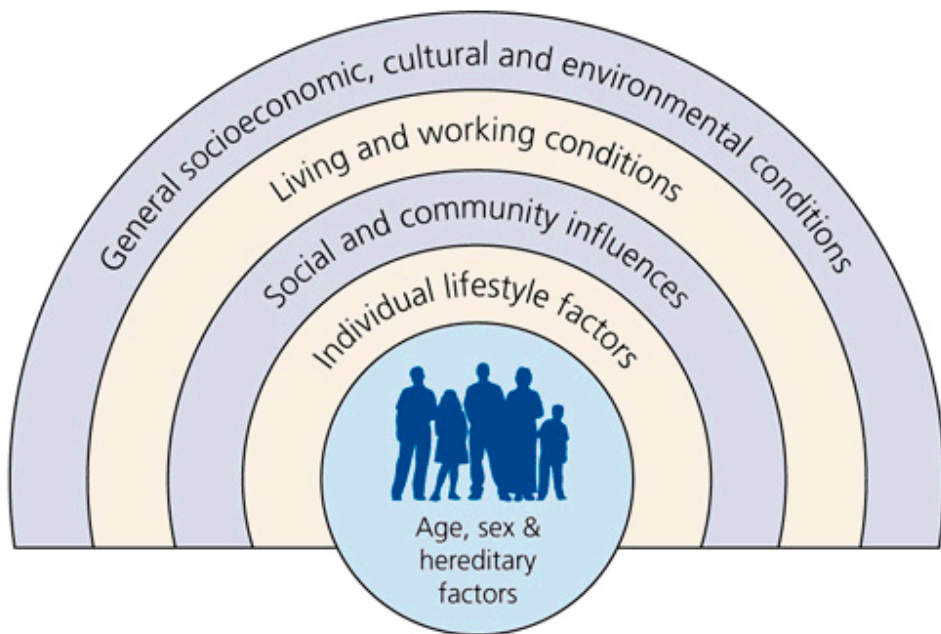
ADD	Attention Deficit Disorder
ADHD	Attention Deficit Hyperactivity Disorder
ASD	Autism Spectrum Disorder
CA	Childhood Adversity
CB	Cyber Bullying
CH	Cyber Harassment
CI	Confidence Interval
ERGT	Emotion Regulation Group Therapy
GHQ	General Health Questionnaire
HBSC	Health Behaviour in School-aged Children
HBSC-SCL	Health Behaviour in School-aged Children Checklist
ICT	Information & Communication Technologies
IM	Instant Messaging
IPV	Intimate Partner Violence
MMOGs	Massive Multiplayer Online Games
NDPs	Neurodevelopmental problems
OR	Odds Ratio
SCB	Statistics Sweden
SES	Socioeconomic Status
SHC	Subjective Health Complaints
SNS	Social Network Sites (e.g. Facebook, Twitter)
STBs	Suicidal Thoughts and Behaviors
TB	Traditional Bullying
TBV	Traditional Bullying Victimization
ULF	Statistics Sweden Survey of Living Conditions
WHO	World Health Organization

# Introduction

This thesis focuses on associations between violence (as bullying, cyberbullying or physical violence) and mental distress among young people in Scania, the southernmost part of Sweden. The association between two types of violence, cyberbullying and self-injury, is furthermore investigated among mentally distressed adolescents.

The french philosopher Emile Durkheim was the first person to investigate mental ill-health empirically in the general population by hypotheses testing, and in his masterpiece from 1897, "Suicide. A study in sociology" suicide is for the first time connected to societal patterns by thorough statistical analysis of data sources.<sup>1</sup> The basic theme is that suicide, which appears to be a phenomenon relating to the individual, actually is explicable aetiologically with reference to the social structure. As stated by the editor: "No social fact to him has been explained until it has been seen in its full and complete nexus with all other social facts and with the fundamental structure of society" (p.17). Social determinants of health are factors affecting health in the general population, positively as protective factors or negatively as risk factors.<sup>2</sup> Figure 1 illustrates the main influences on health as a series of layers on top of each other, translatable into four levels of public health interventions.<sup>3</sup> The age, sex, and genetic make-up of each individual are fixed factors at the center of this model.

Mental health partly depends on hereditary factors but is also influenced by social determinants of health.<sup>4,5</sup> The family is crucial for children in providing a safe environment and providing social support.<sup>2,5</sup> However, risk factors for bullying victimization (such as child maltreatment, domestic violence, parental depression and low socio-economic status) often co-occur in the same families.<sup>6</sup> In a life-course perspective, exposure to stressors can accumulate over time and affect epigenetic, psychosocial, physiological and behavioural factors.<sup>5</sup> A greater number of adverse events in childhood is associated with an increased risk of mental illness in adult years.<sup>5</sup> Emotional support from parents and peers are protective factors which can mitigate risk behaviors and buffer distress among children,<sup>5</sup> and the quality of parental and peer relationships in adolescence can predict adult self-reported mental and somatic health as much as 26 years later.<sup>7</sup> School factors are very important to children's well-being as so much time is spent in school and academic results influence future opportunities in life.<sup>2,5</sup>



**Figure 1. Social determinants of health**

Adapted from: Dahlgren G & Whitehead M. Policies and strategies to promote social equity in health. Background document to WHO - Strategy paper for Europe. Copenhagen: World Health Organization, 1991.<sup>3</sup>

Risky life-style behaviors such as smoking, drinking too much alcohol and using drugs are prevalent among psychiatric outpatients<sup>8</sup> and sometimes used as a form of self-medication.<sup>8,9</sup> Alcohol is furthermore an important risk factor of both poor mental health and violence.<sup>5,10</sup> Unemployment and economic stress are well known risk factors for poor mental health, and the duration of economic stress matters.<sup>11-13</sup> At the community level, factors such as availability to health care and neighbourhood trust and safety have an impact on mental health.<sup>5</sup> Thus contextual and individual social determinants of health interact over the life course in complex patterns.

## Mental distress

Mental health is defined by WHO as a resource for living a productive life:

”Mental health is a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.”<sup>14</sup>

The resource of mental health is particularly important in adolescence when young persons must deal with various challenges during their transition to adulthood. In order to identify vulnerable groups in need of interventions, researchers usually investigate ”non-health” and not health per se. Morbidity and mortality are important objective indicators of health but offer limited information in adolescence because of the low rates of illness and death among young. Furthermore, absence of mental disorder is not necessarily the same as presence of good mental health.<sup>5</sup> However, persons at risk in the general population can be identified by self-reported subjective indicators of health.

’Mental distress’ is a broad umbrella term that encompasses all forms of ”mental non-health” from transient mental disorders to severe psychiatric conditions.<sup>15</sup> In 2010 it was estimated that 38 % of the adult population in the European Union (EU) suffered from a mental disorder each year.<sup>16</sup> The estimated 12-month prevalence was higher for anxiety disorders (14 %) than for major depression (6.9%), and these conditions were more than twice as prevalent among women than men. Alcohol dependence (3.4 %) was three times more prevalent among men, while psychotic disorders (1.2 %) and bipolar disorder (0.9 %) were fairly equally rare. In Sweden common adult psychiatric disorders are often treated in the primary health care, where the prevalence was higher for major depression (12.4 %) than anxiety disorders (9.9 %) in a recent study.<sup>17</sup>

Among young in Sweden, the prevalence of mental distress (defined as psychiatric diagnosis or psychotropic medication) was estimated to be 10 % among boys and girls 10-17 years old, 10 % among young men 18-24 years old, and 15 % among young women 18-24 years old, according to a register-based study conducted by The National Board of Health and Welfare (Socialstyrelsen) in 2016.<sup>18</sup> This corresponds to almost 80 000 children 10-17 years old (45 300 boys and 34 200 girls) and more than 110 000 young adults 18-24 years old (47 200 men and 63 400 women) in Sweden.

During the past three decades *self-reported mental distress* has increased in the Swedish population, especially among young persons, which has resulted in a shift in the age distribution<sup>19</sup> (Figure 2). National data from The Statistics Sweden Survey of Living Conditions (ULF) show that self-reported anxiety (”besvär av



ängslan, oro eller ångest”) was most prevalent among old women and least prevalent among young persons 16-24 years of age in 1988. Between 1988 and 2016 self-reported anxiety decreased among the eldest (from 32 % to 22 % among 75-84 year old women) but increased dramatically among young persons aged 16-24 years (men: 4 % to 27 %; women: 9 % to 38 %).

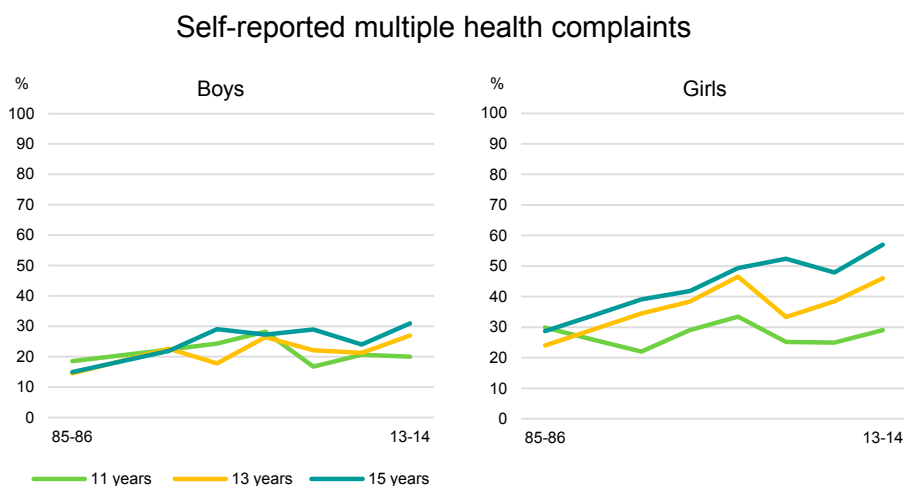


**Figure 2. Self-reported anxiety (%) in the Swedish general population 16-84 years of age, 1988-2016**  
 Men and women in different age-groups in 1988, 1994-2005, and 2008-2016. Home-based interviews until 2005, thereafter telephone-interviews. Question: "Do you have problems with anxiousness, nervousness or anxiety?" (Swedish: "Har du problem med ängslan, oro eller ångest?") Answers "Yes, slight problems" and "Yes, severe problems" combined. National data from The Statistics Sweden Survey of Living Conditions (ULF).

The same development of increasing mental distress is seen among Swedish school children, especially from 15 years of age.<sup>20</sup> Self-reported health complaints such as anxiety, depressive feelings, headache, stomachache etc. (sometimes

called "psychosomatic complaints") often indicate mental distress among children, and can be followed over time through the large WHO collaborative cross-national survey Health Behaviour in School-aged Children (HBSC) ("Skolbarns hälsövanor"), which has been conducted every fourth year in Sweden since 1985/86.<sup>21</sup> Nationally representative samples of students in 5th, 7th and 9th grades of compulsory school (i.e. children around 11, 13 and 15 years old) are asked how often they experience eight different subjective health complaints (SHC): four psychological SHC ("Feeling low"; "Feeling irritable or bad tempered"; "Feeling nervous"; "Sleeping difficulties") and four somatic SHC ("Headache"; "Stomachache"; "Backache"; "Dizziness"). Subjective health complaints are more often reported by girls than boys (in particular "Feeling low" and "Feeling nervous") and become more prevalent by age, especially among girls. Self-reported health complaints have become significantly more prevalent among Swedish school children during the last three decades,<sup>21</sup> with a larger increase in Sweden than in the other Nordic countries.<sup>20,22,23</sup>

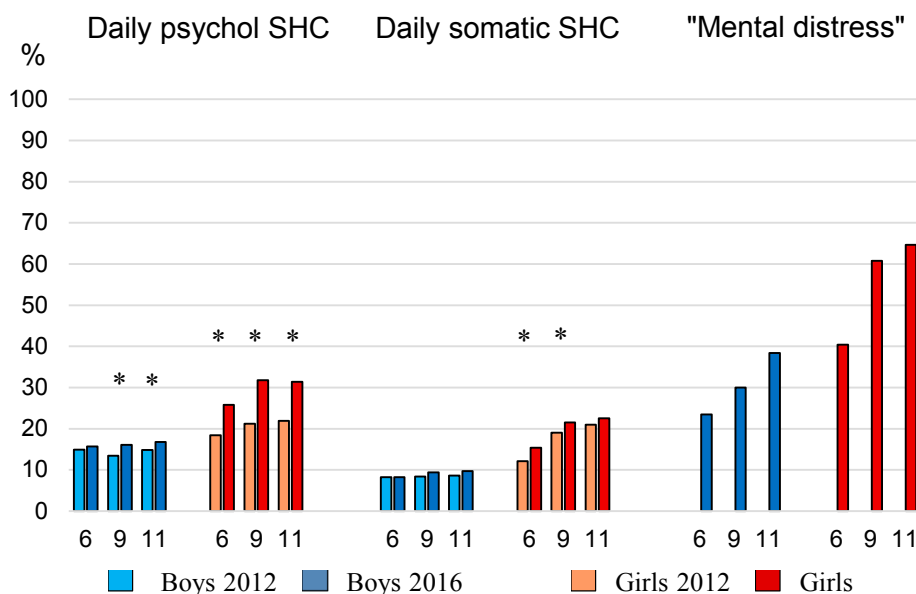
Figure 3 shows the time trend of subjective health complaints among Swedish school children from 1985/86 to 2013/14. The indicator "Multiple health complaints" is defined as two or more subjective health complaints (psychological and/or somatic) more than once a week during the past 6 months.<sup>21</sup> While there has been no increase among 5th grade boys or girls over time, the prevalence has doubled among 9th grade students and was 30 % among boys and almost 60 % among girls 15 years of age in 2013/14.



**Figure 3. Self-reported multiple health complaints (%) among Swedish school children, 1985-2014**  
 "Multiple health complaints" = at least two psychological and/or somatic health complaints more than once a week during the past 6 months. 1985/1986 to 2013/2014. Boys and girls, 5th grade students (11 years old), 7th grade students (13 years old), and 9th grade students (15 years old). Source: The Health Behaviour in School Children (HBSC) survey in Sweden. The Public Health Agency in Sweden (Folkhälsomyndigheten).<sup>24</sup>

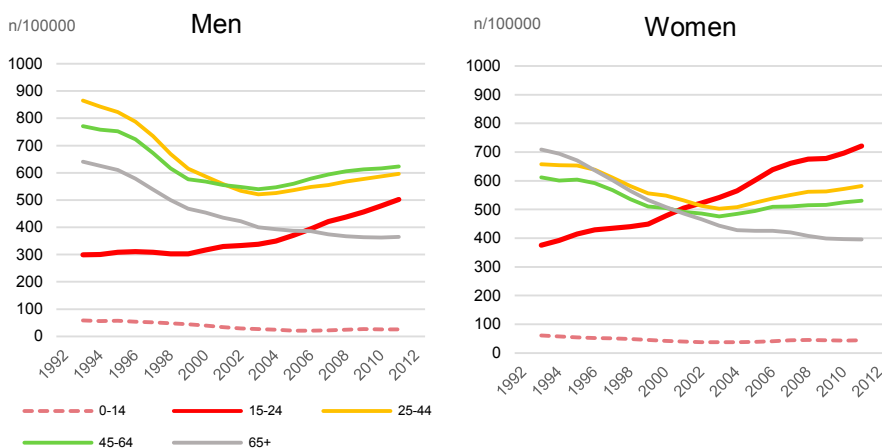
### Self-reported mental distress in Scania 2012 and 2016

Regional data on subjective health complaints among school students in the Swedish county of Scania is shown in Figure 4. Large public health surveys were performed in Scania 2012<sup>25</sup> and 2016<sup>26</sup> on students in 6th and 9th grade compulsory school and 2nd grade of upper secondary school (i.e. children around 12, 15 and 17 years of age) (these surveys provided data for Papers I-III in this thesis). The prevalence of mental distress in Scania is shown according to three measures: "Daily psychological SHC" (at least one psychological subjective health complaint (SHC) on a daily basis past six months); "Daily somatic SHC" (at least one somatic SHC on a daily basis past six months); and "Mental distress" (a broadly defined indicator introduced in the school survey 2016, see page 41 for more information). Between 2012 and 2016, Daily psychological SHC increased among boys and girls in all three grades except boys in 6th grade, and Daily somatic SHC increased significantly among girls in compulsory school in Scania.



**Figure 4. Mental distress (%) among students in 6th and 9th grades compulsory school and 2nd grade of upper secondary school in Scania, 2012 and 2016**  
 SHC = Subjective health complaints (Daily psychological SHC = at least one psychological health complaint on a daily basis past 6 months, Daily somatic SHC = at least one somatic health complaint on a daily basis past 6 months). "Mental distress" = psychological distress at least 2 weeks in a row past 12 months. Questions on SHC were asked in 2012 and 2016, "Mental distress" in 2016 only. Grade 11 = 2nd grade of upper secondary school. \* Significant difference between 2012 and 2016. The 2012 and 2016 public health surveys of children and adolescents in Scania.

Not only has self-reported mental distress increased among young persons in Sweden the past decades, the number of young persons receiving *psychotropic medication* and *inpatient psychiatric care* has also increased.<sup>18,20</sup> Figure 5 shows a considerable increase of psychiatric in-care patients 15-24 years old between 1992 and 2012, when at the same time psychiatric in-care patients in other age groups generally decreased.<sup>19</sup>



**Figure 5. Psychiatric in-care patients in different age groups, 1992-2012**

The number per 100000 inhabitants in different age groups treated in psychiatric in-care\* during 1992-2012, age-standardized 3-year means. \*Child and adolescent psychiatric in-care ("Barn- och ungdomspsykiatrisk vård"), Adult general psychiatric in-care ("Allmänpsykiatrisk vuxenvård"), Forensic psychiatric in-care ("Rättspsykiatrisk regionvård"), Special psychiatric in-care ("Psykiatrisk specialvård"), Geropsychiatric in-care ("Geropsykiatrisk vård"). Source: the National Patient Register (Patientregistret), The National Board of Health and Welfare (Socialstyrelsen), Sweden. In: Public health in Sweden, annual report 2014. The Public Health Agency in Sweden. (Folkhälsan i Sverige, årsrapport 2014. Folkhälsomyndigheten)<sup>19</sup>

The increase of psychiatric inpatients 15-24 year of age is primarily due to depression and anxiety syndromes (mainly women) and substance abuse (mainly men), but there has also been an increase in suicide attempts and personality disorders (mainly women).<sup>27</sup> The increase of *psychiatric diagnoses* among children (10-17 years) and young adults (18-24 years) 2006-2016 is partly due to an increase of neurodevelopmental problems (e.g. autism spectrum disorder and ADHD), especially among boys 10-17 years of age.<sup>18</sup> Furthermore, *disability pensions* ("förtidspension/ aktivitetsersättning") among young adults 19-29 years old have increased considerably in Sweden since 1990, with the increase since 2003 fully explained by disability pensions due to psychiatric reasons.<sup>20</sup> *Suicide*, the ultimate consequence of mental distress, has increased somewhat among Swedish youth 15-19 years of age between 1998-2014 while it has decreased in the age group 20-85 years.<sup>20</sup> Suicide decreased in other Nordic countries among adolescents 15-19 years of age between 1997-2013.<sup>20</sup>

Thus an increase of mental distress is seen among young people in Sweden according to self-reported complaints, psychotropic medication, psychiatric in-care, disability pensions due to psychiatric reasons, and suicide. Overall research has established that this is as a true increase, and not as previously discussed an artefact due to reduced stigma of mental ill-health across generations.<sup>18,20</sup> This alarming development is of great public health concern.<sup>18,20,27</sup> Self-reported health complaints may seem rather harmless but can predict severe mental health disorders. A Swedish community-based study showed that somatic symptoms such as abdominal pain and headache in adolescence predicted suicide and psychiatric disease 15 years later.<sup>28</sup> Self-reported anxiety predicted suicide attempts, psychiatric disease, hospital care, ischemic heart disease, and all cause mortality 5-10 years later in the Swedish population 16-74 years old,<sup>29</sup> and a study of 15 000 young persons 16-29 years of age showed that self-reported anxiety predicted psychiatric disease and suicide attempts in a five year follow-up, and furthermore childlessness at 35 years of age and poor economy at 33 years of age.<sup>27</sup> The outcomes were worse for those who reported severe problems of anxiety (3 %) than those who reported slight problems of anxiety (15 %), but the risks were significantly increased in both groups.<sup>27</sup>

Why has mental distress increased among young persons in Sweden? The causal reasons are unclear, but since the increase involves the whole population of young people (even if the levels of distress are higher in psychosocially vulnerable groups) it is likely that factors affecting the entire generation are involved.<sup>18,20</sup> Self-reported anxiety has increased among young men and women 16-29 years of age irrespective of family circumstances, country of birth, labour market status, parents' socioeconomic status, and geography (living in sparsely populated areas or cities).<sup>30</sup> Factors affecting all young people could be related to school or the transition into adulthood, e.g. finding a job and living accommodation of your own.<sup>18</sup> School has a major impact on adolescents' health, and cross-sectional Swedish studies show that stress related to school-work has increased over time in a development parallel to the increase of mental distress (probably a bi-directional relationship).<sup>20,21,31</sup> Many school students who would have preferred to work might feel obligated to pursue higher education today.<sup>30</sup> There are much fewer job opportunities for adolescents with incomplete education from upper secondary school since the economic crisis in Sweden 1991-1994 (when 300 000 young persons 15-24 years of age left the work force<sup>32</sup>). Links are strong between youth unemployment and mental distress,<sup>11,33</sup> and the poorest development regarding both were seen in Sweden during 1985-2006 among 10 European countries.<sup>33</sup> The increasing shortage of housing in Sweden affects young people in particular, and between 1997 and 2017 the proportion of young adults 20-27 years old still living with their parents increased from 15 % to 24 %.<sup>34</sup>

# Violence

The World Health Organization defines violence as:

“The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation.”<sup>35</sup>

Violence can be divided into three groups according to the perpetrator: self-directed (as in suicide or self-injury); interpersonal (e.g. child, partner, elder, acquaintance, stranger); collective (e.g. in war and in gangs), and furthermore into four categories according to the nature of violence: physical, sexual, psychological or violence involving deprivation or neglect (Figure 6).<sup>35</sup> The types of violence investigated in this thesis were interpersonal violence (bullying in Papers I-III, physical violence in Paper IV), and self-directed violence (self-injury in relation to cyberbullying in Paper III).

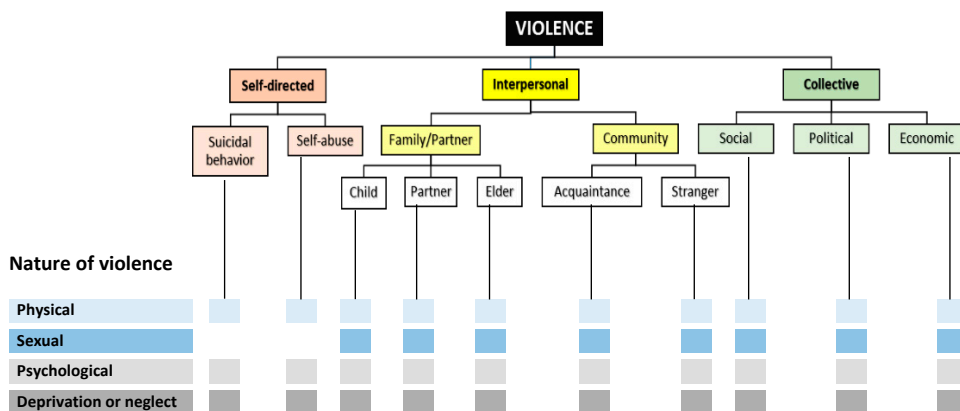


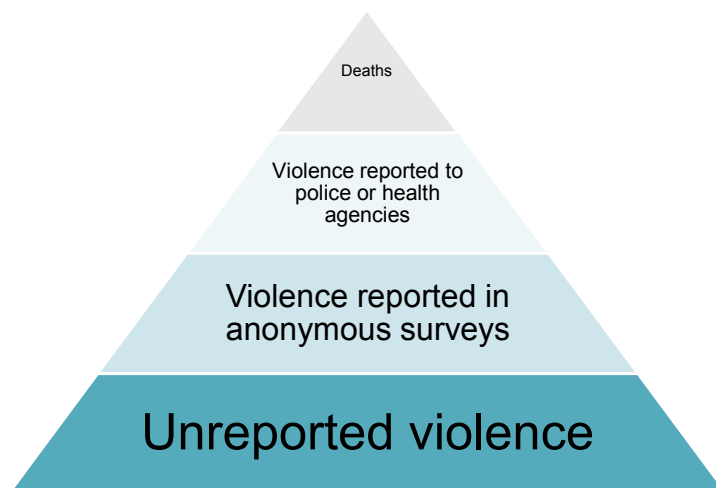
Figure 6. A typology for violence  
From Krug E et al. (2002) World Report on Violence and Health. Geneva, World Health Organization.<sup>35</sup>

The damage caused by violence involves much more than physical injuries. In the words of anthropologists Scheper-Hughes and Bourgois:

“Violence can never be understood solely in terms of its physicality – force, assault, or the infliction of pain – alone. Violence also includes assaults on the personhood, dignity, sense of worth or value of the victim. The social and cultural dimensions of violence are what give violence its power and meaning.”<sup>36</sup>

Violence is common and can to some extent be predicted by demographic and situational factors.<sup>37</sup> Those who have experienced one form of violence are more likely to experience other forms.<sup>37</sup> The prevalence of violence was investigated in a population-based study including all students in 9th grade compulsory school and 2nd grade of upper secondary school (i.e. adolescents around 15 and 17 years of age) in the Swedish county of Sörmland.<sup>38</sup> The self-reported prevalence was: 16.3% for life time child physical abuse; 12.5% for life time exposure to parental intimate violence; 9.3% for exposure to bullying past two months; and 5.8% for having been forced to engage in sexual acts. Exposure to violence was associated with poor health and risk-taking behaviors with a graded relationship to repeated abuse. Different types of violence often co-occurred, and the associations with physical and mental health problems, self-injury, and risk-taking behaviors (such as smoking, binge drinking, drug abuse, sexual risk behavior, shoplifting and violent acts) were increasingly stronger with the number of concurrent types of abuse.<sup>38</sup>

Corporal punishment was banned in 1979 in Sweden. Even so, 15 % of students in a population-based study reported that they had been boxed on the ear or hit by a parent or a caretaker, and of these less than 10 % had told any authority (e.g. personnel in school, social services, police) about this. More than one third had not told anyone.<sup>39</sup> Hidden statistics is a huge problem regarding most types of violence. Many victims suffer in silence because of fear of reprisals or because of shame.<sup>10,40</sup> Experiences of violence are more readily admitted in self-reported questionnaires than in interviews.<sup>37,41</sup> Death, the worst outcome of violence, is a very small tip of the iceberg (Figure 7).



**Figure 7. Most violence is hidden**

Adapted from: Violence/Intentional Injuries – Epidemiology and Overview by Rutherford 2008.<sup>37</sup>

## Bullying

Peer bullying is the most prevalent type of violence encountered by children.<sup>40</sup> Olweus (who is one of the most prolific researchers in this area) defined bullying by three criteria: intentionality; repetitiveness; and a power imbalance between perpetrator(s) and target.<sup>42</sup> (The power differential can be due to different factors such as age, physical strength, popularity etc.<sup>6,42</sup>) Bullying can be categorized as *physical* (e.g., hitting, pushing, kicking); *verbal* (e.g., name-calling, teasing in a hurtful way); *relational* (e.g., social exclusion and spreading rumors); and (in later years) as *cyber* (bullying by electronic means).<sup>43</sup> Physical and verbal bullying (more direct forms of bullying) are more prevalent among boys, while relational bullying (an indirect form of bullying) is more prevalent among girls.<sup>43</sup> Bullying in school may be termed "traditional bullying" in order to distinguish it from the new phenomenon of bullying online ("cyberbullying").<sup>42</sup>

Swedish schools have been obligated by law to take active measures in preventing bullying and other degrading treatment since 1985. Victimization by traditional bullying in school has decreased over time and is low in Sweden by international comparison,<sup>2,44</sup> but the associations between bullying and subjective health complaints are stronger in Sweden than in many other countries.<sup>44</sup> Swedish data from the HBSC study 2013/14 showed that around 3 % of boys and girls had been bullied during the past few months in 9th grade compulsory school, while 4% of boys and 2% of girls in the same grade admitted to bullying others.<sup>21</sup>

### *Bullying roles and context*

As bullying occurs within a social context both individual characteristics of the child (such as gender, internalizing/ externalizing behaviors) and contextual characteristics of the setting (such as school climate, peer status) matter.<sup>45</sup> School is not optional and children do not choose their classmates,<sup>46</sup> but by the time children are 18 years old they have spent more time in school than with their parents.<sup>40</sup> The bullying scene involves bullies, victims, and bully-victims (children involved in bullying both as bullies *and* victims). The remaining children may be labelled "non-involved" but bystanders are also affected<sup>46-48</sup> and bullying can have a broad impact on learning for all students.<sup>49</sup> In summary, victims show internalizing behaviors, bullies externalizing behaviors, and bully-victims show both internalizing and externalizing behaviors and generally fare the worst of all.<sup>6,45</sup>

*Pure bullies* are usually driven by status goals, especially adolescent males.<sup>46</sup> Bullies can be perceived as powerful and popular (although at the same time being disliked by their peers) perhaps because many adolescents appreciate challenges to adult norms and values at this stage of life, and some popular bullies combine bullying with prosocial behavior.<sup>40,46</sup> Pure bullies most likely do not have a



conduct disorder but they are more prone to delinquent behavior and are found in all socioeconomic and ethnic groups.<sup>40</sup> Status is the individual's relative standing in the peer hierarchy, so bullies need an audience and carefully choose their targets, as well as the time and place for the attacks.<sup>46</sup> Bullies select *victims* who are submissive, insecure of themselves, physically weak and in a low-power position in the group, which enable bullies to repeatedly demonstrate their power without fear of retaliation.<sup>46</sup> Repeated bullying consolidates the power relationship and the victims become increasingly unable to defend themselves, getting even more rejected by the group over time.<sup>46,48</sup> Victims are at higher risk of somatic problems such as colds, psychosomatic problems, internalizing problems (at even higher levels than before they were bullied), anxiety/depression disorder, self-harm and thinking about suicide.<sup>40</sup> *Bully-victims* have been described as impulsive, dysregulated, unpopular, aggressive and hot-tempered.<sup>40,46</sup> Bully-victims more often come from families with lower socioeconomic status (SES) and are frequently bullied by their siblings.<sup>40</sup>

### *Consequences of bullying*

Being bullied can have long-term consequences on mental health with adjustment difficulties in late adolescence and early adulthood, and later consequences for job opportunities and social relationships. A dose-effect relationship is seen as those who are bullied more frequently/severely/more chronically have worse outcomes than those who are bullied less harshly for a shorter time.<sup>40</sup>

Bullying was shown to be a major risk factor for victims, and even more so for bully-victims, in a review on long-term effects on bullying focusing on prospective studies that were able to control for pre-existing health conditions and other exposures to violence.<sup>40</sup> Bullying victimization in childhood was associated with elevated risks for psychotic experiences at 18 years of age, depression and anxiety disorder at 18-50 years of age, self-harm and suicidal ideation/ attempts/ suicide, serious illness, smoking, slower recovery from illnesses, poor school performance, less income than peers at age 50, and more problems with social relations in adult life (e.g. less likely to live with a partner). However, no associations were found between victimization and substance use or anti-social behavior.<sup>40</sup> Studies distinguishing between victims and bully-victims showed worse outcomes for bully-victims regarding mental health, economic adaptation, social relationships and early parenthood. Less is known regarding long-term outcomes of pure bullies.<sup>40</sup> Some studies differentiating between bullies and bully-victims found few adverse effects of being a bully on adult outcomes,<sup>40</sup> and although bullies may be at higher risk of low education, unemployment, and anti-social delinquent behavior (e.g. drug use, burglary and serious crime)<sup>42</sup> compared with non-involved peers, these effects may disappear when other adverse family and childhood risk factors are taken into account.<sup>40,50</sup>

## *Cyberbullying*

While traditional bullying has consistently decreased in most countries including Sweden,<sup>51</sup> the new phenomenon of cyberbullying has increased. The rapid technological advancements in information and communication technologies (ICT) has provided a new arena for both social interaction and opportunities for abuse.<sup>52</sup> Practically all adolescents in Sweden have their own smartphone today,<sup>53</sup> and the use of Internet is integrated in daily life with continuous updating and interacting as young persons are no longer simply consumers of media but also producers.<sup>53</sup> Girls use more social networking sites, chats, and blogs, and more sites where you can upload pictures for public display (e.g., Instagram, Snapchat), while boys play more games.<sup>53</sup> In the survey “Kids & media 2017” by the Swedish Media Council (Statens medieråd), 79 % of 18-year old boys reported spending at least three hours every day on the internet and 76 % of 15-year old girls spent at least this much time on their mobile phones every day.<sup>53</sup> Online communication may be popular among youth in part because it seems to provide a sense of privacy, which encourages greater self-disclosure than communicating face-to-face.<sup>54</sup>

Victimization in cyberspace can be broadly defined as “bullying or harassment performed via electronic means”,<sup>55</sup> but research has yet to agree on a more precise definition. The first studies on cyberbullying were published in 2004 and the annual number of scientific publications has since increased rapidly.<sup>56</sup> Agreeing on a comprehensive and static definition of cyberbullying is understandably a challenging task considering the technological development, but the lack of consensus on definition and operationalization seriously limits cross-study comparisons.<sup>56</sup> Past year involvement in cyberbullying varied widely in a recent review of 159 international studies: between 1.0 – 61 % for cybervictims (more girls than boys), 3.0 – 39 % for cyberbullies (more boys than girls), and 1.5 - 72 % for cyberbully-victims.<sup>56</sup>

It would seem logical to simply translate the concept of traditional bullying into the cyber context,<sup>57</sup> but the criteria of traditional bullying—intent to harm, repetition over time, and an imbalance of power between the perpetrator and the victim—are more difficult to define in the cyber context than in real life.<sup>58</sup> Whether there is an intent to harm may be more difficult to determine from communication online than in real life as most social cues are missing.<sup>54</sup> A single online act, such as posting a malevolent picture, may be seen, commented on, and forwarded by many others, which constitutes a repetition, but not necessarily an act of repetition involving the original perpetrator.<sup>58</sup> (For this particular bullying criteria it might be more relevant to consider the number of individuals reached or the length of time the negative message or image remains in cyber space<sup>59</sup>). The anonymity of the cyber perpetrator can be viewed as a form of power imbalance, as can the difficulty of escaping from victimization online—there is no safe haven,

not even at home.<sup>52,59</sup> It has been argued that all three elements of traditional bullying may be present in a single online interaction.<sup>60</sup> It has also been proposed that cyber victimization is less harmful than victimization by traditional bullying as the victim cannot be hurt physically.<sup>61</sup> Research has shown similar negative outcomes for involvement in cyberbullying and traditional bullying in school-aged youth.<sup>62-64</sup> The overlap between the two types of peer victimization is considerable, with those being victimized both in real life and online being particularly distressed.<sup>63,65</sup>

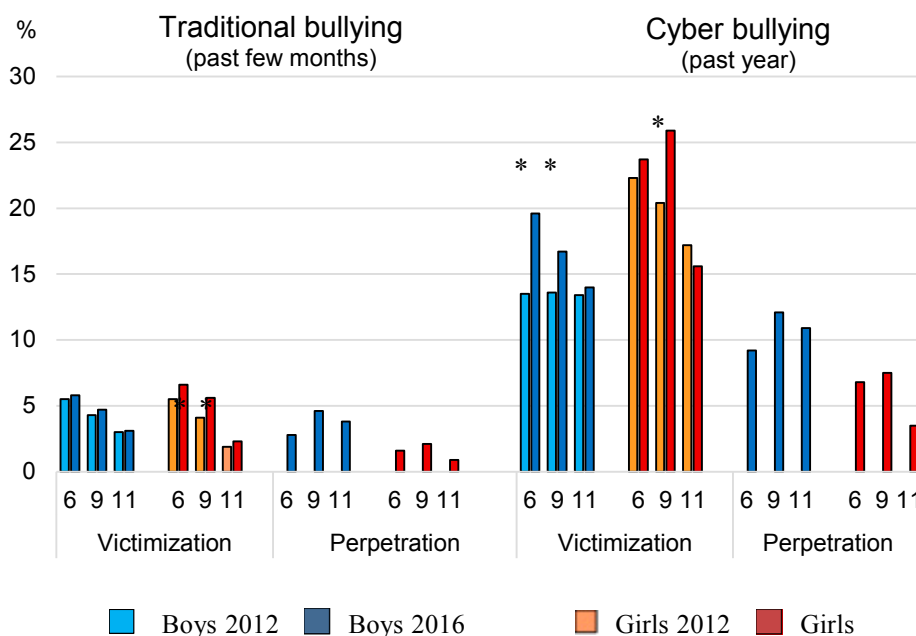
According to recent national data from the Swedish Media Council (Statens medieråd) the past-year prevalence of cyberbullying among Swedish children was 9 % (for 9-12 years old); 21 % (for 13-16 years old); and 19 % (for 17-18 years old) in 2017, defining cyberbullying as: “Someone having been mean to, or bullied/ threatened/ posted pictures or film clips of you, against your will on the internet or the mobile phone”.<sup>53</sup>

Cyberbullying can be perpetrated in an abundance of different ways<sup>54</sup>, see Box 1.

Box 1	Different methods of cyberbullying
<ul style="list-style-type: none"> <li>• <b>"Catfishing"</b>, i.e. tricking people into emotional/ romantic relationships over a long period of time by fabricating online identities and entire social circles</li> <li>• <b>Cheating, forming roving gangs, and blocking entryways</b> in massive multiplayer online games (MMOGs)</li> <li>• <b>Disseminating derogatory insults</b>, humiliating and/or threatening messages or pictures to the targeted individual and to an online community</li> <li>• <b>"Flaming"</b>, an antagonistic "in your face" argumentative style of onlined communication used primarily, but not exclusively by males</li> <li>• <b>Impersonating</b> others online</li> <li>• Online <b>"slamming"</b> in which "by-standers" participate in the online harassment</li> <li>• <b>Rattng</b>, i.e. controlling the targeted individual's computer/webcam via Remote Control Administration Tool software without their knowledge or consent, thereby gaining access to targeted individual's files, spying on the individual and controlling the functions/operations of their computer</li> <li>• <b>Relational aggression</b>, e.g. spreading rumors, creating a false Facebook page to exclude or ostracize a target, deleting the target from a friendship list, posting cruel messages or threats on a social network profile such as the target's Facebook wall</li> <li>• <b>Sexting</b>, i.e. circulating embarrassing/ humiliating/ and/or sexually suggestive pictures</li> <li>• <b>Shock trolling</b>, i.e. mean-spirited offensive posts or messages in an online community intentionally designed to anger, frustrate or humiliate someone in order to provoke a response</li> <li>• <b>Stalking</b> people online and threatening violence</li> <li>• The cyberbully can target an individual via blogs, cellphones, emails, instant messaging (IMs), Internet polling, massive multiplayer online games (MMOGs), social networking sites (e.g. SNS such as Facebook, Twitter), text messaging, video chat services, virtual worlds, webcams and websites.</li> <li>○ <i>Source: Chisholm (2014) Review of the status of cyberbullying and cyberbullying prevention</i></li> </ul>	

*Peer victimization in Scania 2012 and 2016*

Figure 8 shows the prevalence of involvement in traditional bullying and cyberbullying among students in 6th and 9th grade compulsory school and 2nd grade of upper secondary school in the Swedish county of Scania in 2012 and 2016.<sup>25,26</sup>



**Figure 8. Involvement (%) in traditional bullying past few months and cyberbullying past year among students in 6th and 9th grade compulsory school and 2nd grade of upper secondary school in Scania, 2012 and 2016**  
 Victimization in 2012 and 2016. \* Significant change over time. Perpetration in 2016. Grade 11 equals 2nd grade of upper secondary school. The 2012 and 2016 public health surveys of children and adolescents in Scania.

Among adolescents in Scania, students in compulsory school (around 12 or 15 years of age) were more often involved in both types of bullying than older adolescents in 2nd grade of upper secondary school (around 17 years of age), which is in line with younger children more often being involved in bullying.<sup>2,21</sup> Girls were more often victims and boys more often perpetrators, and the perpetrators were most often students in 9th grade compulsory school.<sup>2,21</sup> In Scania, victimization by traditional bullying increased significantly among girls in compulsory school between 2012 and 2016. Victimization by cyberbullying increased significantly among boys in compulsory school and among 9th grade girls. Questions on perpetration were only asked in 2016.

Peer victimization by traditional bullying and/or cyberbullying was investigated in Papers I-III, and in Paper III the different roles of cyberbullying were investigated in relation to self-injury.

## **Physical violence**

Women and men are exposed to physical violence in different situations. Men (especially young men) are more often involved in physical violence both as victims and perpetrators, more often hospitalized due to injuries and more often die as a result of violence than women.<sup>66</sup> Data from the Swedish national public health survey Life & Health (Liv & Hälsa) show a decreasing time trend 2004-2016 regarding past year exposure to physical violence among young men 16-29 years of age (from 13 % to 8 %) while the time trend was stable among young women in the same age group (5 % in 2004 and 4 % in 2016).<sup>67</sup>

While men are most often assaulted in a public place by an unknown perpetrator, women are more often exposed to domestic violence by someone close to them.<sup>66</sup> More women than men are killed by a current or former partner.<sup>66</sup> Violence in a partner relationship severely impacts the victim's physical and mental health with serious long-term consequences.<sup>66,68</sup>

The association between exposure to physical violence and mental distress was investigated among young men and women 18-34 years old in Paper IV.

## **Self-directed violence**

Self-directed violence is a broad term that includes suicidal thoughts and behavior (STBs: ideation, plans, and attempts<sup>69</sup>) as well as different types of self-injuring behaviors.<sup>70</sup> STBs seem to progress over time as suicidal ideation is more common in the beginning of adolescence, suicide attempts at the end of adolescence, and the number of suicide deaths increase at young adulthood.<sup>71</sup>

### *Self-injury*

Studies on self-injurious behavior usually refer to direct intentional destruction of one's own body tissue<sup>72,73</sup> even if all behaviors that are performed intentionally, and with the knowledge that they can or will result in some degree of injury to oneself, could be conceptualized as self-injurious behavior.<sup>72</sup> There is no general consensus on definition and estimates vary widely.<sup>74,75</sup> A distinction is sometimes made according to suicidal intent, but in reality this is difficult to determine<sup>71</sup> as suicidal intentions may be ambivalent, dissimulated, or concealed.<sup>76</sup> Self-injury is

a strong predictor of future suicide attempts, perhaps because this behavior increases both suicidal ideation and the ability to act despite pain.<sup>73</sup>

Self-injury is highly prevalent in clinical samples<sup>73</sup> as this behavior co-occurs with a wide spectrum of psychiatric diagnoses (e.g. depression, anxiety, eating disorder)<sup>77</sup> and is furthermore a diagnostic criterion of borderline personality disorder.<sup>76</sup> Self-injury is also prevalent in community samples when investigated by a multi-item check-list type of questionnaire.<sup>75</sup> For example, 45 % of girls and 38% of boys in 7th and 8th grade of compulsory school (13-14 years old) reported at least one instance of self-injury during the past 6 months, when asked specifically about nine different self-injuring methods in a Swedish community study (Cutting wrists, arms, or body areas; Minor cutting causing bleeding; Carving words, pictures, etc. into the skin; Burning oneself with cigarette, lighter or match; Severe scratching causing bleeding; Sticking sharp objects into the skin; Biting oneself so that the skin is broken; Punching oneself or banging one's head, thereby causing a bruise; and Preventing wounds from healing.)<sup>78</sup> Self-injury was more often associated with psychopathology among girls than boys,<sup>79</sup> and rumination/negative thinking and a lack of positive feelings toward parents were predictors of self-injury independently of general psychopathology.<sup>80</sup>

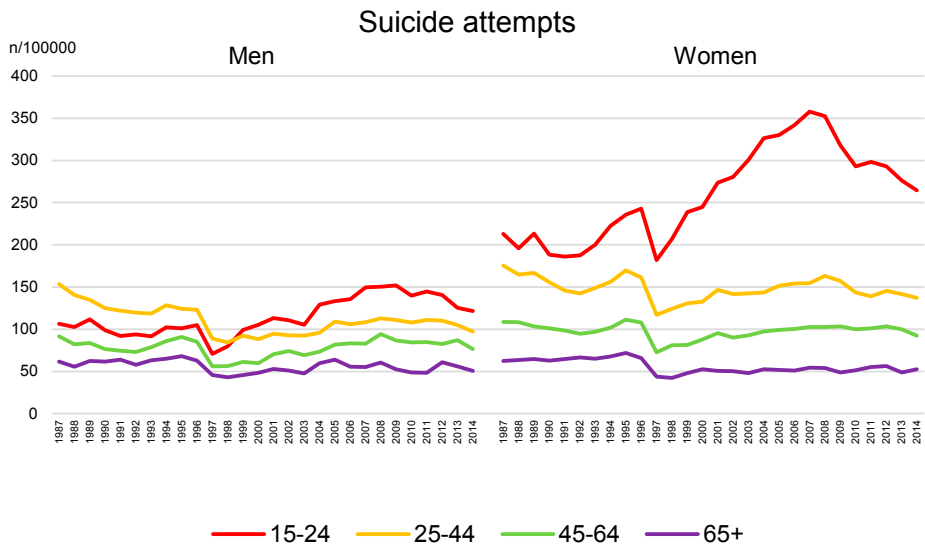
The onset of self-injuring behavior is typically around age 13 or 14 years<sup>73</sup> which coincides with the time of puberty and the increase of internalizing symptoms among girls.<sup>9</sup> Most people who self-injure use multiple methods,<sup>9,74</sup> but girls more often use cutting and boys more often use hitting or burning,<sup>74</sup> and repetition is common.<sup>9</sup> As the physical injuries are often mild and kept in secret only a minority seek help.<sup>9,74</sup> Intentional self-injury can be used as a short-term efficient (although destructive) coping method to reduce intense negative feelings (e.g. to stop feeling “numb” or empty, to punish oneself, or to feel something, even though it is pain).<sup>73,75</sup> Promising results on reducing self-injuring behavior among adolescents have been seen in short-term group therapy focusing on increasing emotion regulation (emotion regulation group therapy, ERGT).<sup>81,82</sup>

Self-injury co-occurs with other types of violence, such as peer victimization in school or online.<sup>83</sup> Self-injury was five times more prevalent among bullied students than non-bullied peers in a school survey of all 9th grade students in a Swedish county.<sup>84</sup> Longitudinal studies have shown that being bullied in childhood increases the risk of self-injury in adolescence,<sup>85,86</sup> both directly and indirectly via depression.<sup>86</sup>

In this thesis self-injury was investigated in relation to different roles in cyberbullying among mentally distressed adolescents in Paper III.

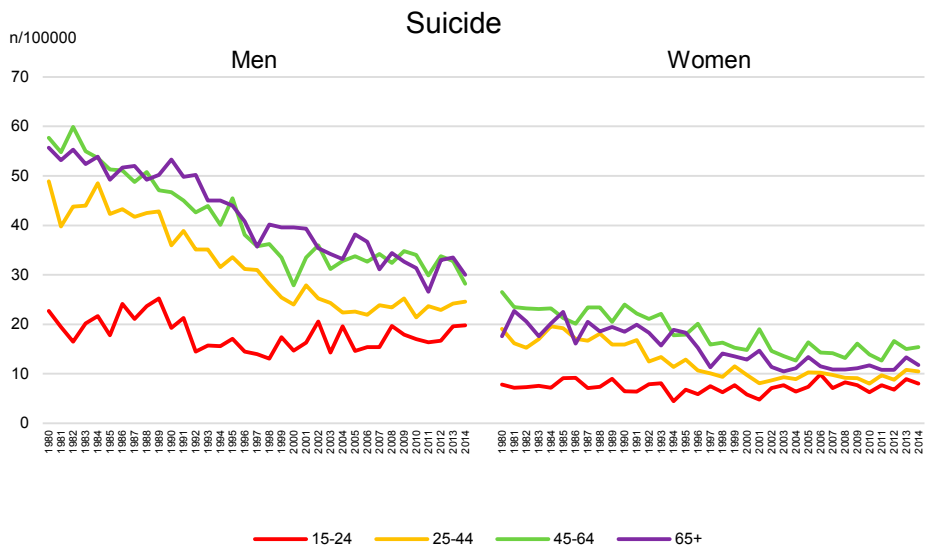
### *Suicide attempts and suicide death*

Figures 9 and 10 show the incidence of suicide attempts and suicide in different age groups in the Swedish population over time. Suicide attempts are most frequently performed by young women 15-24 years of age while suicide is most often committed by older men.<sup>87,88</sup> The suicide rate has not declined among young persons 15-24 years of age during the past decades as it has in all other age groups,<sup>88</sup> and suicide is the most common cause of death among young persons aged 15-24 years in Sweden.<sup>89</sup> Psychological postmortem studies showed that most adolescents who committed suicide were depressed at the time of their death.<sup>90</sup>



**Figure 9. Suicide attempts in the Swedish population in different age groups, 1987-2014**

Number hospitalized for certain and uncertain suicide attempts per 100 000 persons per year. Men and women, 15-24 years old, 25-44 years old, 45-64 years old, and 65 years or older. Source: National Centre for Suicide Research and Prevention of Mental Ill-Health, Sweden (NASP)



**Figure 10. Suicide in the Swedish population in different age groups, 1980-2014**

Number of certain and uncertain suicides per 100 000 persons per year. Men and women, 15-24 years old, 25-44 years old, 45-64 years old, and 65 years or older. Source: National Centre for Suicide Research and Prevention of Mental Ill-Health, Sweden (NASP)



## Social support

Social support is a well established protective factor for health.<sup>2,91</sup> Parental support is the first significant source and it continues to be valuable when children grow up.<sup>92,93</sup> Adolescents who communicate easily with their parents have fewer subjective health complaints than peers with non-easy communication,<sup>94</sup> and in adolescence relationships to parents have been shown to be a stronger predictor of good health than relationships to siblings or friends.<sup>94,95</sup> Parental support might be especially valuable when dealing with adversity such as bullying victimization,<sup>96</sup> for example by helping children cope with the distress of being bullied.<sup>6,83,84</sup> A meta-analysis on parenting behavior concluded that positive parenting behavior with good communication, a warm affectionate relationship, parental involvement and support, and parental supervision were protective against peer victimization.<sup>97</sup>

Peer support becomes increasingly important as children move into adolescence,<sup>2,98</sup> and positive peer relationships are crucial regarding developmental tasks such as forming identity, establishing autonomy and developing social skills.<sup>2</sup> Having more friends has been shown to be protective in traditional bullying, but not in cyberbullying.<sup>43</sup> Social support from parents and peers may protect traditionally bullied students against engaging in self-injurious behavior.<sup>99</sup>

Social support is a broad concept covering several different aspects, such as communicating that a person is valued and accepted despite human flaws (emotional support), helping the person to understand and cope with problematic events (informational support), providing distraction from worries and a social belonging (social companionship), and providing time, money, and material resources (instrumental support).<sup>100</sup> In this thesis, support among students was measured as easy communication, which in a good relationship could be a proxy for several different aspects of support.

The influence of social support on health can be described by two alternative (but not mutually exclusive) theoretical models: "the main effect model" and "the stress-buffering model".<sup>100</sup> According to the main effect model, support has an overall beneficial effect on psychological outcomes regardless of the level of adversity experienced. The stress-buffering model suggests that the protective effect of support differs according to level of stress experienced, i.e. youth with higher levels of peer victimization would benefit more from social support than youth who are less victimized. There is evidence for both models, but while the evidence is robust for a general beneficial influence of social support on mental health among bullied children,<sup>93,98,101-105</sup> evidence regarding the stress-buffering model is inconclusive.<sup>93,98,101,102,104,105</sup>

The protective influence of parental and friend support (measured as easy communication) against mental distress in the context of cyber victimization was investigated according to the main effect model and the stress-buffering model in Paper II.

## Disability

Disability is defined as an umbrella term for impairments, activity limitations and participation restrictions by the International Classification of Functioning, Disability, and Health (ICF),<sup>106</sup> but there is no consensus of what conditions to include.<sup>107,108</sup>

Regardless of how disability is defined, the proportion increases by age in the general population.<sup>108</sup> In the public health surveys “Health on equal terms” (“Hälsa på lika villkor”) conducted by the Swedish National Institute of Public Health (Folkhälsoinstitutet) disability included: long-term illness/ post-injury problems with seriously reduced capacity for work or other daily activities; visual/hearing disability (that cannot be corrected); and the inability to walk without help.<sup>109</sup> Further analysis of national data from 2005-2007 showed that disabled adults more often had little education and a poorer financial situation (fewer worked professionally), poorer mental, physical and dental health, more risky life-style behaviors (such as smoking, drinking alcohol, gambling, a sedentary life style), and more frequent exposure to violence and discrimination than non-disabled persons.<sup>109</sup>

Likewise, children categorized as disabled reported poorer physical and mental health<sup>108</sup> and were more often subjected to victimization compared with non-disabled peers.<sup>107,108,110-112</sup> A Swedish national total population study of all students in 6th and 9th grade compulsory school (around 12 and 15 years of age) showed that disabled students were four times more likely to be bullied compared with non-disabled peers (disability defined as “for example having a physical disability, dyslexia, visual and/or hearing impairments, ADHD, epilepsy or diabetes”).<sup>108</sup>

In the Swedish Media council’s latest report Kids & media 2017, disabled adolescents 13-16 years old twice as often reported past year exposure to cyberbullying (23 % vs. 11 %) or online threats (10 % vs. 5 %) than average.<sup>53</sup> A substudy on adolescents 13-16 years with neurodevelopmental problems (NDPs, e.g. ADHD, ASD) in 2015 showed that youth with NDPs more often had experienced that someone had been mean to or bullied them online past year compared with peers without NDPs (29 % vs. 12 %).<sup>113</sup> Children with neurodevelopmental diagnoses such as ADHD and ASD constitute a special group

of disability with heightened risk of peer assault and bullying due to difficulties in social interaction.<sup>107,114</sup> The number of individuals diagnosed with ADHD has increased in all age groups in Sweden between 2006 and 2011.<sup>115</sup>

Most studies investigating disability have either used an index of different disabilities or focused on one form of disability. Few studies have investigated outcomes across disability types,<sup>107,116</sup> and as commented in a recent review, relatively little research has examined the association between cyberbullying victimization and disability.<sup>117</sup>

Associations between exposure to traditional bullying victimization and/or cyber harassment among students with and without disability, as well as psychological and somatic subjective health complaints across different types of disability, were investigated in Paper I.

# Aims and objectives

The overall aim of this thesis was to investigate associations between bullying, violence and mental distress among young people.

The specific aims were to investigate:

- ... mental distress among disabled and non-disabled adolescents, focusing on the impact of traditional bullying victimization and/or cyber harassment, and furthermore to investigate mental distress across different types of disability (*Paper I*)
- ... the influence of parental/friend support on the association between cyber harassment and mental distress among adolescents (*Paper II*)
- ... the associations between self-injury and involvement in cyberbullying as a cyberbully, cybervictim, or a cyberbully-victim among mentally distressed adolescents (*Paper III*)
- ... the association between exposure to physical violence and mental distress among young men and women, and furthermore to explore the setting of violence (*Paper IV*)



# Subjects and Methods

## Subjects

All subjects in this thesis were young persons living in Skåne (Scania), the southernmost region of Sweden. They participated in one of three regional public health surveys conducted by the county of Scania, i.e., the 2008 public health survey of Scania (young adults in Paper IV), the 2012 public health survey of children and adolescents in Scania (Papers I-II), and the 2016 public health survey of children and adolescents in Scania (Paper III).

The primary purpose of these large cross-sectional surveys was to map out the health situation in the general population of Scania in order to facilitate public health work regionally and locally. The adult population 18-80 years old was investigated for the first time in 2000 with repeated surveys in 2004, 2008, and 2012. The public health survey of school students in Scania in 6th and 9th grades of compulsory school and 2nd grade of upper secondary school was performed for the first time in 2012 and repeated in 2016.

### **The 2008 public health survey in Scania**

A total of 52 142 persons aged 18–80 years (a random stratified sample selected from the official population registers of people living in Scania) received a postal questionnaire in September 2008. After two reminder letters a total of 28 198 had returned completed questionnaires (response rate 54.1 %).<sup>118</sup> This survey consisted of 134 main questions (in total 273 items including subqueries and follow-up questions). The following topics were included: Health; Medication; Sleep and well-being; Dental health; Life-style; Sexual health; Social relations; Violence; Trust in societal institutions; Occupation and economy; Work environment; Corporate health care; Home environment; Life quality; Health care consumption; and Background data.

Paper IV included all participants 18–34 years old who had answered the questions on physical violence and mental distress (GHQ-12), i.e.: 5929 young adults, 2502 men and 3427 women.

## **The 2012 public health survey of children and adolescents in Scania**

The first public health survey of school students in Scania including the majority of all students in 6th and 9th grades of compulsory school and 2nd grade of upper secondary school (i.e., adolescents around 12, 15, and 17 years of age) was performed in 2012. The questionnaire included questions on living conditions, lifestyle factors, mental and physical health, sleep, well-being, social relations, and school,<sup>25</sup> and while students in the two older grades received 116 main questions (in total 290 items including subqueries and follow-up questions) students in 6th grade received a slightly shorter questionnaire. The pen and paper questionnaires were completed anonymously during one school-hour in classrooms in March 2012. Students with reading disabilities had access to audiovisual technical help. In total 29 428 students answered the questionnaire, i.e.: 9650 (85 %) in 6th grade compulsory school; 9791 (83 %) in 9th grade compulsory school; and 9987 (72 %) in 2nd grade of upper secondary school (response rates based on the number of students registered in the participating schools). Students who were absent could not reply at a later time.

Paper I included boys and girls in 9th grade compulsory school (15-16 years old) who had answered all questions on disability, subjective health complaints (SHC), victimization by traditional bullying and cyber harassment, i.e.: 7533 students, 3608 boys and 3925 girls.

Paper II included boys and girls in 9th grade compulsory school (14-17 years old) with answers on all eight subjective health items (SHC), i.e.: 8544 students, 4190 boys and 4354 girls.

## **The 2016 public health survey of children and adolescents in Scania**

A second public health school survey was performed in 2016, using the same modus operandi as in 2012.<sup>26</sup> This survey was revised according to feed-back from participants 2012, including updates on questions regarding digital media due to the rapid technological development. A new question on mental distress was added and those who answered “Yes” received a follow-up question on self-injury. The questions on traditional bullying and cyber bullying were extended with items on perpetration. However, many questions were kept identical to those in 2012 in order to enable comparison over time. Students in the two older levels received a questionnaire consisting of 106 main questions (in total 235 items including subqueries and follow-up questions), while students in 6th grade compulsory school received a slightly shorter questionnaire. Language options were Swedish and English.

Students completed the questionnaires anonymously during one school-hour in January 2016 (nearly 80 % online). Those who were absent could not reply at a later time. In total 27 395 students answered the questionnaire, i.e.: 10 303 (83 %) in 6th grade compulsory school; 9143 (77 %) in 9th grade compulsory school; and 7949 (73%) in 2nd grade of upper secondary school (response rates based on the number of students registered in the participating schools).

Paper III included boys and girls in 9th grade compulsory school (14-17 years old) combined with boys and girls in 2nd grade of upper secondary school (15-21 years old), who had answered both cyberbullying questions (victimization/ perpetration), replied "Yes" to the new question on mental distress and furthermore answered the follow-up question on self-injury, i.e.: 6841 students, 2257 boys and 4584 girls.

**Table 1. Overview of studies included in this thesis**

All studies were cross-sectional.

Paper	Data source	Associations between...	Informants
I	The 2012 child and adolescent public health survey in Scania	Peer victimization (TB and/or CH) and SHC among disabled and non-disabled adolescents (n=7533)	Students in 9th grade compulsory school (n=9791)
II		CH and SHC, influence of support (and TB) (n=8544)	
III	The 2016 child and adolescent public health survey in Scania	Involvement in CB as a bully, victim, or bully-victim and self-injury among mentally distressed adolescents (n=6841)	Students in 9th grade compulsory school + 2nd grade of upper secondary school (n=17092)
IV	The 2008 public health survey in Scania	Experience of physical violence and self-rated psychological health (GHQ-12) (n=5929)	Adults 18-34 years old (n=6193)

TB = traditional bullying, CH = cyber harassment, SHC = subjective health complaints, CB = cyber bullying, GHQ-12 = General Health Questionnaire 12 items

The Scania public health surveys asked for information on health and living conditions which is not harmful per se, although some questions might raise further thoughts and reflections. It was clearly stated in the survey that participation was completely voluntary and that no individual answers would be identifiable in the presentations of results. The school surveys were furthermore anonymous. At the end of the school questionnaire students were thanked for their participation and encouraged to talk to someone (e.g. parents, other adult person, teacher, or school health care staff) if there was something in the survey they could not get out of their mind.



## Measures of central concepts

“The words of everyday language, like the concepts they express, are always susceptible of more than one meaning, and the scholar employing them in their accepted use without further definition would risk serious misunderstanding.” (Emile Durkheim, *Le Suicide* 1897, p. 41)<sup>1</sup>

### **Mental distress** (Papers I-IV)

#### *Subjective Health Complaints (SHC) (Papers I-III)*

Subjective health complaints is a general term used to describe a variety of common health symptoms (such as headache, stomachache, nervousness, etc.) experienced with or without a diagnosis.<sup>119</sup> We chose to assess subjective health complaints by the Health and Behaviour in School-aged Children Symptom Checklist (HBSC-SCL), a reliable and valid instrument<sup>119</sup> used for decades in the cross-national WHO collaborative study Health Behaviour in School-aged Children.<sup>2</sup> The students were asked how often they had experienced eight subjective health complaints in the last six months (Headache; Stomachache; Backache; Feeling low; Feeling irritable or bad tempered; Feeling nervous; Difficulties in falling asleep; Dizziness), pinpointing the frequency of each complaint on a five grade scale (“About every day”; “More than once a week”; “About once a week”; “About once a month”; “Rarely or never”).<sup>119</sup> A division of SHC into psychological and somatic symptoms was supported by previous studies,<sup>120</sup> i.e.: *psychological SHC* (“Feeling low”; “Feeling irritable or bad tempered”; “Feeling nervous”; “Sleeping difficulties”) and *somatic SHC* (“Headache”; “Stomachache”; “Backache”; “Dizziness”).<sup>120</sup> A variety of different scoring methods have been used in earlier research, some based on dichotomization (with varying cut-offs), others on summation of item scores. We used two different scoring methods of SHC in this thesis: 1) dichotomization: “*Daily psychological SHC*” and “*Daily somatic SHC*” (in Papers I and III) and 2) summation score: “*SHC-index*” (in Paper II). Thus in Papers I and III subjective health complaints were divided into psychological and somatic SHC, with high symptom load defined as experiencing at least one SHC (psychological or somatic, respectively) on a daily basis (dichotomization “about every day” / less often”).<sup>120</sup> In Paper II each subjective health complaint was rated on a five-point frequency scale, ranging from one point for “Rarely or never” to five points for “About every day,” generating an SHC-index score of 8–40 (higher scores indicating more SHC).<sup>121</sup> Cronbach’s alpha coefficient for SHC-index in the selected study sample was 0.81 for boys and girls, respectively.

### *“Mental distress” (Paper III)*

A broadly defined question on mental distress (“må dåligt” in Swedish) was introduced in the school survey 2016:

”By “Mental distress” we mean that you have experienced distress during a prolonged period of time (at least two weeks in a row) e.g. due to stress, depressive feelings, worrying, loneliness, exposure to bullying, anxiety or suicidal thoughts (one reason sufficient).”

Students were then asked if they had experienced such distress during the past 12 months (“No/Yes”). This question originates from the Swedish county of Sörmland where it has been used in public health school surveys since 2006.<sup>122</sup> In order to avoid confusion with the general term of mental distress, this measure is furthermore referred to as “Mental distress”.

### *GHQ-12 (Paper IV)*

The 12-item General Health Questionnaire (GHQ-12) is an internationally well validated instrument of self-reported mental distress in the general population.<sup>123,124</sup> GHQ-12 has been shown to prospectively predict health care consumption,<sup>125</sup> morbidity,<sup>126</sup> and mortality<sup>127,128</sup> in adult populations. The twelve items of GHQ-12 reflect different aspects of psychological health, such as anxiety and depression, the ability to perform daily activities and the ability to cope with everyday problems during “the past few weeks”. Each item has four response categories, e.g. “Better than usual”, “Same as usual”, “Less than usual”, and “Much less than usual”. Scoring in Paper IV was according to the GHQ method (0,0,1,1) instead of the Likert method (0,1,2,3).<sup>129</sup> Thus the respondent’s answers to the 12 items were dichotomized into “Good” or “Poor” psychological health. If three or more of the twelve items denoted “Poor” psychological health, the respondent’s general psychological health (GHQ-12) was defined as poor. This cut-off has been widely used for decades in Sweden as well as in international research.<sup>130</sup> The GHQ-12 instrument is the shortest (other GHQ measures contain for instance 28 or 60 items), but it has been shown to be a very robust measure of psychological health.<sup>123</sup> The GHQ-12 measure has been validated by the National Institute of Public Health (Statens folkhälsoinstitut) and by Statistics Sweden (SCB).<sup>130</sup>

### **Traditional bullying (Papers I-III)**

Bullying in school may be termed “traditional bullying” in order to separate it from the new phenomenon of cyberbullying. The questions used on traditional

bullying were originally developed by Olweus.<sup>42</sup> A definition of bullying preceded the questions on victimization and perpetration in the 2016 public health survey:

“We say a student is being bullied when another student, or a group of students, say or do nasty and unpleasant things to him or her. It is also bullying when a student is teased repeatedly in a way he or she does not like or when he or she is deliberately left out of things. But it is not bullying when two students of about the same strength or power argue or fight. It is also not bullying when a student is teased in a friendly and playful way.”

### *Bullying victimization (Papers I-III)*

Students were asked: “How often have you been bullied in school during the past few months?” with five answer options: “I have not been bullied in school during the past few months”; “It has happened once or twice during the past few months”; “Two or three times a month”; “About once a week”; “Several times a week”. Those who had been bullied two or three times a month or more often (i.e., more than once a month) were categorized as traditional bullying victims in line with earlier research.<sup>2,21,42,64</sup>

### *Bullying perpetration (Paper III)*

In 2016 the bullying question was extended with an item on perpetration: “How often have you bullied others in school during the past few months?” with the same answer options and cut-off as for traditional bullying victimization.<sup>2,21,42,64</sup> Students were separated into four mutually exclusive groups according to answers on victimization and perpetration, i.e.: “Non-involved”; “Bully”; “Victim”; and “Bully-victim”.

### **Cyber harassment (Papers I-II)**

In 2012 the question on cyber victimization was phrased: “Have you during the past 12 months, in school or out of school, been exposed to harassment or violation involving a cell phone and/or the Internet (text messaging, instant messaging (MSN), Facebook, e-mail or similar)?” The response options were “No”, “Yes, once” and “Yes, several times”. This question was previously used in a Swedish public health school survey in Region Örebro County in 2011.<sup>131</sup>

## **Cyberbullying (Paper III)**

### *Victimization and Perpetration*

The question on cyber victimization was slightly changed in 2016 by adding the word “bullying” to the description and including an item on perpetration: ”Have you been exposed to/ exposed others to bullying, harassment or violation online (through a cell phone or the Internet) in school or out of school, during the past 12 months?” with three response options: “No”; “Yes, once”; “Yes, several times”. Answers to these two questions were dichotomized (“No/Yes”) and combined in order to separate students into four mutually exclusive groups: ”Non-involved”; ”Cyberbully”; ”Cybervictim”; and ”Cyberbully-victim”. For reasons of simplicity, ”Bullying, harassment, or violation online” was furthermore referred to as ”Cyberbullying”.

## **Self-injury (Paper III)**

Only students who answered “Yes” to the question on “Mental distress” in the 2016 school survey received a follow-up question on self-injury: ”Have you during the past 12 months tried to cut (”skära”), superficially cut (”rispa”), or injure yourself in some other way?” with answer options: “No”; “Yes, once”; “Yes, 2-5 times”; “Yes, more than 5 times”. Answers were dichotomized into “No/Yes”. This question was previously used in Swedish public health school surveys in the county of Sörmland.<sup>122</sup>

## **Physical violence (Paper IV)**

### *Exposure to physical violence*

Participants in the 2008 public health survey were asked: “Have you at any time during the past twelve months been exposed to physical violence?” with answer options “Yes/ No”. This question was previously used in Swedish national public health surveys<sup>132</sup> and validated by the National Institute of Public Health (Folkhälsoinstitutet) and by Statistics Sweden (SCB).<sup>130</sup>

### *Location of physical violence*

Those who affirmed experience of physical violence received a supplementary question regarding location with five answer options (several could be ticked): “At work/ at school”; “At home”; “In somebody else’s home/ in the neighborhood”; “In a public place/ at a venue/ on a train, bus, subway”; “Some other place”. This question was previously used in Swedish national public health surveys<sup>132</sup> and

validated by the National Institute of Public Health (Folkhälsoinstitutet) and by Statistics Sweden (SCB).<sup>130</sup>

## **Disability (Paper I)**

In the 2012 school survey, students were asked: "Do you have any of the following disabilities? ("Yes/No") listing six categories: "Hearing disability"; "Visual disability that cannot be corrected by glasses or contact lenses"; "Moving disability"; "Reading–writing disability, dyslexia"; "ADHD/ ADD"; "Other disability". Those who had ticked "Yes" on one or more disability options, or "No" on all disability options, were included in Paper I. (A small group of students not affirming disability but with internally missing answers on disability items were excluded due to uncertainty regarding disability status.) Answers were furthermore dichotomized into "No disability" versus "At least one disability".<sup>116</sup>

To explore the impact of disability and victimization by traditional bullying (TB) on daily subjective health complaints, students were divided into four mutually exclusive groups: "Neither disabled nor bullied"; "Disabled"; "Bullied"; "Disabled and bullied". To explore the impact of disability and cyber harassment (CH) on daily subjective health complaints students were likewise divided into four mutually exclusive groups: "Neither disabled nor cyber harassed"; "Disabled"; "Cyber harassed"; "Disabled and cyber harassed". To explore the simultaneous impact of disability, traditional bullying victimization, and cyber harassment on daily subjective health complaints, students were divided into six mutually exclusive groups: "No disability, no TB, no CH"; "Disability"; "TB or CH"; "Disability + TB or CH"; "TB + CH"; "Disability + TB + CH".

## **Social support (Paper II)**

Easy communication was used as a proxy for social support from parents and friends among school students. The question was phrased: "If you have a problem or just want to talk to someone, how easy or difficult would it be to talk to...?" with several alternative sources of support listed, including "Parents or the adults you live with" and "Friends." The approachability of each source of support was specified on a five grade scale: "Very easy"; "Rather easy"; "Neither easy nor difficult"; "Rather difficult"; "Very difficult". The alternatives were dichotomized with the two first alternatives indicating high support (*Easy communication*) and the three latter low support (*Non-easy communication*). This question has been used for many years by The Swedish Council for Information on Alcohol and Other Drugs (CAN) in large national surveys of Swedish 9th grade students' use of alcohol, tobacco, and drugs.<sup>133</sup>

## Covariates

The following covariates were treated as potential confounders in the statistical analyses:

### **Sociodemographic factors**

#### *Age* (Papers I-IV)

Adjustment for age by a numeric discrete variable was performed in all studies even though the age interval was relatively narrow in Papers I-III.

#### *Economic stress* (Papers III, IV)

Students were asked in 2016: “Reflect on the past 12 months. Were you ever unable to buy something you wanted, that others your age have, because you could not afford it?” with answer options: “Yes, several times”; “Yes, once”; “No”. This item was dichotomized (“Youth unable to buy same things as peers several times/less often past 12 months”) and labelled *Economic hardship* in Paper III. Among adults *Economic stress* was assessed with the item “How often during the past twelve months have you had problems paying your bills?” with four answer options: “Never”; “Occasionally”; “Every second month”; “Every month” (Paper IV).

#### *Ethnic background* (Papers I-IV)

Students were asked to specify their own, their mother’s, and their father’s place of birth into one of four categories: “Sweden”; “Norway, Finland, Denmark or Iceland”; “Other European country”; “Non-European country”. In Paper I Statistic Sweden’s definition of *Background* was used (Swedish = born in Sweden with at least one Swedish-born parent/ Foreign = born abroad, alternatively born in Sweden with two foreign-born parents).<sup>134</sup> In Paper II *Parental origin* (both/one/no parent born in Sweden) was used, and in Paper III the student’s own *Country of birth*. Adults specified their birth country in the 2008 public health survey and these were categorized as: “Sweden”; “Other Scandinavian country”; “Other European country”; or “Non-European country” in Paper IV.

#### *Occupation* (Papers I-IV)

Among adolescents, adjustment was made for *Parental occupation* (both/one/no parent working) (Papers I-III). In Paper IV adjustment was made for the young adults’ own *Socioeconomic status* (SES) by occupation (information from Statistics Sweden (SCB)) which included the employed categories: “Higher non-manual employees”; “Medium level non-manual employees”; “Low level non-

manual employees”; “Skilled manual workers”; “Unskilled manual workers”; “Self-employed/ Farmers”. The groups outside the workforce comprised: “Unemployed”; “Early retired” (for health or early retirement entitlement in the employment contract reasons); “Students”; “Persons on long term sick leave”. Furthermore, there was the group “Unclassified”.

## Life-style

### *Alcohol* (Papers I-IV)

Students were asked: “Try to recall the last 12 months. How often did you, on one and the same occasion, drink alcohol equivalent to at least four cans of strong beer or strong cider/alcoholic soft drink, *or* six cans of medium strong beer, *or* a whole bottle of wine, *or* 25 cl of hard liquor (approx. 6 shots or drinks)? (Do not count alcoholic beverages below 2.8%, e.g. light beer or cider.)” The answer options were: “Once a week or more often”; “2-3 times per month”; “Once a month”; “2-6 times last year”; “Never”. *Intense alcohol consumption* was defined as youth drinking a large quantity of alcohol in one session at least once a month (Papers I-III).<sup>133</sup>

*Alcohol risk consumption* among adults was estimated by an index of three questions: (1) “How often do you drink alcohol?”; (2) “How much alcohol do you typically consume when you drink?”; and (3) “How often do you drink a large amount on one occasion?” “Large amount “ was specified as “six glasses”, with the clarification: “One glass equals 50 cl medium strong beer *or* 33 cl strong beer, *or* 10-15 cl wine, *or* 5-8 cl strong wine, *or* 4 cl hard liquor, e.g. whisky”. The index of alcohol risk consumption could take a point value between 0 and 12. Alcohol risk consumption was defined as 8–12 points for men and 6–12 points for women. Additionally, those who had been intoxicated 2–3 times a month or more often were defined as alcohol risk consumers (Paper IV). These questions were previously used in Swedish national public health surveys.<sup>135</sup>

### *Daily smoking* (Papers I-III)

Students were asked: “Do you smoke cigarettes?” with seven answer options: “No, I have never smoked”; “No, but I have tried it”; “No, I have smoked but gave it up”; “Yes, every day”; “Yes, almost every day”; “Yes, at parties”; “Yes, occasionally”. Those who answered “Yes, every day” were classified as daily smokers.

### *Narcotics* (Paper III)

The section on narcotics was introduced by a definition in the school survey 2016: “By narcotics we mean Hashish, Marijuana, Spice, Amphetamines, Ecstasy, LSD,

Cocaine, Heroin, GHB, or the like”. Students were then asked: “Have you ever used narcotics? You can mark more than one alternative” with answer options: “Yes, during the past 30 days”; “Yes, during the past 12 months”; “Yes, more than 12 months ago”; “No”. Use of narcotics was dichotomized into “past 12 months yes/no”.

## **Psychosocial factors**

### *Close friend* (Paper I)

Students were asked: “Do you have a close friend with whom you can talk in confidence about almost any personal matter?” with four response options: “I have no close friends”; “I have one close friend”; “I have two close friends”; “I have several close friends”. This item was dichotomized into “having/ not having a close friend”.

*Cyber harassment*, description on page 42 (covariate in Paper I).

### *Emotional support* (Paper IV)

Adults were asked: “Do you feel that you have one or several persons who can give you sufficient personal support to handle the stress and problems of life?” with four response options: “Yes, I am absolutely certain to get such support”; “Yes, possibly”; “Not certain”; “No”. This item was dichotomized with the three latter alternatives classified as low emotional support.

### *Instrumental support* (Paper IV)

Instrumental support among adults was assessed with the question “Can you get help from one or several persons in case of illness or practical problems (to borrow things, repair things, write a letter, get advice or information)?” This item had the same alternative answers as emotional support and was dichotomized correspondingly.

### *Loneliness* (Paper III)

Students were asked: “Do you suffer from loneliness?” with five response options: “Every day”; “Several times a week”; “About once a week”; “Once or a few times a month”; “Less often than once a month”. This item was dichotomized into “loneliness at least about once a week/ less often”.



*Parental support*, description on page 44 (covariate in Papers I and III).

#### *Study difficulties* (Paper III)

Study difficulties in school (“Yes/No”, index of seven items) was based on the following seven factors: Doing homework; Preparing for exams; Finding the most suitable study method; Completing tasks that require own initiative; Performing tasks that require writing; Performing tasks that require reading (e.g. from a book); Following teaching in class. Students were asked “Do you have difficulties with any of the following in school?” with four response options for each item: “Not at all” (0 points); “Rather little” (0 points); “Rather much” (1 point); “Very much” (3 points). Respondents scoring 3-21 points were categorized as having study difficulties. This question was previously used in national public health school surveys in Finland.<sup>136</sup>

*Traditional bullying victimization*, description on page 42 (covariate in Papers I-II)

#### *Trust* (Paper IV)

Generalized (horizontal) trust in other people was appraised by the item “Generally, you can trust other people” with four alternative answers: “Do not agree at all”; “Do not agree”; “Agree”; “Completely agree”. These alternatives were dichotomized with the two first alternatives indicating low trust and the two latter high trust.

## **Health**

#### *Body weight* (Paper III)

Body Mass Index (BMI) was based on the student’s self-reported data on body length and body weight and dichotomized into “normal/overweight or obese”. Cut-off values 9th grade students in compulsory school: boys 23.29, girls 23.94, 2nd grade students of upper secondary school: boys and girls 25.00.<sup>137</sup>

*Disability*, description on page 44 (covariate in Paper II)

# Methods

## Paper I

Differences in background characteristics between adolescents with and without disability were analyzed by Chi square statistics. Multi-adjusted analyses were performed by binary logistic regression (odds ratios with 95 % confidence intervals). The associations between Daily psychological subjective health complaints (SHC) (at least one psychological complaint on a daily basis) and four mutually exclusive combinations of disability and traditional bullying victimization were investigated (i.e.: "Neither disabled nor bullied" (reference category); "Disabled"; "Bullied"; "Disabled and bullied"). The associations between Daily psychological SHC and four mutually exclusive combinations of disability and cyber harassment were likewise investigated (i.e.: "Neither disabled nor cyber harassed" (reference category); "Disabled"; "Cyber harassed"; "Disabled and cyber harassed"). Identical analyses were performed regarding associations with Daily somatic SHC. All the above-mentioned analyses were stratified by gender. Furthermore, multiadjusted analyses were performed for boys and girls combined (gender-adjusted), investigating associations between Daily psychological SHC and six mutually exclusive combinations of disability, victimization by traditional bullying (TB), and victimization by cyber harassment (CH) (i.e.: "No disability, no TB, no CH" (reference category); "Disability"; "TB or CH"; "Disability + TB or CH"; "TB + CH"; "Disability + TB + CH"). Identical analyses were performed regarding associations with Daily somatic SHC.

Finally, each disability category was analyzed in relation to Daily psychological SHC. Students with a certain type of disability (boys and girls combined, gender-adjusted) were compared with all other students including those with some other type of disability as the disability categories were not mutually exclusive. Identical analyses were performed regarding associations with Daily somatic SHC.

The following modelling was used in the multiadjusted logistic regression analyses: Model 1 adjusted for sociodemographic factors (age, background, parental occupation), Model 2 furthermore adjusted for living habits (daily smoking, intense alcohol consumption), Model 3 furthermore adjusted for psychosocial factors (close friend, communication with parents), and Model 4 furthermore adjusted for victimization by traditional bullying (TB) or cyber harassment (CH).

## **Paper II**

Differences in background characteristics among adolescents differently exposed to cyber harassment past year (not cyber harassed; cyber harassed once; cyber harassed several times) were analyzed by Chi square statistics for all categorical variables, and by one-way ANOVA for “SHC-index”. To examine the associations between cyber harassment and SHC-index modified by support, a series of hierarchical regression analyses were performed. The distribution of SHC-index data was somewhat positively skewed (more so among boys than girls) but with small differences between median and mean values, and a statistician deemed the data distribution sufficient for linear regression analysis. In Model 1, the dependent variable of SHC-index was regressed on the independent variable of cyber harassment, adjusted for age, parental occupation, parental origin, daily smoking, intense alcohol consumption, and disability. In Model 2, parental/friend support was added (with separate analyses for the two types of support). In a final third model, the interaction of cyber harassment and social support was added (separate analyses for the two types of support). If the interaction term added in Model 3 was statistically significant, a moderating (or stress-buffering) effect of social support on the association between cyber harassment and SHC-index could be inferred.<sup>138</sup> Furthermore, an identical series of hierarchical regression analyses was performed with additional adjustment for traditional bullying victimization. All analyses were stratified by sex.

## **Paper III**

Differences in background characteristics between adolescents with and without broadly defined mental distress (“Mental distress”) were analyzed by Chi-Square statistics. Due to survey design only students affirming “Mental distress” were furthermore investigated as only these had been able to answer a question on self-injury. Associations between self-injury and mutually exclusive cyberbullying groups (i.e.: ”Non-involved” (reference category); ”Cyberbully”; ”Cybervictim”; ”Cyberbully-victim”) were investigated by multiadjusted binary logistic regression analysis (odds ratios with 95 % confidence intervals). Model 0 adjusted for age, Model 1 adjusted for sociodemographic factors (parental occupation, country of birth, economic hardship), Model 2 furthermore adjusted for life-style (smoking, alcohol, narcotics), Model 3 furthermore adjusted for psychosocial factors (loneliness, communication with parents, study difficulties), and Model 4 furthermore adjusted for BMI (overweight-obesity). All analyses were stratified by sex.

## **Paper IV**

The association between mental distress (GHQ-12) and background factors was investigated by bivariate binary logistic regression analysis (odds ratios with 95 % confidence intervals). The association between mental distress and past year experience of physical violence was investigated by multiadjusted binary logistic regression analysis. Adjustments were made for age, country of origin, socioeconomic status, economic stress, alcohol risk consumption, emotional support, instrumental support, and trust. The setting of violence was investigated and illustrated as proportion (%). All statistical analyses were performed on weighted data and stratified by sex.

### **Statistic software**

The statistical analyses were performed using IBM SPSS Statistics version 19 (Paper IV) and version 22 (Papers I-III).



# Results

## ***Paper I: Subjective health complaints and exposure to peer victimization among disabled and non-disabled adolescents: A population-based study in Sweden.***

Significantly more boys (24 %, n=869) than girls (22 %, n=862) reported having some type of disability in 9th grade compulsory school in 2012. The prevalence of different types of disability was in falling order (boys and girls combined): Reading–writing disability, dyslexia 9.5 %, Hearing disability 5.6 %; Visual disability that cannot be corrected by glasses or contact lenses 5.5 %; Other disabilities than the ones listed 3.4 %; ADHD/ADD 3.3 %; Moving disability 2.2 %. Boys significantly more often reported reading-writing disability, dyslexia, and ADHD/ADD than girls.

Disabled students significantly less often had two working parents, more often smoked daily and used alcohol intensely, and more often reported non-easy parental communication and not having a close friend compared with non-disabled peers. Disability was more prevalent among boys with a Swedish background than boys with a foreign background.

Disabled students had more than twice as often been (traditionally) bullied past few months compared with non-disabled peers (boys: 7.4 % vs. 3.4 %; girls 7.3 % vs. 3.2 %). Past year cyber harassment was almost twice as prevalent among disabled students than non-disabled peers (boys: 20 % vs. 12 %; girls: 28 % vs. 18%).

The odds ratios (ORs) of mental distress (measured as Daily psychological SHC and Daily somatic SHC) were twice as high among disabled boys and girls who had neither been bullied nor cyber harassed, in the fully adjusted models, compared with non-disabled non-victimised peers. The ORs increased by exposure to bullying or cyber harassment among both disabled and non-disabled students, with the highest ORs among disabled bullied students. Among these a clear gender difference was seen regarding the pattern of psychological and somatic symptoms. Disabled bullied girls reported the highest OR of Daily psychological SHC (girls, OR: 7.3 (95% CI: 4.4, 12.1 ); boys, OR: 5.7 (95% CI: 3.4, 9.5)), while disabled bullied boys reported the highest OR of Daily somatic SHC (boys, OR: 9.5 (95%

CI: 5.5, 16.4); girls, OR: 3.3 (95% CI: 1.9, 5.5)). The pattern of gender difference was less pronounced among disabled cyber harassed boys and girls.

The highest ORs of all were seen among disabled students who had both been bullied and cyber harassed (Daily psychological SHC, OR: 11.9 (95% CI: 7.5, 18.9); Daily somatic SHC, OR: 7.6 (95% CI: 4.7, 12.2), boys and girls combined (age and gender adjusted ORs).

Across disability groups, students with ADHD/ADD reported the the highest ORs (and students with reading-writing disability, dyslexia the lowest ORs) of both Daily psychological SHC and traditional bullying victimization in age and gender adjusted analyses. ORs of cyber harassment were more evenly distributed across disability groups.

### ***Paper II : Subjective health complaints in adolescent victims of cyber harassment: moderation through support from parents/friends – a Swedish population-based study.***

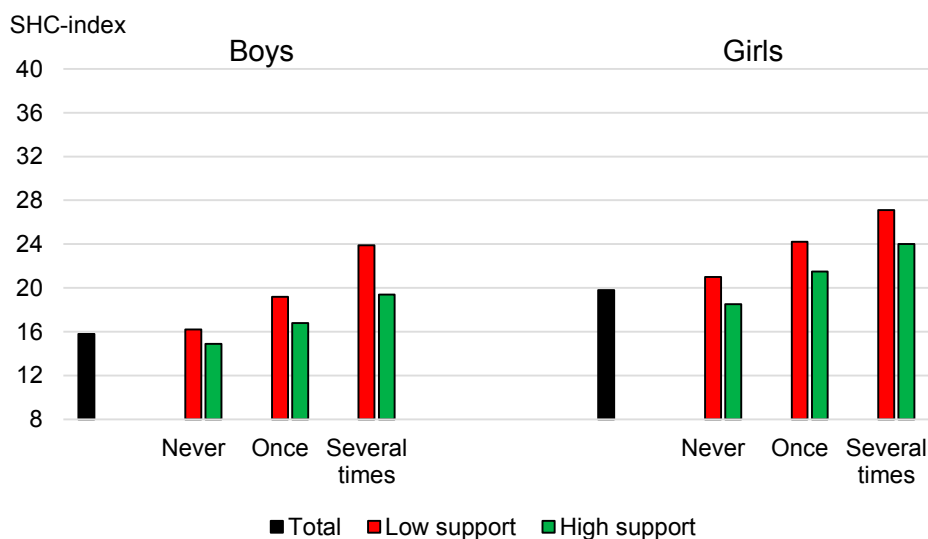
Mental distress (measured as SHC-index 8-40) was higher among girls (mean 19.8, median 19, mode 16) than boys (mean 15.8, median 15, mode 12) in 9th grade compulsory school in 2012 (data not shown). Significantly more girls (20 %, n=849) than boys (14 %, n=540) had been cyber harassed past year, which had more often happened once (girls: 13 %, boys: 9 %) than several times (girls: 7 %, boys: 5 %). Four per cent of boys and girls reported traditional bullying victimization past few months.

Cyber harassed adolescents significantly more often reported not having two working parents, daily smoking, intense alcohol consumption, some form of disability, and not finding it easy to talk to parents or friends when having a problem (low parental/friend support) compared with non-harassed peers. No association was found between cyber harassment and body weight. Girls with two parents born abroad were significantly less often cyber harassed than girls with one or two parents born in Sweden, while no significant association between cyber harassment and parental origin was seen among boys. Furthermore, cyber harassed students had significantly more often been bullied.

Cyber harassment was associated with mental distress controlling for age, parental occupation, parental origin, daily smoking, intense alcohol consumption, and disability. The associations were stronger for cyber harassment several times than once. Evidence was found for a generally beneficial (main) effect of both parental and friend support on the association between cyber harassment and mental distress in both genders. Furthermore, indications of a stress-buffering effect were seen for both parental and friend support among cyber harassed boys, while there

were no indications of a stress-buffering effect for either type of support among girls.

Figure 11 shows the level of mental distress (mean SHC-index) among boys and girls stratified by high and low friend support. Students with high support reported less mental distress than peers with low support regardless of frequency of exposure to cyber harassment, illustrating the general beneficial effect of friend support. However, for boys the protective influence of support appeared to increase by frequency of victimization, indicating that support was more beneficial to boys cyber harassed several times than for boys cyber harassed once, i.e. a stress-buffering effect. The diverging levels of mental distress among boys with low/ high friend support by increasing exposure to cyber harassment in Figure 11 corresponds to a statistically significant interaction term between cyber harassment and friend support in the statistical analysis. In contrast, a parallel increase of mental distress by exposure to cyber harassment is seen among girls stratified by high and low friend support, indicating that the protective influence of friend support on mental distress is similar regardless of frequency of exposure among girls.



**Figure 11. Mental distress (mean SHC-index) among 9th grade boys and girls in Scania stratified by high and low friend support by exposure to past year cyber harassment**

Support measured as communication with friends, *low support* = non-easy communication, *high support* = easy communication. Total = mean SHC-index among all boys/ girls in the study population. The 2012 public health survey of children and adolescents, Scania, Sweden.



Identical analyses with further adjustment for traditional bullying victimization did not change the associations between cyber harassment and SHC-index substantially, indicating that cyber harassment had an effect of its own on mental distress.

***Paper III: Associations between self-injury and involvement in cyberbullying among mentally distressed adolescents in Scania, Sweden.***

Only students affirming "Mental distress" of a broad description at least two weeks in a row past year (33 % of the boys and 63 % of the girls in 9th grade compulsory school and 2nd grade of upper secondary school combined in 2016) received a supplementary question on self-injury. Of these 263 boys (12 %) and 1188 girls (26%) admitted to self-injurious behavior past year. The prevalence of self-injury was higher among girls in 9th grade compulsory school (31 %) than in 2nd grade of upper secondary school (21 %), while the prevalence among boys was similar in the two grades (13 % and 11 % respectively).

The selected study sample of mentally distressed students had significantly more often been involved in cyberbullying and traditional bullying, were more disadvantaged socioeconomically, reported higher levels of risky life-style behaviors and study difficulties in school, more often felt lonely and less often communicated easily with their parents than excluded classmates who had not experienced mental distress two or more weeks in a row past year. Girls (but not boys) with mental distress were more often overweight or obese, and mentally distressed boys were more often foreign-born while mentally distressed girls were more often Swedish-born in comparison with less mentally distressed peers.

In this vulnerable study sample of mentally distressed students, those who had self-injured were significantly more often disadvantaged socioeconomically (more often reported not having two working parents and inability to buy the same things as peers several times past year), reported more risky life-style behaviors (daily smoking, intense alcohol consumption, use of narcotics), more often reported loneliness, non-easy parental communication, and study difficulties, and were more often overweight or obese compared with mentally distressed peers who had not self-injured. Boys born outside Europe had more often self-injured than boys born in Sweden while no association was seen between country of birth and self-injury among girls. Increasingly higher odds of self-injury were seen among cyberbullies, cybervictims, and cyberbully-victims, using non-involved as reference group in age-adjusted analyses (boys, OR: 1.8, 2.3, 3.0; girls, OR: 2.1, 3.2, 4.8). The same pattern was seen for involvement in traditional bullying among

boys, but among girls the highest odds of self-injury was seen among traditional bullies.

The associations between self-injury and involvement in cyberbullying weakened after multiple adjustments for potential confounders. Among boys significance was lost for cyberbullies after adjusting for risky life-style in Model 2. Among girls associations remained significant for all cyberbullying groups throughout the modelling. In the present study sample risky life style among students involved in cyberbullying was most prevalent among male cyberbullies and female cyberbully-vicims (data not shown). Crosstabulation (Figure 2 in Paper III) showed that the majority of mentally distressed students had neither been involved in cyberbullying during the past year nor traditional bullying during the past few months. Among those involved in both types of bullying, online victims had most often been victims in school and online bullies had most often been bullies in school. Male cyberbully-victims had equally often been bullies, victims, or bully-victims in school, while female cyberbully-victims had most often been victims in school.

#### ***Paper IV: Experience of physical violence and mental health among young men and women: a population-based study in Sweden.***

Among young adults 18-34 years old, mental distress (measured by General Health Questionnaire, GHQ-12) was more prevalent among women (28 %) than men (19%) in the 2008 public health survey in Scania. The highest prevalence was seen among the youngest women 18-21 years of age, with a peak of more than 40%, twice the rate of young men the same age. Strong bivariate associations were seen between mental distress and socioeconomic status (especially for those outside the workforce), economic stress, psychosocial factors (low emotional support, low instrumental support, and low trust) among both men and women. Alcohol risk consumption was associated with mental distress among women but not among men. Men born outside Europe had significantly higher odds of mental distress compared to men born in Sweden, while there was no significant association between country of birth and mental distress among women.

One in ten men (n=223) and one in twenty women (n=174) had experienced physical violence during the past year. Table 2 shows that among adults 18-34 years old, younger persons (18-24 years) were more often exposed to violence than older persons (25-34 years), with the highest exposure among young men 18-24 years of age (16 %).

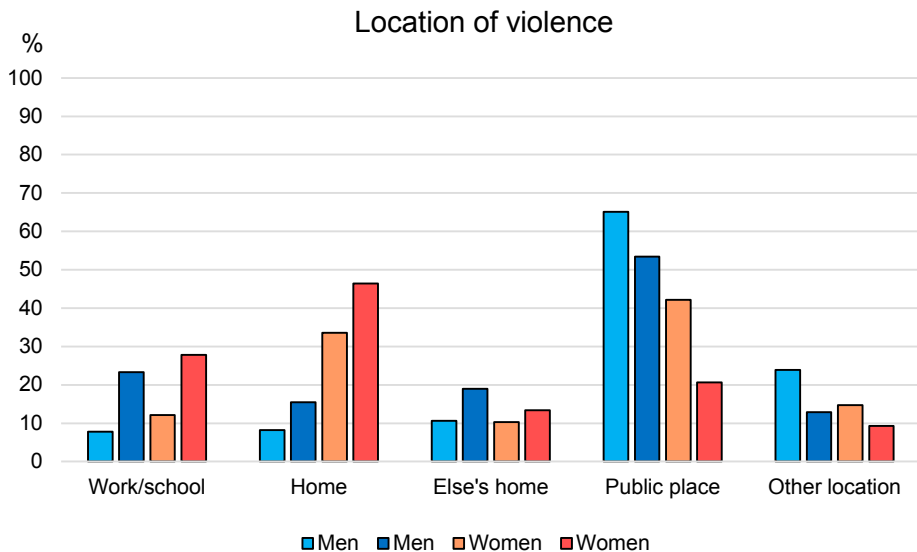
**Table 2. Exposure to physical violence among men and women 18-34 years old stratified by age. The 2008 public health survey in Scania.**

	Men				women			
	<i>n</i> = 2574				<i>n</i> = 3535			
	<i>n</i>	%	OR	(95 % CI)	<i>n</i>	%	OR	(95 % CI)
18-24 years	145	15.9	<b>3.5***</b>	(2.7, 4.3)	94	6.6	<b>1.8***</b>	(1.3, 2.3)
25-34 years (REF)	78	5.2	1.0		80	3.9	1.0	
Total	223	9.5			174	4.9		

*n* = true number of persons exposed to physical violence ( 84 missing). Percentages (%) and ORs based on weighted data. Significance levels: \* *p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001.

Of women exposed to past year violence, 51 % reported poor psychological health past few weeks compared with 27 % of women not exposed to violence. The corresponding prevalence among men was 21 % and 19 %. The age-adjusted bivariate association between exposure to violence and mental distress was 2.66 (95 % CI: 2.00, 3.53) among women and 1.12 (95 % CI: 0.85, 1.47) among men, using non-exposed women/ men as reference group. Multiple adjustments for potential confounders (country of origin, socioeconomic status, economic stress, alcohol risk consumption, emotional support, instrumental support, trust) weakened the association found in women but statistical significance remained in the final model (1.70 (95 % CI: 1.24, 2.33)).

Overall, most women had been violated at home (38 %) or in a public place (32%) while most men (61 %) had been violated in a public place (including streets, venues and transportation by bus, train or subway). Stratification by age in Figure 12 shows that younger women (18–24 years) were most often violated in a public place, indicating different life styles between younger and somewhat older women (25-34 years of age). Among men the most common location was a public place regardless of age.



**Figure 12. Location of violence reported by men and women 18-24 years old and 25-34 years old**  
 Location: At work/school; At home; At somebody else's home or in the neighborhood; In a public place, venue, or transportation by bus, train, subway; Other location. Men = light/dark blue. Women = orange/red. Lighter colours to the left = 18-24 years old. Darker colours to the right = 25-34 years old. Percentages may add up to more than 100% due to some participants having been victimized more than once in different locations. The 2008 public health survey in Scania.



# Discussion

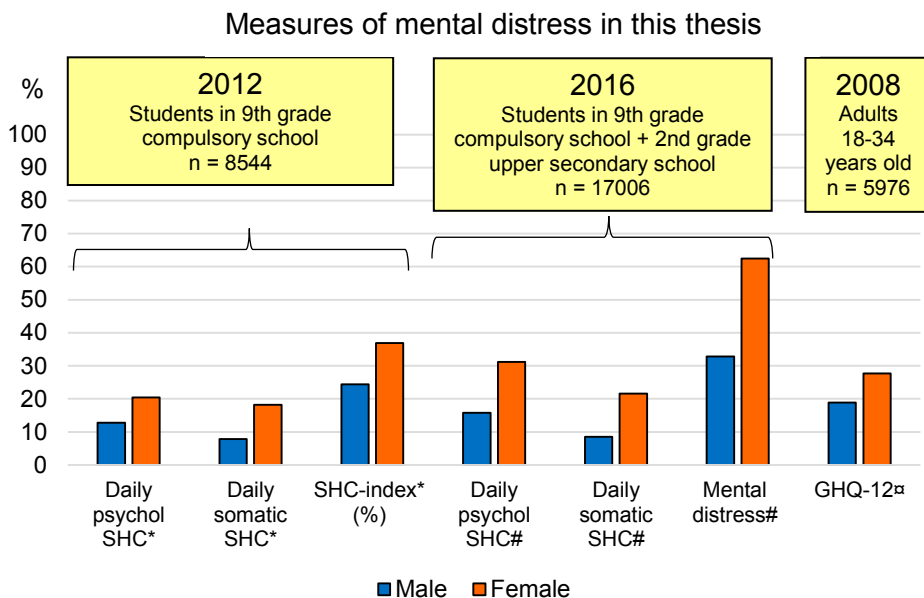
## Mental distress in this thesis

As previously pointed out, mental distress is an umbrella term encompassing a wide range of conditions from transient psychological distress to severe psychiatric disorders.<sup>15</sup> Measurement of mental distress is based on self-description, and the Swedish saying:

”Som man frågar får man svar” (approx.: ”Answers depend on how you ask”)

highlight an important feature of self-reported data - *how* a question is phrased (as well as the number of answer options) have a large impact on resulting data. For example, the reported prevalence of e.g. bullying victimization or self-injury will be lower when measured by a single-item question than by a multi-item check-list type of questionnaire.<sup>63,75</sup> Results are furthermore highly dependent on *who* you ask - the prevalence of mental distress is naturally higher in a clinical sample of psychiatric patients than in the general population. Ideally, cross-study comparisons should be made on studies based on identical questions and answer options.

Figure 13 illustrates the estimated prevalence of mental distress in the three populations investigated in this thesis (i.e.: students in 9th grade compulsory school in 2012; students in 9th grade compulsory school and students in 2nd grade of upper secondary school combined in 2016; and adults 18-34 years of age in 2008), according to three measures of mental distress: (1) subjective health complaints (SHC) calculated as: a) daily psychological SHC, b) daily somatic SHC, c) mean SHC-index (transformed into a percentage); (2) the new measure called ”Mental distress”; and (3) GHG-12. To increase the comparability of these measures, the variations on SHC (Daily psychological SHC; Daily somatic SHC; SHC-index) were all applied to the same population of 9th grade students in the 2012 survey (the study selection used in Paper II), and the measures of Daily psychological SHC, Daily somatic SHC and ”Mental distress” were applied to the total population of students in 9th grade compulsory school and 2nd grade of upper secondary school combined in the 2016 survey. Mental distress among young adults 18-34 years old was measured by GHQ-12 in 2008.



**Figure 13. Prevalence of mental distress according to different measures in this thesis**

\* Students in 9th grade compulsory school, 2012 (study sample Paper II): Daily psychological SHC, Daily somatic SHC, SHC-index 8-40 transformed into a percentage (mean value minus 8 divided by 32).

# All students in 9th grade compulsory school and students in 2nd grade of upper secondary school combined, 2016 (86 missing gender): Daily psychological SHC, Daily somatic SHC, "Mental distress".

$\alpha$  Adults 18-34 years of age, 2008: GHQ-12 (217 missing GHQ-12).

The 2012 and 2016 public health surveys of children and adolescents in Scania, and the 2008 public health survey in Scania.

As shown in Figure 13, the prevalence of mental distress varied greatly by measure. The lowest prevalence was seen for Daily somatic SHC and the highest for the broadly defined "Mental distress" which emphasized the duration of distress (at least two weeks in a row past year) more than the character (examples given were: "stress, depressive feelings, worrying, loneliness, exposure to bullying, anxiety or suicidal thoughts"). Additional analysis of the association between "Mental distress" and eight different daily subjective health complaints was conducted to explore the character of this measure (Table 3). The strongest association by far was with daily depressive feelings, and the second strongest with daily anxiety in bivariate age-adjusted logistic regression analysis.

**Table 3. Associations between "Mental distress" and daily subjective health complaints (SHC)**

"Mental distress" = mental distress during a prolonged period of time (at least two weeks in a row during the past 12 months) e.g. due to stress, depressive feelings, worrying, loneliness, exposure to bullying, anxiety or suicidal thoughts (one reason sufficient).

Daily psychological SHC = at least one of the following complaints during the past six months: daily depressive feelings; daily anxiety; daily irritability/ bad temper; daily sleeping difficulties.

Daily somatic SHC = at least one of the following complaints during the past six months: daily headache; daily stomachache; daily backache; daily dizziness.

Prevalence (%) of Daily psychological SHC, Daily somatic SHC, and the eight separate daily subjective health complaints. Age-adjusted odds ratios (OR, (95% CI)) for "Mental distress" with the reference category of peers experiencing subjective health complaints less often than daily (OR: 1.0). All students in 9th grade compulsory school and 2nd grade of upper secondary school combined (86 missing gender). The 2016 public health survey of children and adolescents in Scania.

	Boys n=8554				Girls n=8452			
	n	%	OR	(95% CI)	n	%	OR	(95% CI)
Daily psychological SHC	1316	16.5	4.3	(3.8, 4.8)	2584	31.6	5.0	(4.4, 5.6)
Depressive feelings	307	3.8	16.2	(11.3,23.1)	1095	13.3	14.0	(10.6,18.5)
Anxiety	310	3.8	9.4	(7.0, 12.7)	1061	12.9	7.9	(6.3, 9.9)
Irritability/ bad temper	520	6.4	3.9	(3.3, 4.8)	1272	15.4	3.7	(3.1, 4.3)
Sleeping difficulties	829	10.2	3.6	(3.1, 4.2)	1337	16.2	4.2	(3.6, 4.9)
Daily somatic SHC	763	9.6	2.8	(2.4, 3.2)	1792	22.0	3.0	(2.6, 3.4)
Headache	222	2.7	3.4	(2.5, 4.5)	665	8.0	2.6	(2.1, 3.1)
Stomachache	161	2.0	3.5	(2.5, 4.8)	499	6.0	3.6	(2.8, 4.6)
Backache	387	4.8	2.3	(1.9, 2.8)	784	9.5	2.5	(2.1, 3.0)
Dizziness	187	2.3	3.5	(2.6, 4.8)	470	5.7	3.1	(2.4, 3.9)

All associations significant p <0.001.

The higher prevalence of mental distress seen among females than males is consistent with overall research.<sup>21,132,135</sup> Swedish data showed that the gender difference in self-reported mental distress was smallest among children before puberty, increased greatly between 11 to 15 years of age and was largest among youth aged 16-19 years.<sup>30</sup> Although women confess to much more mental distress and have higher rates of anxiety and depressive disorders, men have higher rates of aggression, drug and alcohol abuse<sup>16</sup> (which could to some extent be expressions of mental distress<sup>30,139</sup>) and most suicides are committed by men.<sup>89</sup> It is therefore possible that the currently used self-report measures (such as HBSC-SCL and GHQ-12) capture mental distress better among females than males.<sup>20,139</sup>

## Disabled students and peer victimization in Paper I

In line with earlier research, disabled 9th grade students constituted a generally more vulnerable group socioeconomically, psychosocially, life-style related and health-wise compared with non-disabled peers.<sup>108,109</sup> Disability alone was associated with doubled odds of daily subjective health complaints (SHC),



psychological as well as somatic. These associations were only marginally affected by multiple adjustments of the potential confounders used in our study, indicating that features of disability in itself might be linked to higher levels of health complaints. However, in a large public health survey of disability in the Swedish population 16-84 years old, the odds ratio of poor health decreased by a third when adjusting for age, education, lack of cash margin, sedentary leisure time, obesity, insulting treatment and social participation, indicating that disabled persons might suffer unnecessarily poor health.<sup>109</sup>

In line with earlier research, disabled students had more often been exposed to peer victimization by traditional bullying and cyber harassment than non-disabled peers.<sup>53,108,111,</sup>

A gender difference was seen in the pattern of reported subjective health complaints among disabled traditionally bullied students, as boys reported the highest odds of daily somatic SHC and girls the highest odds of daily psychological SHC. Maybe boys tend to express mental distress more through somatic complaints while girls are more socialized to express distress through psychological symptoms?<sup>2,140</sup> The highest odds of all were seen among disabled students exposed to both traditional bullying and cyber harassment, in line with earlier research.<sup>65,141,142</sup>

Across six disability types, students with ADHD/ADD had most often been traditionally bullied and reported the highest levels of daily psychological SHC. A study based on a nationally representative sample of 4046 children aged 2-17 years in the United States showed that disabilities associated with interpersonal and behavioral difficulties were most strongly associated with victimization risks, and that ADHD/ADD was the only disability type significantly associated with peer assault/ bullying after multiple adjustment, increasing the odds by more than 40%.<sup>107</sup> In Paper I additional statistical analyses excluding students with ADHD/ADD resulted in somewhat weaker associations generally, but the overall pattern of statistically significant associations between peer victimization and subjective health complaints remained intact. However, this could be due to comorbidity with other neurodevelopmental disorders (NDPs) such as Asperger/autism spectrum disorder,<sup>115</sup> as these would have been categorized as "Other disability" in the 2012 public health school survey.

## Support & cyber harassment - mental distress in Paper II

In line with most research, girls were more often cyber harassed than boys.<sup>56</sup> Perhaps this form of peer victimization can be seen as an extension of relational

bullying which is more common among girls? <sup>43,96</sup> Cyber harassed students were significantly more often socioeconomically disadvantaged, experienced less parental and friend support, more often smoked daily and used alcohol intensely, more often reported having some type of disability, and were more often bullied compared with non-harassed peers, which is supported by earlier research. <sup>84,117,143</sup>

A dose-response effect was seen as cyber harassment several times was more strongly associated with subjective health complaints than cyber harassment once. <sup>84</sup> The significant association for being cyber harassed once could be due to special features of cyber victimization, such as one incident of humiliating pictures spreading to an increasingly larger audience online. <sup>52,61</sup>

Peer victimization in school and online overlap. Previous research has established that the strongest predictor of being cyber victimized is being a victim of traditional bullying, <sup>117</sup> and it has been suggested that distress from cyber harassment in reality could be due to concurrent bullying victimization. <sup>57</sup> However, in our study the association between cyber harassment and mental distress remained significant after multiple adjustments including traditional bullying victimization, indicating that cyber harassment has an effect of its own on mental distress. This is in line with a short-term longitudinal study in which cyber victimization was an additional risk factor beyond traditional bullying victimization on depressive symptoms among peer victimized adolescents. <sup>144</sup>

The protective influence of parental and friend support (measured as easy communication) against mental distress in the context of cyber victimization was investigated according to the main effect model and the stress-buffering model. <sup>100,138</sup> In line with earlier research on traditional bullying, evidence was found for a general beneficial effect (main effect) of both parental and friend support among boys and girls. <sup>93,98,101-105</sup> Furthermore, indications of a stress-buffering effect were seen for parental and friend support for cyber harassed boys, but not girls. This is in line with results of one study on traditional bullying victimization which showed main effects for social support (parents, teachers, classmates, close friend) on depression among boys and girls, and furthermore a stress-buffering effect of parental and close friend support among peer-victimized boys only. <sup>93</sup> While there is robust evidence for a general beneficial effect of support on the relationship between traditional bullying victimization and mental distress, findings regarding stress-buffering effects differ. One study reported stress-buffering effects of support among girls only, <sup>104</sup> a few studies reported stress-buffering effects among both boys and girls, <sup>98,102</sup> and yet other studies found no evidence of a stress-buffering effect in either gender. <sup>101, 105</sup>

Gender differences on stress-buffering effects might be due to mediating factors such as different coping styles among boys and girls. <sup>93</sup> We used communication with parents/peers as a proxy for social support but do not know the content of

support received. Girls have been shown to use more emotion-focused and ruminative coping than boys,<sup>145</sup> and this type of coping is associated with more mental distress than problem-focused coping among cyberbullied children.<sup>146</sup> There is evidence that boys recover faster than girls after cessation of victimization on symptoms of anxiety, depressive feelings, and self-esteem.<sup>147</sup> Perhaps boys benefit more from the support they do get and are more often encouraged to use distraction to cope with peer victimization?<sup>93</sup>

## Cyberbullying involvement and self-injury in Paper III

In a vulnerable study sample of mentally distressed students, those who had performed self-injury were significantly even more vulnerable than mentally distressed peers who had not self-injured. Mental distress was broadly defined in this study, and additional analysis showed that out of eight different subjective health complaints, daily depressive feelings were most strongly related to self-injury (data not shown). Strong associations between self-injury and depression is in line with earlier research. For example, a large cross-sectional 10-country European study found that depression, but not anxiety, partially mediated the effect of relational and verbal victimization on direct self-injurious behaviour among 15 year old adolescents.<sup>99</sup> A Finnish community study compared self-cutting adolescents with controls, and 63% of self-cutting girls were diagnosed with major depressive disorder in comparison with 5 % of controls.<sup>77</sup> A prospective Swedish community study on depressive symptoms and deliberate self-harm found a bi-directional relationship among adolescent girls as the one predicted the other, potentially leading to a vicious cycle of increasing self-harm.<sup>78</sup> Among boys depressive symptoms predicted increased self-harm one year later but not vice versa.<sup>78</sup>

Increasingly stronger associations were seen between self-injury and cyberbullying involvement across cyberbullying groups in the order of cyberbullies, cybervictims, and cyberbully-victims. This is in line with a previous study on traditional bullying and suicidality<sup>148</sup> as well as a study on bullying (that included cyberbullying in relational-verbal bullying) and self-harm.<sup>149</sup> Bully-victims are generally known to exhibit the poorest outcomes across bullying groups.<sup>40,64,143,149</sup> In accord with most earlier research, boys were more often involved in both types of bullying as bullies or bully-victims, while girls were more often victims.<sup>149</sup> Statistical significance for self-injury was lost among male cyberbullies after adjustment for smoking, alcohol, and use of narcotics. Risky life-style is more prevalent among bullies and bully-victims than among victims and non-involved,<sup>143</sup> and in the present study use of tobacco, alcohol, and

narcotics was most common among male cyberbullies and female cyberbully-victims (data not shown).

Regarding self-injury and involvement in traditional bullying, the same pattern as in cyberbullying was seen for boys but not for girls, as female traditional bullies had the highest odds ratio of self-injury across traditional bullying groups. The small group of girls bullying others in the present study might consist of individuals with high levels of psychiatric problems including depression. Traditional bullying perpetration predicted depression among girls but not among boys in a community study investigating associations among bullying, cyberbullying, and suicide in a study sample of high school students.<sup>150</sup>

## Physical violence and mental distress in Paper IV

Among young adults 18-34 years old, men reported exposure to past year physical violence twice as often as women (10 % vs. 5 %). This is in line with earlier research, e.g. a study on youth 15-23 years of age at Swedish Youth Health Centers (Ungdomsmottagningen) in which 27 % of men and 18 % of women reported exposure to past year physical abuse when answering a detailed questionnaire.<sup>151</sup>

In the present study a strong association between experience of physical violence (past year) and mental distress (past few weeks) was seen in women, but not in men. This gender difference corresponds to findings from the previously mentioned study at Swedish Youth Health Centers, where young women 15-23 years of age reported more severe effects from all types of abuse than men.<sup>151</sup> Women were more often abused by a person close to them than men, and physical abuse was furthermore often combined with sexual and/or emotional abuse among women, whereas physical abuse most often occurred in isolation among men.<sup>151</sup> A Swedish population-based study investigating life-time polyvictimization and associations with mental health and behavioral problems among 2500 young adults 20-24 years old, found that past week depression was associated with all types of lifetime victimization (Physical; Verbal; Sexual; Neglect; Witnessing violence; Property crimes) among women, but only with verbal violence among men.<sup>152</sup> Our results showed that women were most often violated at home while men were most often violated in public places including streets, venues, buses, trains and subways, in line with prior Swedish research.<sup>152</sup> Different locations might indicate different contexts of violence and to be victimized at home could point to domestic violence which is extremely harmful.<sup>68</sup>

Men may of course also be affected by violence. In a Swedish study, mental health outcomes such as anxiety, post-traumatic stress, and self-harm were associated with lifetime victimization among both men and women, while the patterns of depression, suicide attempts, and alcohol risk were more diversified by gender.<sup>152</sup> It could be that most men had recovered from mental distress at the time they answered the Scania survey, while more women (probably more often victims of intimate partner violence (IPV)) had not, since the present study used different time frames for violence (past year) and mental distress (past few weeks). Women more often worry about being assaulted than men<sup>153</sup> and as worrying is negatively related to mental health<sup>154</sup> it could be that both actual exposure to violence and fear of exposure to violence is one reason of increasing mental distress among young women in Sweden.<sup>155</sup>

## Methodological considerations

### Strengths

All data in this thesis originate from the large cross-sectional population-based public health surveys conducted in Region Scania. Strengths of this data material are its *size* and the fact that it is *population-based*, which generate good statistical power and reduce selection bias. The high response rate in the public health surveys of children and adolescents is furthermore a strength. *Valuable information on living habits and subjective health* can only be obtained through self-report surveys, and self-reported questionnaires have been shown to be better for obtaining information on sensitive topics (such as violence) than interviews.<sup>37,41,156</sup> *Different measures of mental distress* is a strength, with HBSC-SCL (among students) and GHQ-12 (among adults) being well validated measures.<sup>2,119,123</sup> A broad survey design including many topics enables multiple *adjustments for potential confounders* and the large number of respondents enables *subgroup-analysis*.

Self-reported data may be considered less precise than objective data (such as mortality rates and laboratory values), but its subjective quality reflects other aspects that may be equally important to health and well-being. Subjective evaluations of health can predict objective health outcomes.<sup>27-29,125-128</sup>

## Limitations

However, several limitations need to be considered. First of all, the *cross-sectional survey design* prevents conclusions regarding causal relationships. Second, although the broad survey content design enables adjustments for several potential confounders, *residual confounding* could still be present. The superficial treatment of different topics means a shortage of additional in-depth questions desirable for research purposes. All papers included in this thesis would have benefitted from more information on our key areas of interest. For example we had no information on the intensity or duration of bullying victimization, no information on risky online behavior, no information on severity of disability (only number of disabilities: ORs for Daily psychological SHC and Daily somatic SHC increased 1.8 times by one disability, 3 times by two disabilities and 10 times by three or more disabilities using non-disabled students as reference group). Furthermore, we had no information on the relationship between perpetrator and victim of physical violence, nor the frequency of physical violence. The assessment of self-injury was limited to a single question which only specified cutting (more common among girls) using the expression "in some other way" to encompass all other self-injuring methods, which means that we do not know what other methods were included and that the prevalence could be underestimated, especially among boys.<sup>74</sup> We furthermore lacked information on other important factors such as parental health (mental/physical), parental substance abuse and other childhood adversities (e.g. parental death, parental criminality, child welfare intervention, residential stability) which are known to have a large impact on children's mental health.<sup>157</sup>

A third limitation concerns the *validity and reliability* of some of the instruments used. The questions on self-injury and "Mental distress" (in Paper III), and cyber harassment/cyber bullying (in Papers I-III) have not been rigorously evaluated by previous research.

Fourth, the selected study sample in Paper III was not population-based due to a flaw in the survey design - only students affirming "Mental distress" received a question on self-injury (33 % of boys and 63 % of girls). As a consequence we cannot estimate the prevalence of self-injury in the total population. The prevalence of daily depressive feelings was 9 % (boys: 4 %, girls: 13 %) in the total population of students in 9th grade compulsory school and 2nd grade of upper secondary school combined, 17 % (boys: 10 %, girls: 20 %) in the selected study sample of mentally distressed students, and 40 % (boys: 33 %, girls: 41 %) among mentally distressed self-injuring students.

Although efforts were made to reach all subjects randomly selected for participation in the public health surveys of adults in Scania through reminder letters, it is well known that certain groups choose to participate more often than others, e.g.: women

more often than men; older persons more often than younger persons; higher educated more often than lower educated; and native born more often than foreign-born (i.e. "self-selection bias").<sup>158</sup> Those who decline participation in a survey ("externally missing") more often suffer from poor health, poorer living habits and more often belong to lower sociodemographic groups compared with those who choose to participate.<sup>158</sup> Adults not proficient in Swedish and students not proficient in Swedish or English might refrain from participation in the Scania public health surveys.

Comparison between participants of the 2008 Scania Public Health Survey with register statistics of the total population 18–80 years in Scania showed that the age interval 18-34 years was somewhat underrepresented and the age interval 65-80 years somewhat overrepresented. Some under-representation of men and persons with low formal education was also observed, but the most serious under-representation concerned people born outside Europe. To compensate for selection bias due to different response rates in different groups, the geographically stratified random sample was weighted by various factors, i.e. age, sex, country of birth, marital status, income, and education. The differences between unweighted and weighted data were very small.

The public health surveys of children and adolescents in Scania 2012 and 2016 aimed to include all students in grades 6 and 9 of compulsory school and 2nd grade of upper secondary school. Although the response rates were fairly high (72-85 % in 2012, 73-83% in 2016), it is possible that those who chose not to complete the survey or were absent from school when the survey was administered were different from those who participated. For example, it is likely that some disabled adolescents were unable to participate in the school survey because of their disability. Non-participating students might be at higher risk of poor health, bullying, and self-injury.<sup>158,159</sup> Differences in the proportion of native-born students were small, i.e.: 88.4 % (self-reported) vs. 88.1 % (Statistics Sweden (SCB)) among 9th grade students in 2012, 84.7 % vs. 84.3 % among 9th grade students in 2016, and 85.6 % vs. 83.7 % among 2nd grade students of upper secondary school in 2016.

Some respondents chose not to answer all the questions in the survey ("internally missing") and returned incomplete questionnaires. Questions of a sensitive nature are more often left blank than neutral questions. Missing data analysis was performed on 17 092 students in 9th grade compulsory school and 2nd grade of upper secondary school combined in Paper III. In missing analysis, the excluded 2778 students (16.3 %) with internally missing on key questions (gender, age, mental distress or involvement in cyberbullying) generally reported higher levels of economic stress, perceived loneliness, involvement in traditional bullying, and poorer psychological and somatic health (e.g. Daily psychological SHC and Daily somatic SHC) than students with answers on all key questions.

## Ethical permission

Ethical approval to conduct the research studies included in this thesis was granted by the Regional Ethical Committee at Lund University, Sweden: Paper I-II: Dnr 2013/317, Paper III: Dnr 2016/431, Paper IV: No. 2010/343.





# Conclusions

**Paper I:** Disabled 9th grade students in Scania reported poorer health and were more exposed to both traditional bullying and cyber harassment than non-disabled peers. A difference in gender pattern was seen among disabled bullied students as girls tended to express distress more by psychological symptoms and boys more by somatic symptoms. Across six disability groups, students with ADHD/ADD reported the highest levels of mental distress and were also most often bullied.

**Paper II:** Victimization by cyber harassment was prevalent among 9th grade students in Scania. The association between cyber victimization and mental distress was stronger for victimization several times than once past year, but statistical significance was also seen for being cyber harassed once. Support from parents and friends (measured as easy communication) had a generally beneficial effect on mental distress among peer victimized boys and girls, while indications of a stress-buffering effect of parental and friend support were seen among boys only.

**Paper III:** Among students in 9th grade compulsory school and 2nd grade of upper secondary school who affirmed broadly defined mental distress at least 2 weeks in a row past year (33 % of boys and 63 % of girls), self-injury was prevalent, especially among girls. The association between cyberbullying and past year self-injury was increasingly stronger from cyberbully, cybervictim, to cyberbully-victim. Statistical significance was lost among male cyberbullies after adjustment for risky life-style (alcohol, smoking, narcotics).

**Paper IV:** Among young adults 18-34 years of age, men had twice as often been exposed to past year physical violence while women more often reported mental distress past few weeks. Women exposed to violence showed more than doubled odds of mental distress compared with non-exposed women, but this pattern was not seen among men. The association found in women was attenuated but remained significant after multiple adjustments. In general, men had most often been violated in public places while women had most often been violated at home.



# Future directions

The trend of increasing mental distress among Swedish youth is highly alarming and a threat to public health.<sup>18,20,27</sup> It is crucial to stop and reverse this development for many reasons, including the scenario of an increasingly larger group of young persons having difficulty establishing themselves at work and in adult life.<sup>27</sup> There is strong evidence for interventions targeting children early (such as programs promoting safe, stable and nurturing relationships between parents and children) and interventions supporting children's development of life skills (cognitive, emotional, interpersonal and social skills that enable individuals to deal effectively with the challenges of everyday life).<sup>10</sup> All forms of interventions are needed (*universal* for everyone; *selective* for subgroups with risk factors, e.g. disabled children; and *indicative* for individuals at high risk). The disparity between needs and resources is of great concern, as pointed out in BRIS latest report<sup>20</sup> as well as in a recent report on child and adolescent psychiatry in Sweden ("Hur mår BUP?")<sup>160</sup>.

This thesis investigated associations between violence and mental distress among young persons in Scania, Sweden. Findings from this thesis support that interventions aimed at preventing bullying behaviour in school and online would be greatly beneficial to children's mental health, and that it is vital that those who still become victims receive adequate help to cope with their stress. There is much to gain - for example it has been estimated that 20-43% of cases of self harm among children and adolescents could potentially be prevented in the general population if bullying was eliminated.<sup>85,86</sup> It is furthermore important for school and health professionals to be aware of the association between involvement in peer victimization and self-injury among mentally distressed adolescents.<sup>40,86</sup>

In future research qualitative methods would be useful to explore gender differences in experiences of mental distress, violence,<sup>152</sup> and social support. There is no doubt that the Internet and related technologies are posing new challenges to mental health, and the specific challenges and differences in vulnerability among young people need to be better understood.<sup>161</sup> It is important to reach consensus on a definition of cyber victimization, and more research is needed to examine the degree to which risk and protective factors may be unique to cyberbullying above and beyond traditional bullying.<sup>117</sup> Furthermore, longitudinal studies are needed in order to establish direction of causality between cyberbullying involvement and self-injury.<sup>150</sup>



# Populärvetenskaplig sammanfattning

Sammantaget visar forskning en reell ökning av psykisk ohälsa bland unga i Sverige sedan slutet av 1980-talet. Ökningen gäller självrapporterade besvär, psykiatriska diagnoser, sjukhusinläggningar, behandling med antidepressiva läkemedel, långa sjukskrivningar/ förtidspensioneringar pga psykiska besvär samt självmord (som ökat i åldersgruppen 15-19 år, inte minskat i åldersgruppen 15-24 år, men minskat tydligt i alla äldre åldersgrupper). Utvecklingen är alarmerande med stora risker för den framtida folkhälsan i Sverige.

Denna avhandling består av fyra delarbeten. Dessa har dels undersökt sambandet mellan att vara utsatt för våld (mobbing/ nättrakasserier/ fysiskt våld) med psykisk ohälsa, dels undersökt sambandet mellan att vara inblandad i nätmobbing med självskadebeteende bland skolelever som har psykisk ohälsa. Samtliga undersökningar är tvärsnittsstudier baserade på självrapporterade uppgifter i Region Skånes folkhälsoundersökningar.

Den första studien visade att mer än var femte elev i årskurs 9 hade någon form av funktionsnedsättning år 2012. Elever med funktionsnedsättning hade sämre hälsa och var ungefär dubbelt så ofta mobbade och nät-trakasserade än klasskamrater utan funktionsnedsättning. Elever med funktionsnedsättning som mobbats hade kraftig ohälsa, vilken bland pojkar främst uttrycktes som kroppsliga besvär (ont i magen, huvudvärk, ont i ryggen, yrsel) och bland flickor främst som psykiska besvär (nedstämdhet, oro, irritation/dåligt humör, sömnsvårigheter). Elever med ADHD/ADD hade mer psykiska besvär och var oftare mobbade än jämnåriga med andra sorters funktionsnedsättning.

Den andra studien visade att flickor oftare än pojkar trakasserats på nätet och att sambandet med psykosomatiska besvär var starkare för dem som varit med om detta flera gånger än en gång under det senaste året. Det fanns dock ett statistiskt säkerställt samband även för att ha blivit nät-trakasserad en enda gång senaste året, vilket kan bero på den snabba och omfattande spridningen av elakheter på nätet. Goda relationer med föräldrar och kamrater är skyddande för hälsan och bland elever som blivit nät-trakasserade hade de som hade lätt för att prata med föräldrar/vänner mindre psykosomatiska besvär än de som inte tyckte det var lätt att kommunicera. Pojkar som trakasserats flera gånger på nätet verkade vara extra skyddade av god kommunikation med föräldrar och vänner.

Den tredje studien undersökte sambandet mellan inblandning i nätmobbning och självskadebeteende bland de elever i årskurs 9 och gymnasieskolans årskurs 2 som mått dåligt en längre tid (minst 2 veckor i rad) senaste året. Sambandet med självskadebeteende blev gradvis starkare från dem som bara mobbat andra, till dem som enbart blivit mobbade, till dem som både mobbat andra och själva blivit utsatta på nätet. När hänsyn togs till riskbruk av alkohol, daglig rökning och narkotika-användning upphörde sambandet med självskadebeteende för pojkar som enbart mobbat andra på nätet.

Den fjärde studien undersökte sambandet mellan utsatthet för fysiskt våld och psykisk ohälsa bland unga vuxna 18-34 år. Var tionde man och var tjugonde kvinna svarade att de någon gång utsatts för fysiskt våld under det senaste året. Männerna hade oftast blivit utsatta för våld ute i samhället och kvinnorna i det egna hemmet. Sambandet mellan utsatthet för våld och psykisk ohälsa var starkt för kvinnor men sågs inte alls bland män. Detta beror sannolikt delvis på att män och kvinnor utsätts för våld i olika sammanhang.

Sammanfattningsvis stöder fynden i denna avhandling att en minskning av våld och mobbning skulle gynna den psykiska hälsan bland unga i Sverige. Förebyggande insatser är viktiga (både generella och riktade till utsatta grupper) och de som blivit utsatta måste få adekvat hjälp. Interventioner som förbättrar relationer med föräldrar och jämnåriga har potential att förbättra den psykiska hälsan direkt (genom bättre kontakt) och indirekt (genom minskad mobbning). Det är även viktigt att skolan och vården känner till sambandet mellan mobbning och självskadebeteende bland elever som mår dåligt.

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Paper I







ORIGINAL ARTICLE

Special Issue: In the era of pluralism: vaccination uptake, migrant health and child health trajectories

## Subjective health complaints and exposure to peer victimization among disabled and non-disabled adolescents: A population-based study in Sweden

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### Abstract

**Aims:** To investigate subjective health complaints (SHCs) (psychological and somatic, respectively) among disabled and non-disabled adolescents, focusing on the impact of traditional bullying and cyber harassment, and furthermore to report psychological and somatic SHCs across different types of disability. **Methods:** Data from the public health survey of children and adolescents in Scania, Sweden, 2012 was used. A questionnaire was answered anonymously in school by 9791 students in the 9th grade (response rate 83%), and 7533 of these with valid answers on key questions were included in this study. Associations with daily SHCs were investigated by multi-adjusted logistic regression analyses. **Results:** Any disability was reported by 24.1% of boys and 22.0% of girls. Disabled students were more exposed to cyber harassment (boys: 20.0%; girls: 28.2%) than non-disabled peers (boys: 11.8%; girls: 18.1%). Exposure to traditional bullying showed the same pattern but with a lower prevalence. Disabled students had around doubled odds of both daily psychological SHCs and daily somatic SHCs in the fully adjusted models. In general, the odds increased with exposure to cyber harassment or traditional bullying and the highest odds were seen among disabled students exposed to both cyber harassment and traditional bullying. Students with ADHD/ADD had the highest odds of daily psychological SHCs as well as exposure to traditional bullying across six disability types. **Conclusions: Disabled adolescents report poorer health and are more exposed to both traditional bullying and cyber harassment. This public health issue needs more attention in schools and in society in general.**

**Key Words:** Subjective health complaints, disability, peer victimization, bullying, cyber harassment, adolescent, Sweden, population study

### Background

Signs of increasing mental ill-health among young people is of great public health concern in Sweden. Self-reported health complaints as well as hospitalization for psychiatric disease have increased among Swedish adolescents during the last decades [1]. Girls report higher levels of psychological distress than boys [1, 2].

Peer victimization among children is associated with mental health problems such as anxiety, depression,

psychosomatic symptoms, and self-harm, and can have long-lasting effects [3, 4]. Bullying is defined as aggressive behaviour that is repetitive and intentional and involves a power differential between victim and perpetrator [5]. Regular bullying can be termed traditional bullying (TB) to differentiate it from the new phenomenon of cyberbullying [5], which has become more prevalent as adolescents spend an increasing amount

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of time online [6]. Victimization by TB is low in Sweden by international comparison [2, 7] but the associations with subjective health complaints (SHCs) are stronger in Sweden than in many other countries [7]. Exposure to cyberbullying is associated with similar health consequences as exposure to TB [8, 9].

There is no consensus on how to define disability, but children categorized as disabled report poorer physical and mental health [10] and are more often subjected to victimization compared to non-disabled peers [10-13]. Disabled students in grades 6 and 9 were four times more likely to be bullied compared to non-disabled peers in a total population study in Sweden (disability defined as for example having a physical disability, dyslexia, visual and/or hearing impairments, ADHD, epilepsy or diabetes) [10].

There is limited research on bullying and cyber harassment (CH) among adolescents with and without a disability examining general somatic and psychological health in population-based samples [12].

The main aim of this study was to investigate the associations between daily SHCs among disabled and non-disabled adolescents, focusing on the impact of TB and CH. The symptom load was separated into psychological and somatic SHCs as it might be expected that the underlying health condition of many disabilities can be expressed through somatic symptoms [12]. Furthermore, we wanted to investigate the associations between SHCs and different categories of disability as most studies have combined different types of disability into a single index [10, 14]. To the best of our knowledge, this is the first study investigating psychological and somatic SHCs among adolescents with and without a disability in combination with exposure to TB and/or CH, as well as the first study investigating psychological and somatic SHCs across different disability types in a large population-based sample.

## Methods

This is a sub-study on 9th grade students participating in a large cross-sectional public health survey of children and adolescents in Skåne (Scania), which was performed to map out the health situation among children in the southernmost region of Sweden [15]. The students and their parents were informed that participation was voluntary, confidentiality assured, and that results of the survey would be used in research. The questionnaires were completed anonymously during one school-hour in March 2012. Students with reading disabilities had access to technical help. Nearly 30,000 students in grades 6 and 9 in compulsory school, and grade 2 in upper secondary school, answered the questionnaires, including 9791 students in the 9th grade (response rate 83%). The final sample

for this study included boys and girls in the 9th grade (15-16 years old) who had answered the questions on disability, SHCs, TB and CH: i.e. 7533 students: 3608 boys and 3925 girls. This study was reviewed and approved by the Regional Ethical Committee at Lund University, Sweden (Dnr 2013/317).

### *Subjective health complaints (SHCs)*

Overall psychological and somatic health was measured by the Health and Behaviour in School-aged Children Symptom Checklist (HBSC-SCL), a reliable and valid instrument that has been used for decades in cross-national World Health Organization (WHO) studies [2]. The students were asked how often they had experienced eight different symptoms during the last six months on a five-grade scale from 'about every day' to 'rarely or never'. The symptom load was separated into *psychological SHCs* ('feeling low', 'feeling irritable or bad tempered', 'feeling nervous', 'sleeping difficulties') and *somatic SHCs* ('headache', 'stomach ache', 'backache', 'dizziness'), which is supported by previous studies [16]. High symptom load was defined as experiencing at least one SHC on a daily basis (dichotomization: 'about every day'/'less often') [16].

### *Disability*

The question on disability was phrased: 'Do you have any of the following disabilities?' (yes/no), listing six categories: '*Hearing disability*', '*Visual disability that cannot be corrected by glasses or contact lenses*', '*Moving disability*', '*Reading-writing disability, dyslexia*', '*ADHD/ADD*', '*Other disability*' [17]. Students who had ticked yes on one or more disability options, or no on all disability options, were included in this study. Results were dichotomized into 'No disability' versus 'Any disability'.

### *Traditional bullying (TB)*

The students were asked how often they had been bullied in school during the past few months with five response options from 'I have not been bullied' to 'several times a week'. Those who had been bullied two or three times a month or more often (i.e. more than once a month) were categorized as TB victims in line with earlier research [2, 5, 18].

### *Disability and TB*

To explore the impact of disability and TB on daily SHCs, students were divided into four mutually exclusive groups: 'Neither disabled nor bullied' (reference category), 'Disabled', 'Bullied', and 'Disabled and bullied'.

*Cyber harassment (CH)*

The question was phrased: 'Have you during the past 12 months, in school or out of school, been exposed to harassment or violation involving a cell phone and/or the Internet (text messaging, instant messaging (MSN), Facebook, e-mail or similar)?' Answers were dichotomized into yes/no.

*Disability and CH*

To explore the impact of disability and CH on daily SHCs, students were divided into four mutually exclusive groups: 'Neither disabled nor cyber harassed' (reference category), 'Disabled', 'Cyber harassed', and 'Disabled and cyber harassed'.

*Disability, TB, and CH*

To explore the simultaneous impact of disability, TB, and CH on daily SHCs, students were divided into six mutually exclusive groups: 'No disability, no TB, no CH' (reference category), 'Disability', 'TB or CH', 'Disability + TB or CH', 'TB + CH', and 'Disability + TB + CH'.

*Covariates*

Adjustment was made for the following potential confounders: *Background* (Swedish = born in Sweden with at least one Swedish-born parent/Foreign = born abroad, alternatively born in Sweden with two foreign-born parents) [19], *Parental occupation* (both parents working/one or no parent working), *Daily smoking* (youth smoking cigarettes every day/less often), *Intense alcohol consumption* (youth drinking a large quantity in one session at least once a month/less often) [20], *Close friend* (having/not having a close friend with whom you can talk in confidence about almost any personal matter) [15], and *Communication with parents* (easy/not easy to talk to parents when having a problem or just wanting to talk) [15].

*Statistics*

Differences in background characteristics between disabled and non-disabled students were analysed by Fisher's exact test (2-sided). Multi-adjusted analyses were performed by binary logistic regression. Model 1 was adjusted for sociodemographic factors (age, background, parental occupation), Model 2 was further adjusted for living habits (daily smoking, intense alcohol consumption), Model 3 further adjusted for psychosocial factors (close friend, communication with parents), and Model 4 further adjusted for

exposure to TB or CH. Analyses of disability combined with both TB and CH, as well as analyses of SHCs across subcategories of disability were performed for boys and girls, combined and adjusted for gender. The statistical analyses were performed using IBM SPSS Statistics version 22.

**Results**

Any disability was reported by significantly more boys (24.1%,  $n = 869$ ) than girls (22.0%,  $n = 862$ ) ( $p = 0.03$ ) (Figure 1). The prevalence of different types of disability was in falling order (boys and girls combined): *Reading-writing disability, dyslexia* 9.5% ( $n = 719$ ), *Hearing disability* 5.6% ( $n = 422$ ); *Visual disability that cannot be corrected by glasses or contact lenses* 5.5% ( $n = 415$ ); *Other disability* 3.4% ( $n = 258$ ); *ADHD/ADD* 3.3% ( $n = 249$ ); and *Moving disability* 2.2% ( $n = 163$ ). *Reading-writing disability, dyslexia*, and *ADHD/ADD* were significantly more often reported by boys than girls ( $p < 0.001$ ).

Disabled adolescents were significantly more often exposed to TB and CH than non-disabled peers and they reported daily psychological SHCs and daily somatic SHCs about twice as often (Table I). They also more often smoked daily, had intense alcohol consumption, lacked a close friend, had non-easy communication with their parents, and less often reported having two working parents. Disability was more prevalent among boys with a Swedish background than boys with a foreign background.

Bivariate associations between daily SHCs and covariates were all statistically significant apart from foreign background (not significant for daily psychological SHCs among girls and for daily somatic SHCs among boys) (data not shown).

Table II shows a general pattern of gradually increasing odds of daily psychological SHCs across mutually exclusive combinations of disability and TB, and across mutually exclusive combinations of disability and CH, stratified by gender. Disability alone was associated with doubled odds of daily SHCs and this association hardly changed through the multiple adjustments. The highest odds ratios (ORs) were seen among disabled students exposed to TB, girls: OR: 7.3 (95% CI: 4.4, 12.1), boys: OR: 5.7 (95% CI: 3.4, 9.5). Identical analyses regarding daily somatic SHCs (data not shown) also revealed doubled odds through the models for disability alone, but three times higher ORs among disabled boys exposed to TB, OR: 9.5 (95% CI: 5.5, 16.4) compared to girls: OR: 3.3 (95% CI: 1.9, 5.5). Combinations of disability and CH showed somewhat weaker associations with daily SHCs and a less pronounced gender difference for psychological SHCs and somatic SHCs compared with corresponding

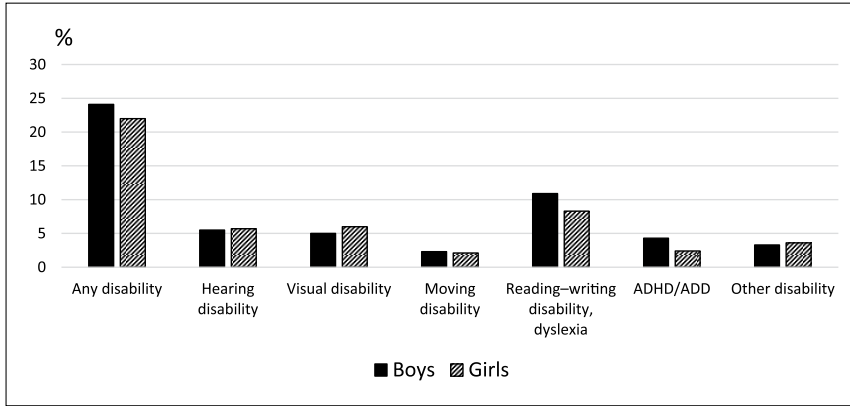


Figure 1. Prevalence (%) of *Any disability* and different types of disability among 9th grade boys and girls. The child and adolescent public health survey, Scania, 2012.

combinations of disability and TB. Additional analyses showed significantly higher ORs (around double) of daily psychological and somatic SHCs, respectively, among disabled students exposed to TB or CH compared to non-disabled students likewise exposed to TB or CH through most of the models for TB and all of the models for CH (data not shown).

Combinations of disability, TB, and CH showed a general gradual increase with the highest odds among disabled students exposed to both TB and CH (OR: 11.4 for daily psychological SHCs, OR: 7.0 for daily somatic SHCs) (Table III).

The associations between daily psychological or somatic SHCs with different types of disability are shown in Figure 2 (boys and girls combined). Students with a certain type of disability were compared with all other students (including those with some other type of disability) as the categories were not mutually exclusive. *Reading-writing disability, dyslexia* was associated with the lowest age and gender adjusted odds of daily psychological SHCs (1.7) and daily somatic SHCs (1.9), while *ADHD/ADD* was associated with the highest odds of daily psychological SHCs (OR: 5.2 (95% CI: 4.0, 6.7)). Additional age and gender adjusted bivariate analyses showed the highest odds of TB among students with *ADHD/ADD* (5.4) and *Moving disability* (4.1), and the lowest odds among students with *Reading-writing disability, dyslexia* (2.5), while the odds of CH were more evenly distributed across the different categories of disability (1.7, 2.6) (data not shown).

## Discussion

The prevalence rate of disability 23.0% in the present study was higher than a comparable study using the

same definition among 9th-grade students in another Swedish county (Örebro): 16.8% [17]. The prevalence in Scania was three percentage units higher for *Reading-writing disability, dyslexia* (significantly more often reported by youth with a Swedish background), and two percentage units higher for *Visual disability* (significantly more often reported by youth with a foreign background) (data not shown). Whether the prevalence is truly higher in Scania is difficult to know – it could reflect different compositions of study samples or different diagnostic procedures.

SHCs become more prevalent during adolescence [2] and the prevalence of daily SHCs among 15–16 year-old students in the present study (daily psychological SHCs 16.5%, daily somatic SHCs 13.0%, data not shown) is in line with a Danish study reporting somewhat lower levels among children 11–15 years old (daily psychological SHCs 14.6%, daily somatic SHCs 9.8%) [16].

Disability alone was associated with doubled odds of daily psychological SHCs as well as daily somatic SHCs. These associations were only marginally affected by multiple adjustments, which could indicate that features of disability in itself are linked to higher levels of both somatic and psychological SHCs.

A gender difference was seen regarding the two types of SHCs, as disabled TB boys reported the highest odds of somatic SHCs and disabled TB girls the highest odds of psychological SHCs. It could be that boys express mental distress more through somatic complaints while girls are socialized to express distress more through psychological symptoms [2, 21]. Not surprisingly the highest odds of daily SHCs were seen among disabled students exposed to both TB and CH, which is in line with earlier research [8, 22].

Table 1. Characteristics (%) of 9th grade boys and girls with and without disability. The child and adolescent public health survey, Scania, 2012.

	Boys					Girls					
	<i>n</i> = 3608					<i>n</i> = 3925					
	Total		Disability		<i>p</i> -value <sup>a</sup>	Total		Disability		<i>p</i> -value <sup>a</sup>	
	<i>n</i>	%	No	Yes		<i>n</i>	%	No	Yes		
		<i>n</i> = 2739		<i>n</i> = 869				<i>n</i> = 3063		<i>n</i> = 862	
		75.9%	24.1%				78.0%	22.0%			
<b>Daily psychological SHCs</b>											
No	3175	88.0	90.0	81.6		3116	79.4	82.9	67.1		
Yes	433	12.0	10.0	18.4	<0.001***	809	20.6	17.1	32.9	<0.001***	
<b>Daily somatic SHCs</b>											
No	3352	92.9	94.6	87.6		3201	81.6	84.7	70.4		
Yes	256	7.1	5.4	12.4	<0.001***	724	18.4	15.3	29.6	<0.001***	
<b>Bullied traditionally past few months</b>											
No	3451	95.6	96.6	92.6		3764	95.9	96.8	92.7		
Yes	157	4.4	3.4	7.4	<0.001***	161	4.1	3.2	7.3	<0.001***	
<b>Cyber harassed past year</b>											
No	3112	86.3	88.2	80.0		3129	79.7	81.9	71.8		
Yes	496	13.7	11.8	20.0	<0.001***	796	20.3	18.1	28.2	<0.001***	
<b>Both bullied and cyber harassed</b>											
No	3531	97.9	98.6	95.6		3832	97.6	98.3	95.2		
Yes	77	2.1	1.4	4.4	<0.001***	93	2.4	1.7	4.8	<0.001***	
<b>Background</b>											
Swedish	2806	77.8	77.0	82.1		3009	76.7	77.5	75.7		
Foreign	779	21.6	23.0	17.9	0.001**	895	22.8	22.5	24.3	0.290 ns	
Missing	23	0.6				21	0.5				
<b>Both parents working</b>											
Yes	2765	76.6	84.0	79.2		2880	73.4	80.8	75.6		
No	572	15.9	16.0	20.8	0.002**	734	18.7	19.2	24.4	0.002**	
Missing	271	7.5				311	7.9				
<b>Daily smoking</b>											
No	3370	93.4	95.6	88.9		3644	92.8	95.0	87.9		
Yes	216	6.0	4.4	11.1	<0.001***	257	6.5	5.0	12.1	<0.001***	
Missing	22	0.6				24	0.6				
<b>Intense alcohol consumption</b>											
No	2990	82.9	86.0	78.9		3303	84.2	87.3	78.6		
Yes	558	15.5	14.0	21.1	<0.001***	564	14.4	12.7	21.4	<0.001***	
Missing	60	1.7				58	1.5				
<b>Close friend</b>											
Yes	3296	91.4	93.8	90.3		3713	94.6	96.3	92.8		
No	250	6.9	6.2	9.7	0.001**	174	4.4	3.7	7.2	<0.001***	
Missing	62	1.7				38	1.0				
<b>Easy to talk to parents if problems</b>											
Yes	2397	66.4	68.7	60.7		2358	60.1	61.8	55.4		
No	1194	33.1	31.3	39.3	<0.001***	1548	39.4	38.2	44.6	0.001**	
Missing	17	0.5				19	0.5				

Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .<sup>a</sup>Fisher's exact test, 2-sided.

Whether the association between TB victimization and SHCs differ between disabled and non-disabled students is not clear. Earlier research has shown inconsistent results, which could be due to different statistical approaches. In the present study additional logistic

regression analyses with non-disabled TB students as a reference category showed significantly higher (around doubled) odds of daily psychological SHCs and daily somatic SHCs among disabled TB students through most of the modelling, with a similar pattern for CH

Table II. Daily psychological subjective health complaints (SHCs) in groups defined by disability and victimization by traditional bullying (TB), and groups defined by disability and victimization by cyber harassment (CH), among 9th grade boys and girls (OR, 95% CI). The child and adolescent public health survey, Scania, 2012.

		Disability and victimization by traditional bullying past few months				Disability and victimization by cyber harassment					
		Crude		Model 1		Model 2		Model 3		Model 4	
<i>n</i>	%	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
<b>Boys</b>											
<b>Reference group</b>	2646	73.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Disabled</b>	805	22.3	1.9***	(1.5, 2.4)	1.8***	(1.4, 2.3)	1.8***	(1.4, 2.3)	1.7***	1.7***	(1.3, 2.1)
<b>Bullied</b>	93	2.6	2.4***	(1.4, 4.1)	2.4**	(1.4, 4.2)	2.2**	(1.3, 3.9)	1.9*	1.6 ns	(0.8, 2.9)
<b>Disabled and bullied</b>	64	1.8	5.7***	(3.4, 9.5)	4.3***	(2.4, 7.7)	3.5***	(1.9, 6.5)	3.1**	2.2*	(1.1, 4.4)
	3608	100.0									
<b>Girls</b>											
<b>Reference group</b>	2965	75.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Disabled</b>	799	20.4	2.3***	(1.9, 2.7)	2.2***	(1.8, 2.6)	2.0***	(1.6, 2.4)	1.9***	1.8***	(1.5, 2.3)
<b>Bullied</b>	98	2.5	3.5***	(2.3, 5.3)	2.8***	(1.8, 4.5)	3.1***	(1.9, 4.8)	2.8***	2.3**	(1.4, 3.7)
<b>Disabled and bullied</b>	63	1.6	7.3***	(4.4, 12.1)	8.2***	(4.7, 14.3)	6.8***	(3.8, 12.3)	5.6***	4.5***	(2.5, 8.3)
	3925	100.0									
<b>Disability and victimization by cyber harassment</b>											
<b>Boys</b>											
<b>Reference group</b>	2417	67.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Disabled</b>	695	19.3	2.0***	(1.5, 2.6)	1.9***	(1.5, 2.5)	1.9***	(1.4, 2.5)	1.9***	1.9***	(1.4, 2.5)
<b>Cyber harassed</b>	322	8.9	3.0***	(2.2, 4.1)	3.0***	(2.2, 4.1)	2.9***	(2.1, 4.0)	2.6***	2.5***	(1.8, 3.6)
<b>Disabled and cyber harassed</b>	174	4.8	4.8***	(3.4, 6.8)	3.9***	(2.6, 5.8)	3.5***	(2.3, 5.2)	2.9***	2.7***	(1.7, 4.1)
	3608	100.0									
<b>Girls</b>											
<b>Reference group</b>	2510	63.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Disabled</b>	619	15.8	2.2***	(1.5, 2.6)	2.2***	(1.7, 2.7)	2.0***	(1.6, 2.5)	2.0***	1.9***	(1.5, 2.4)
<b>Cyber harassed</b>	553	14.1	2.3***	(1.8, 2.8)	2.2***	(1.8, 2.8)	2.1***	(1.6, 2.6)	1.9***	1.8***	(1.4, 2.3)
<b>Disabled and cyber harassed</b>	243	6.2	5.1***	(3.9, 6.8)	4.7***	(3.5, 6.4)	4.0***	(3.0, 5.4)	3.3***	3.0***	(2.1, 4.1)
	3925	100.0									

Reference group: Neither disabled nor traditionally bullied boys and girls, alternatively neither disabled nor cyber harassed boys and girls.  
 Model 1: Adjusted for sociodemographic factors (age, background, parental occupation).  
 Model 2: Further adjusted for living habits (daily smoking, intense alcohol consumption).  
 Model 3: Further adjusted for psychosocial factors (close friend, communication with parents).  
 Model 4: Further adjusted for victimization by cyber harassment or traditional bullying.  
 Significance levels: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Table III. Multiple adjusted associations between subjective health complaints (SHCs) and combinations of disability, traditional bullying (TB), and cyber harassment (CH) among 9th grade students (boys and girls combined) (OR, 95% CI). The child and adolescent public health survey, Scania, 2012.

		Crude		Age + gender		Model 1		Model 2		Model 3	
		OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
<b>Daily psychological SHCs</b>											
<b>Reference group</b>	4827	1.0		1.0		1.0		1.0		1.0	
<b>Disabled</b>	1266	2.0***	(1.7, 2.4)	2.1***	(1.8, 2.5)	2.1***	(1.7, 2.5)	2.0***	(1.7, 2.5)	1.9***	(1.6, 2.3)
<b>TB or CH</b>	884	2.5***	(2.1, 3.0)	2.3***	(2.0, 2.8)	2.3***	(1.9, 2.8)	2.2***	(1.9, 2.8)	2.0***	(1.7, 2.5)
<b>Disabled + TB or CH</b>	386	5.1	4.1***	4.0***	(3.3, 5.2)	3.6***	(3.2, 5.1)	3.2***	(2.8, 4.6)	2.7***	(2.1, 3.6)
<b>TB + CH</b>	91	1.2	5.1***	5.0***	(3.3, 7.8)	4.4***	(2.7, 7.0)	4.0***	(2.5, 6.5)	3.6***	(2.2, 5.9)
<b>Disabled + TB + CH</b>	79	1.0	11.4***	11.9***	(7.5, 18.9)	10.5***	(6.4, 17.2)	8.2***	(4.9, 13.8)	6.7***	(3.9, 11.5)
	7533	100.0									
<b>Daily somatic SHCs</b>											
<b>Reference group</b>	4827	1.0		1.0		1.0		1.0		1.0	
<b>Disabled</b>	1266	2.0***	(1.7, 2.4)	2.1***	(1.8, 2.5)	2.1***	(1.7, 2.5)	1.9***	(1.7, 2.5)	1.9***	(1.6, 2.3)
<b>TB or CH</b>	884	2.1***	(1.7, 2.5)	1.9***	(1.5, 2.3)	1.8***	(1.4, 2.2)	1.7***	(1.3, 2.1)	1.6***	(1.2, 1.9)
<b>Disabled + TB or CH</b>	386	5.1	4.2***	4.0***	(3.2, 5.2)	4.0***	(3.1, 5.2)	3.7***	(2.8, 4.8)	3.3***	(2.5, 4.4)
<b>TB + CH</b>	91	1.2	2.3**	2.2**	(1.2, 3.7)	2.0*	(1.1, 3.5)	1.9*	(1.02, 3.4)	1.7 ns	(0.9, 3.1)
<b>Disabled + TB + CH</b>	79	1.0	7.0***	7.6***	(4.7, 12.2)	6.6***	(4.0, 11.1)	5.2***	(3.0, 8.8)	4.2***	(2.4, 7.3)
	7533	100.0									

\*Reference group = Non-disabled students who have neither been traditionally bullied (TB) past few months nor cyber harassed (CH) past year.

ns = Not significant.

\* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

Model 1: Adjusted for sociodemographic factors (background, parental occupation).

Model 2: Further adjusted for living habits (daily smoking, intense alcohol consumption).

Model 3: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 4: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 5: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 6: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 7: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 8: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 9: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 10: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 11: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 12: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 13: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 14: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 15: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 16: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 17: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 18: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 19: Further adjusted for psychosocial factors (close friend, communication with parents).

Model 20: Further adjusted for psychosocial factors (close friend, communication with parents).



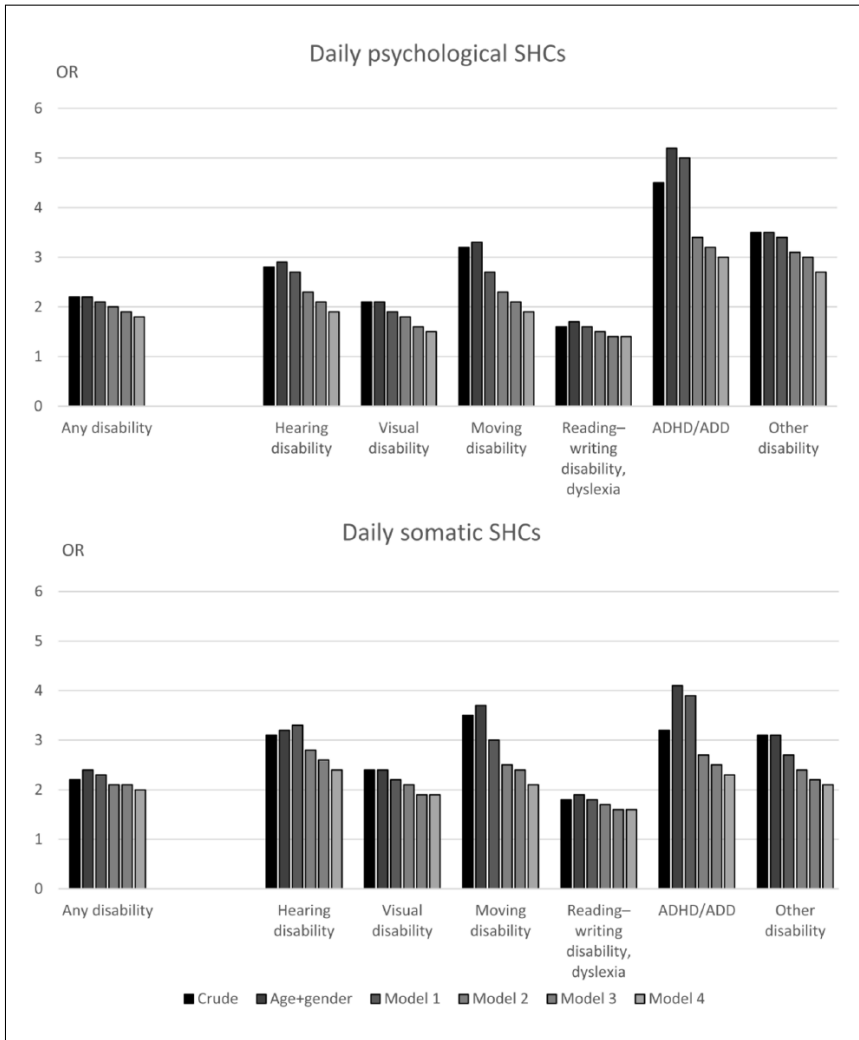


Figure 2. Odds ratios (OR) of daily psychological and somatic subjective health complaints (SHCs) among disabled students (*Any disability* and different types of disability). Crude, adjusted for age and gender, Model 1 adjusted for sociodemographic factors (foreign background, parental occupation), Model 2 further adjusted for living habits (daily smoking, intense alcohol consumption), Model 3 further adjusted for psychosocial factors (close friend, communication with parents), and Model 4 further adjusted for exposure to traditional bullying (TB) and cyber harassment (CH). The child and adolescent public health survey, Scania, 2012.

(data not shown). This is in line with a study of 7005 students, 16–20 years old, which found that having a physical disability or a chronic disease seemed to potentiate the harmful effects of TB on depression and physical symptoms [12]. A recent study found that peer victimization partially mediated the relationship

between disability status and psychosocial distress [23]. Other studies found no difference between disabled and non-disabled students regarding the association between TB victimization and SHCs [18, 24].

Few studies have investigated subjective health across disability types [17]. In the present study the

most prevalent type – *Reading-writing disability, dyslexia* – was associated with the lowest odds of daily psychological and somatic SHCs, while *ADHD/ADD* had the highest odds of daily psychological SHCs, as well as the highest odds of exposure to TB (OR: 5.4 (95% CI: 3.8, 7.6)) (data not shown). A study based on a nationally representative sample of 4046 children aged 2–17 years in the United States showed that disabilities associated with interpersonal and behavioural difficulties were most strongly associated with victimization risks, and that physical disability did not increase the risk for any type of victimization once confounders and co-occurring disabilities were controlled [14]. *ADHD/ADD* was the only disability type significantly associated with peer assault/bullying after multiple adjustments, increasing the odds by more than 40% [14]. Students involved in bullying as both bullies or victims (‘bully-victims’) have worse mental health outcomes than bullies or victims [3, 4, 8, 9], and there might be a higher prevalence of bully-victims among adolescents with *ADHD/ADD* than in other categories of disability [14, 25]. In the present study additional statistical analyses excluding students with *ADHD/ADD* resulted in somewhat weaker associations, but the overall pattern of statistically significant associations remained intact (data not shown).

#### *Strengths and limitations*

The large population-based sample including information on several relevant confounders is a strength of this study, as well as the possibility to separate disabled students into different categories of disability. However, not all disabled adolescents were able to participate, which might lead to an underestimation of the associations found.

There are limitations to the present study. First, causality cannot be inferred by a cross-sectional study design. Second, response bias due to self-reported data could be present, although anonymous self-administered questionnaires have been shown to be quite reliable regarding disclosure of sensitive information [26]. Third, we had no information on severity of disability, only number of disabilities. Of those reporting any disability 81.3% (n = 1411) reported one, 13.5% (n = 230) two, and 5.2% (n = 90) three or more disabilities (data not shown). Having more than one disability was significantly associated with poorer self-reported health, with the poorest outcome among students with three or more disabilities (ORs for daily psychological SHCs and daily somatic SHCs respectively increased 1.8 times with one disability, 3 times with two disabilities and 10 times with three or more disabilities compared to

the reference group of non-disabled students, data not shown). This is in line with a Swedish study that found considerably worse mental health among adolescents with multiple impairments [17]. Fourth, we had no information on the perpetration of TB or CH and thus were not able to identify bully-victims, who are known to have the poorest outcomes among bullies, victims and non-involved [3, 4, 8, 9]. Disabled children were more likely to be bully-victims involved in both traditional- and cyber peer-victimization in a Swedish population-based study [24]. Fifth, we had no information on other important factors such as parental psychological disorder, which is known to have a large impact on children’s mental health [14].

#### **Conclusions**

Disabled 9th grade boys and girls have increased odds of daily psychological and daily somatic SHCs as well as increased odds of exposure to TB and CH in comparison to non-disabled peers. Disabled children constitute a vulnerable and heterogeneous group and these children need more individualized attention in school [10], as highlighted in the latest report from the Ombudsman for Children in Sweden [27], as well as more attention in society at large. Interventions aimed at preventing bullying behaviour in schools and online would be greatly beneficial to the mental health of all young people, regardless of disability status.

#### **Acknowledgements**

The authors wish to thank all participating students for their cooperation, and Region Skåne (Scania) for providing data from the 2012 Scania public health survey of children and adolescents.

#### **Abbreviations**

ADD = Attention-Deficit Disorder  
 ADHD = Attention-Deficit Hyperactivity Disorder  
 CH = Cyber Harassment  
 HBSC-SCL = Health and Behaviour in School-aged Children Symptom Checklist  
 SHCs = Subjective Health Complaints  
 TB = Traditional Bullying

#### **Conflict of interest**

The authors declare that there is no conflict of interest.

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Paper II





RESEARCH ARTICLE

Open Access



# Subjective health complaints in adolescent victims of cyber harassment: moderation through support from parents/friends - a Swedish population-based study

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## Abstract

**Background:** Victimization in cyberspace has emerged as a new public health issue among the young. The main purpose of this study was to analyze associations between cyber victimization defined as cyber harassment (CH) (a somewhat broader concept than cyberbullying) and subjective health complaints (SHC), to study whether these associations were modified by parental/friend support (measured as communication), and to explore the influence of traditional bullying victimization (TBV) on the association between CH and SHC.

**Methods:** The study population consisted of 8544 students in 9th grade (around 15 years old) who participated in the 2012 Scania public health survey of children and adolescents. The survey was a cross-sectional total-population study conducted in school, with a response rate of 83 %.

Main and interaction (stress-buffering) effects of social support on the relationship between CH and SCH were investigated by hierarchical multiple linear regression analyses, adjusted for potential confounders, including TBV.

**Results:** The past-year prevalence of CH (once or several times) was 14 % among boys and 20 % among girls. Having been cyber harassed once or several times during the past year was associated with higher levels of SHC, controlling for age, parental occupation, parental origin, daily smoking, intense alcohol consumption, and disability. Among both boys and girls, the associations were stronger for CH occurring several times than for CH occurring only once. Main effects of parental/friend support were seen for both boys and girls, while stress-buffering effects were indicated for boys only. Additional analysis further adjusting for TBV did not change the associations substantially, indicating that CH has an effect of its own on SHC.

**Conclusion:** Intervention programs aimed at improving the quality of peer and family relationships among children and adolescents might reduce the incidence of both cyber harassment and traditional bullying and lower the prevalence of psychosomatic complaints.

**Keywords:** Cyber harassment, Subjective health complaints, Adolescent, Sweden, Parental support, Friend support, Population study

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## Background

### Introduction

Cyber victimization has emerged as a new public mental health issue affecting youth today, as expanding use of the Internet and cell phones has provided a new arena for both social interaction and opportunities for abuse [1–4]. In Sweden practically all adolescents have their own cell phones (most often smart phones) and have access to the Internet, where they spend an increasing amount of time [5]. Girls use more social networking sites, chats, and blogs, and more sites where you can upload pictures for public display (e.g., Instagram), while boys play more games and watch more video clips [5].

Cyber victimization can be broadly defined as bullying or harassment performed via electronic means, such as using cell phones or the Internet [4]. However, research has yet to reach consensus on a more precise definition. Extending the concept of traditional bullying into the cyberworld would seem logical [6], but is somewhat problematic [7], as the criteria of traditional bullying—intent to harm, repetition over time, and an imbalance of power between the perpetrator and the victim [6]—are relatively clear-cut in traditional bullying, while the aspects of repetition and power imbalance are more difficult to define in a cyber context [7, 8]. A single online act, such as posting a malevolent picture, may be seen, commented on, and forwarded by many others, which constitutes a repetition, but not necessarily one that involves the original perpetrator [7]. The anonymity of the perpetrator can be viewed as a form of power imbalance, as can the size of the potential audience, the longevity of the message, and the difficulty of escaping from it—there is no safe haven, even at home [1, 3, 7, 8]. It has been argued that the very nature of the Internet implies that all three elements of traditional bullying may be present in a single online interaction [9]. However, it has also been proposed that victimization in cyberspace is less harmful than victimization by traditional bullying as the victim cannot be hurt physically [8].

Estimates of cyber victimization vary widely due to different definitions as well as differences in age group, sampling, methodology, and time frame [1, 10]. Studies with narrow definitions and shorter time frames (past few months) have reported prevalence as low as around 2 % [11, 12], while studies with wider definitions and longer time frames (past year) have reported cyber victimization of more than every fourth adolescent [13]. The Swedish Media Council reported a prevalence of 6 % among boys and 20 % among girls 13–16 years, using the definition of cyber victimization as “Someone having been mean to or bullied you using the Internet or a cell phone during the past year” [14]. Cyber victimization (defined as having been treated in a nasty or hurtful way online during the past 12 months)

increased among European children 9–16 years old from 7 % (boys 6 %; girls 8 %) to 12 % (boys 8 %; girls 15 %) between 2010 and 2014 [15]. Traditional bullying victimization (TBV) on the other hand consistently decreased in most countries including Sweden between 1993/94 and 2005/06 [16]. The prevalence of TBV is low in Sweden by international comparison [16–18] however, the associations between TBV and subjective health complaints (SHC) are stronger in Sweden than in many other countries [17]. Cyber victimization has been shown to have negative outcomes similar to those of TBV, for example, psychosomatic complaints [19, 20], depressive symptoms [4, 10, 20–23], anxiety [20], loneliness [24], lower self-rated health (cyber victimization included in written-verbal bullying victimization) [12], lower self-esteem [4, 6, 20], lower academic performance [20], substance use [21], delinquency [21], self-injury [10], suicidal ideation [10, 20, 23], and suicide attempts [10]. The highest psychological distress has been seen among children who are victimized in both contexts [10].

Social support is a protective factor for health [25], associated with a lower prevalence of both cyber victimization [2, 26] and TBV [2, 27–30]. Parents are the first significant source of support for children, and parental support continues to be valuable [29, 31], even though peer support becomes increasingly important as children grow older [18, 28]. A meta-analysis of studies on parenting behavior and peer victimization concluded that positive parenting behavior including good communication of parents with the child, a warm and affectionate relationship, parental involvement and support, and parental supervision were protective against peer victimization [30]. Results from a longitudinal study showed that family support protected adolescents living in single-parent families from cyber victimization when their friends were not supportive, and furthermore that low family support coupled with low friend support predicted the highest levels of cyber victimization [26].

Social support is furthermore associated with a lower prevalence of mental health problems in adolescents [27–29, 31–33]. Communication with parents is fundamental in establishing the family as a protective factor [18], and young people who easily communicate with their parents have fewer SHC [33]. Although relationships to parents have been shown to be a stronger predictor of good health than relationships to siblings or friends in adolescence [33, 34], positive peer relationships are crucial for adolescents regarding developmental tasks such as forming identity, developing social skills, and establishing autonomy [18].

The way social support influences health can be described by two alternative (but not mutually exclusive) theoretical models: the main effect model and the stress-

buffering model [25]. According to the main effect model, support has an overall beneficial effect on psychological outcomes, regardless of the level of adversity experienced. In the context of the present study, social support would reduce SHC among students irrespective of exposure to cyber harassment. According to the stress-buffering (or interaction) model, the protective effect of social support differs according to the level of stress experienced. In this context, the beneficial effect of social support on SHC would vary among students differently exposed to cyber harassment (CH) (statistically there would be a significant interaction effect of social support and CH on SHC) [25, 35].

Earlier research on TBV among children has investigated these two models for different sources of social support on a variety of mental health outcomes. Solid evidence for the main effect model has been provided [27–29, 32, 36–38], but evidence regarding the stress-buffering model is inconclusive. While several studies have reported support for stress-buffering effects on different combinations of social support and gender [28, 29, 32, 37], others have found no support for the stress-buffering model [36, 38]. The effect of social support on cyber victimization and mental health outcomes has been less extensively researched. To the best of our knowledge there is no earlier study on adolescent cyber victimization that has explored the theories of main and stress-buffering effects of support from parents and friends with respect to SHC. We found one population-based study (in which cyber victimization was included in written-verbal bullying) that reported that the opportunity to speak to an adult about things that worried the child modified the associations between cyber victimization and self-reported general health [12]. The present study will primarily contribute to the existing body of knowledge by adding information on the effect of support from parents/friends on the association between cyber victimization (measured as harassment) and SHC. In this study cyber victimization is defined as “cyber harassment” instead of “cyberbullying” in order to include even single incidents of cyber violation during the past year.

We hypothesize that there will be significant associations between CH and SHC among 9th grade students in Scania, with stronger associations for having been cyber harassed several times than for only once (H1). We also hypothesize that there will be a generally beneficial effect of parental/friend support (a main effect) on the association between CH and SHC (H2). Furthermore, we hypothesize that there will be indications of a stress-buffering effect of social support on the association between CH and SHC (H3), however, we make no assumptions regarding differences between parental/friend support or gender differences, due to inconsistent findings in earlier research. Finally, we hypothesize that

further adjustment for TBV in the multiple adjusted regression models will weaken the association between CH and SHC slightly, but will not affect the significance of the association. This result would indicate that CH has an effect of its own on SHC (H4).

## Methods

### Study population and procedure

A large public health survey of children and adolescents was performed in Skåne (Scania), the southernmost region of Sweden, in 2012. The main purpose of the survey was to map out the health situation among adolescents, and the questionnaire included questions on living conditions, lifestyle factors, mental and physical health, sleep, well-being, social relations, and school [39]. The students were informed of the purpose of the survey, that participation was voluntary, that their answers would remain confidential, and that the results of the survey would be used in research. Their parents were likewise informed and invited to inform the teachers if they did not want their children to participate. The questionnaires were completed anonymously during one school-hour in classrooms during one week in March 2012. Students with reading disabilities had access to technical help to complete the questionnaire. Nearly 30000 students answered the questionnaires in grades 6 and 9 and the second year of upper secondary school (i.e., adolescents around 12, 15, and 17 years of age), including 9792 students in 9th grade (response rate 83 %). The selected study sample for the present research study consists of 9th grade students with answers on all eight SHC items; that is 8544 students, 4190 boys (49.0 %) and 4354 girls (51.0 %). This study was reviewed and approved by the Regional Ethical Committee at Lund University, Sweden (Dnr 2013/317). Written parental consent was not required, as 9th grade students are viewed as mature enough to make their own decision regarding participation in this type of public health survey in Sweden.

### Measurements

#### **Dependent variable: subjective health complaints**

*Subjective health complaints* is a general term used to describe a variety of common health symptoms such as headache, stomachache, nervousness, and so on, experienced with or without a diagnosis [40]. We chose to assess SHC by the Health and Behaviour in School-aged Children Symptom Checklist (HBSC-SCL), a reliable and valid instrument [40] used for decades in the cross-national WHO collaborative study Health Behaviour in School-aged Children [18]. The students were asked how often they had experienced the following eight health complaints in the last six months: headache, stomachache, backache, feeling low, feeling irritable or



bad tempered, feeling nervous, difficulties in getting to sleep, and dizziness [41, 42]. Each health complaint was rated on a five-point frequency scale, ranging from one point for "Rarely or never" to five points for "About every day," generating an index score of 8–40, with higher scores indicating more SHC [42]. Cronbach's alpha coefficient in the present study was 0.81 for both boys and girls, respectively. SHC for boys were mean 15.8, median 15, mode 12, and for girls mean 19.8, median 19, mode 16.

### Independent variables

*Cyber harassment* was assessed by the question "Have you during the past 12 months, in school or out of school, been exposed to harassment or violation involving a cell phone and/or the Internet (text messaging, instant messaging (MSN), Facebook, e-mail or similar)?" The response options were "No", "Yes, once" and "Yes, several times" [39, 43].

*Social support* was measured with a question on parental/friend support which was phrased "If you have a problem or just want to talk to someone, how easy or difficult would it be to talk to...?" Several alternative sources of social support were given, including "Parents or the adults you live with" and "Friends." There were five response options for each alternative, ranging from "Very easy" to "Very difficult." The response options were dichotomized into "Easy communication" ("Very easy", "Rather easy"), and "Not easy communication" ("Neither easy nor difficult," "Rather difficult," "Difficult"). "Easy communication" equals high support and "Not easy communication" equals low support. This question has been used for many years in a large national survey of Swedish 9th grade students on alcohol, tobacco, and drug use [44].

### Covariates

Adjustment was made for the following potential confounders: *Parental occupation* (both/one/no parent working) [12, 31]; *Parental origin* (both/one/no parent born in Sweden) [12]; *Daily smoking* (smoking cigarettes every day/less often) [45]; *Intense alcohol consumption* (drinking a large quantity in one session at least once a month/drinking alcohol less often) [13, 44, 46]; and *Disability* (no disability versus any disability of the following alternatives: hearing disability/visual disability that cannot be corrected by glasses or contact lenses/moving disability/reading-writing disability, dyslexia/ADHD-ADD/other disability.) [12]. Further adjustment was made for *Traditional bullying victimization* in an additional analysis, assessed by the question "How often have you been bullied in school during the past few months?" Those who had been bullied two or three times a month or more often (i.e., more than once a month) during the

past few months were categorized as traditional bullying victims in line with earlier research [6, 18, 41]. *Body weight* (BMI normal weight: boys <23.29; girls <23.94; overweight: boys 23.29–28.29; girls 23.94–29.10, BMI obesity: boys 28.30+, girls 29.11+ [12, 47]. All analyses were stratified according to gender, as there are known gender differences regarding SHC (girls report more SHC) [18, 31, 33, 41] as well as social support (in Sweden more 15-year old boys than girls report easy communication with parents [18], while adolescent girls have been known to report more peer support [28, 29]).

### Statistics

Differences in background characteristics were analyzed by Pearson chi square tests for all categorical variables, and by one-way ANOVA for SHC.

To examine the associations between cyber harassment and SHC modified by support, a series of hierarchical regression analyses were performed according to the procedures recommended by Baron and Kenny [35]. In Model 1, the dependent variable of SHC was regressed on the independent variable of CH, adjusted for age, parental occupation, parental origin, daily smoking, intense alcohol consumption, and disability (H1). BMI was not included in the multiple adjusted analyses as there were no significant associations between body weight and CH in our study sample. In Model 2, parental/friend support was added (with separate analyses for the two types of support) (H2). In a final third model, the interaction of CH and social support was added (separate analyses for the two types of support). If the interaction term added in Model 3 was statistically significant, a moderating (or stress-buffering) effect of social support on the association between CH and SHC could be inferred (H3). Furthermore, an identical series of hierarchical regression analyses was performed with additional adjustment for TBV (H4). The statistical analyses were performed using IBM SPSS Statistics version 22.

### Results

Descriptive statistics of the study population stratified by exposure to cyber harassment is presented in Table 1. Among boys, 540 (14 %) had experienced CH during the past year: 351 boys (9 %) once and 189 boys (5 %) several times. The prevalence was higher among girls; 849 girls (20 %) reported that they had been cyber harassed during the past year: 562 girls (13 %) once and 287 girls (7 %) several times. Victimization by CH was significantly more often reported by boys and girls who did not have two working parents, who smoked and had intense alcohol consumption, had some form of disability, and who did not find it easy to talk to parents or friends if having a problem (low parental/friend support).

**Table 1** Characteristics (%) of cyber harassed 9th grade boys and girls. The Scania public health survey among children and adolescents, 2012

	Boys			p-value <sup>a</sup>	Girls			p-value <sup>a</sup>
	Cyber harassed past year				Cyber harassed past year			
	No (n = 3372; 86 %)	Yes, once (n = 351; 9 %)	Yes, several times (n = 189; 5 %)		No (n = 3333; 80 %)	Yes, once (n = 562; 13 %)	Yes, several times (n = 287; 7 %)	
Parental occupation								
Both parents working	83.5	78.8	75.3		80.4	74.8	74.6	
One parent working	13.7	17.2	18.4		15.7	21.4	18.7	
No parent working	2.8	4.1	6.3	0.007**	3.9	3.9	6.7	0.003**
Parental origin								
Both parents born in Sweden	67.2	70.1	63.8		65.6	69.2	67.8	
One parent born in Sweden, one abroad	11.9	9.9	16.2		11.3	13.2	15.5	
Both parents born abroad	20.9	20.1	20.0	0.288	23.2	17.5	16.6	0.002**
Daily smoking								
No	95.1	91.1	77.3		94.8	90.3	83.8	
Yes	4.9	8.9	22.7	0.000***	5.2	9.7	16.2	0.000***
Intense alcohol consumption								
No	85.7	77.3	68.9		87.5	79.0	73.0	
Yes	14.3	22.7	31.1	0.000***	12.5	21.0	27.0	0.000***
Weight								
Normal weight	77.1	73.3	71.2		88.6	89.3	85.9	
Overweight	19.1	22.4	24.7		9.5	9.5	10.3	
Obese	3.8	4.3	4.1	0.257	1.8	1.2	3.8	0.136
Disability								
No	77.4	67.3	58.5		80.1	72.0	65.0	
Yes	22.6	32.7	41.5	0.000***	19.9	28.0	35.0	0.000***
Bullied traditionally more than once a month								
No	97.5	91.6	71.5		97.8	94.5	76.8	
Yes	2.5	8.4	28.5	0.000***	2.2	5.5	23.2	0.000***
Easy to talk to friends if problems								
Yes	77.2	72.4	66.0		80.8	77.8	74.6	
No	22.8	27.6	34.0	0.000***	19.2	22.2	25.4	0.017*
Easy to talk to parents if problems								
Yes	68.5	55.2	47.9		63.1	52.0	46.2	
No	31.5	44.8	52.1	0.000***	36.9	48.0	53.8	0.000***
SHC-index 8–40 <sup>b</sup>								
Mean	15.2	17.6	20.8	0.000***	18.9	22.1	24.8	0.000***
Median	14	17	20		18	22	25	
SD	5.3	5.5	7.8		6.0	6.1	6.8	

Significance levels: \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001

<sup>a</sup>Pearson chi-square test for all variables except SHC-index

<sup>b</sup>One-way ANOVA

CH was significantly more often reported by boys and girls who had experienced traditional bullying victimization (TBV) during the past few months. The

overlap between past year CH and past few months TBV increased with increasing exposure to CH; among those who had been cyber harassed several times, 29 % of boys

**Table 2** Estimated regression coefficients (95 % confidence intervals (CI)) for the association between cyber harassment (CH), parental/friend support, and subjective health complaints (SHC) among 9th grade boys in Sweden

Predictors	Model 1	Model 2		Model 3	
	Regression coefficients (95 % CI)	Parental support	Friend support	Parental support	Friend support
CH past year					
No					
Yes, once	2.2*** (1.5–2.8)	1.9*** (1.2–2.5)	2.1*** (1.4–2.7)	1.2* (0.2–2.1) $p = 0.013$	3.3*** (2.1–4.5)
Yes, several times	4.6*** (3.8–5.5)	4.2*** (3.4–5.1)	4.5*** (3.7–5.3)	5.2*** (4.0–6.4)	6.2*** (4.7–7.7)
Social support		-2.5*** (-2.9 to -2.1)	-1.6*** (-2.0 to -1.2)	-2.5*** (-2.9 to -2.1)	-1.3*** (-1.7 to -0.8)
Interaction					
CH once x support				1.2 (-0.07 to 2.4) $p = 0.064$	-1.6* (-3.0 to -0.2) $p = 0.022$
CH several times x support				-2.0* (-3.6 to -0.3) $p = 0.018$	-2.5** (-4.2 to -0.7) $p = 0.007$
Adjusted R Square	0.087	0.133	0.101	0.135	0.104

Model 1 excludes social support, Model 2 includes social support, and Model 3 includes cyber harassment-social support interactions. All models controlled for age, parental occupation, parental origin, daily smoking, intense alcohol consumption, and disability  
 \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

and 23 % of girls reported TBV, compared to around 2 % of boys and girls who had not been cyber harassed. The numbers should be interpreted with care, as both definitions and time frames of the two types of victimization differ, but a pattern of increasing simultaneous victimization can still be discerned. The total prevalence of TBV during the past few months was 4 % among boys and girls, respectively (data not shown).

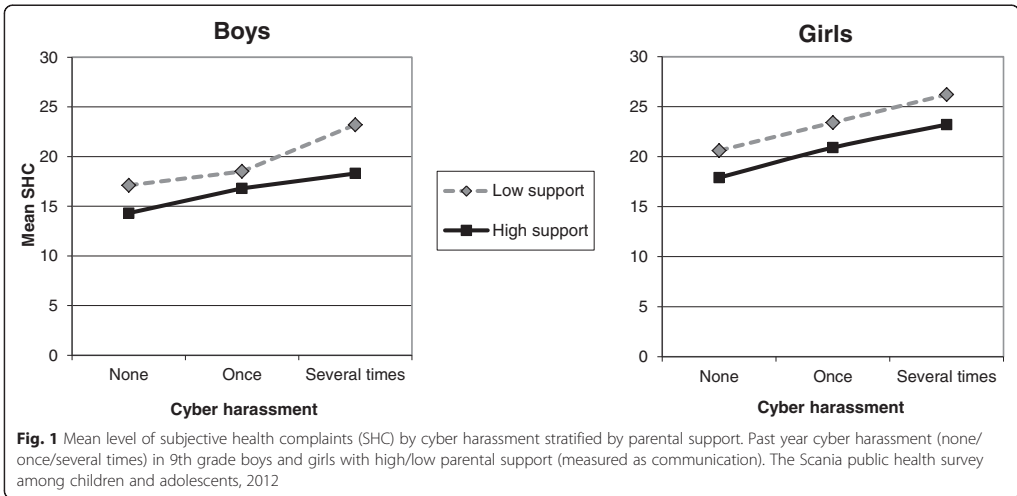
The results of multiple hierarchical linear regressions assessing main and interaction (stress-buffering) effects of social support on the relationship between CH and SCH are presented in Table 2 (boys) and Table 3 (girls). Having been cyber harassed once or several times during the past year was associated with higher levels of SHC,

controlling for age, parental occupation, parental origin, daily smoking, intense alcohol consumption, and disability (Model 1 in Tables 2 and 3). The associations were stronger for CH several times than for CH once, supporting H1. Including parental/friend support in the next model revealed a negative association between support and SHC, indicating a main effect of social support on SHC in boys and girls, supporting H2. Furthermore, the levels of SHC were somewhat decreased, but remained statistically significant (Model 2 in Tables 2 and 3). Adding interaction variables in the final stage of the analysis revealed different patterns for boys and girls (Model 3 in Tables 2 and 3). Among boys there was a significant interaction effect between parental support

**Table 3** Estimated regression coefficients (95 % confidence intervals (CI)) for the association between cyber harassment (CH), parental/friend support, and subjective health complaints (SHC) among 9th grade girls in Sweden

Predictors	Model 1	Model 2		Model 3	
	Regression coefficients (95 % CI)	Parental support	Friend support	Parental support	Friend support
CH past year					
No					
Yes, once	2.4*** (1.8–3.0)	2.1*** (1.6–2.7)	2.4*** (1.8–2.9)	2.1*** (1.3–2.9)	2.4*** (1.1–3.6)
Yes, several times	4.8*** (4.1–5.6)	4.4*** (3.7–5.2)	4.7*** (3.9–5.5)	4.3*** (3.3–5.4)	4.4*** (2.8–6.0)
Social support		-2.5*** (-2.9 to -2.1)	-2.6*** (-3.0 to -2.1)	-2.5*** (-3.0 to -2.1)	-2.6*** (-3.1 to -2.0)
Interaction					
CH once x support				0.02 (-1.1 to 1.1) $p = 0.974$	-0.1 (-1.4 to 1.4) $p = 0.988$
CH several times x support				0.2 (-1.3 to 1.7) $p = 0.805$	0.4 (-1.4 to 2.2) $p = 0.681$
Adjusted R square	0.13	0.167	0.156	0.167	0.155

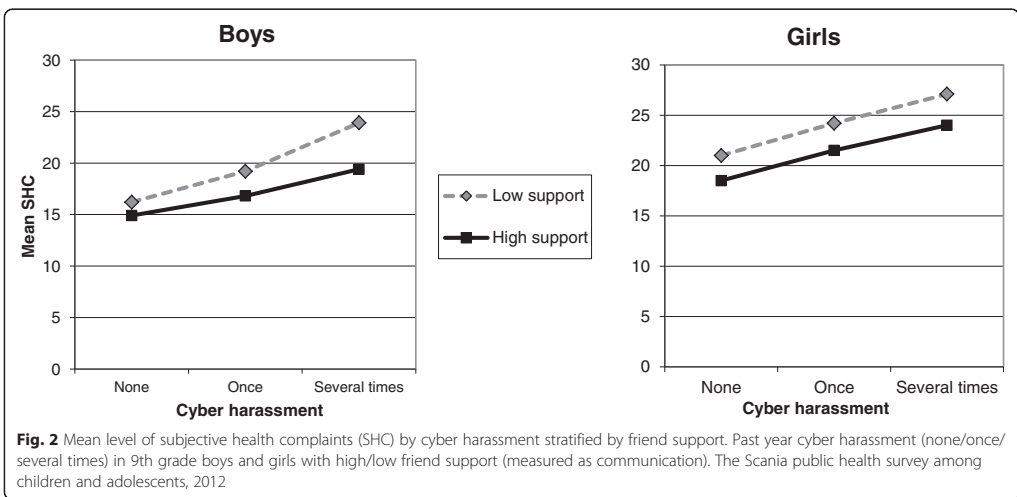
Model 1 excludes social support, Model 2 includes social support, and Model 3 includes cyber harassment-social support interactions. All models controlled for age, parental occupation, parental origin, daily smoking, intense alcohol consumption, and disability  
 \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$



and CH several times, indicating a stress-buffering effect of parental support on SHC for boys who had been cyber harassed several times (Model 3 in Table 2). Friend support showed significant interactions with both categories of CH for boys, with stronger influence on SHC for CH several times than CH once. Among girls there were no significant interactions between either type of support and CH (Model 3 in Table 3). Thus, H3 was partially supported; interaction effects were found for boys but not for girls. In an additional analysis with further adjustment for TBV, the association between CH and SHC was only slightly affected and remained

statistically significant (Additional file 1: Table S1 (boys) and Additional file 2: Table S2 (girls)), supporting H4.

The mean level of SHC by CH stratified by social support is illustrated in Fig. 1 (Parental support) and Fig. 2 (Friend support). The mean level of SHC increased with increasing exposure to CH among both boys and girls. A generally beneficial (main) effect of support on the association between CH and SHC is visualized by a higher line representing low support compared to a lower line representing high support among boys and girls. Among boys, the increases in SHC were steeper between CH once and several times for boys with low parental support (Fig. 1),



and gradually steeper for those with low friend support (Fig. 2), in comparison with the respective lines representing high support, indicating an interaction (stress-buffering) effect of both types of support on the association between CH and SHC among boys. Among girls, the almost parallel lines representing high and low support illustrate the absence of an interaction effect (Figs. 1 and 2).

## Discussion

The present study showed that having been cyber harassed during the past year was associated with higher levels of SHC in adolescent boys and girls, with stronger associations for cyber harassment (CH) several times than CH once (H1). Girls were more often cyber harassed than boys, which is in line with most studies [2, 6, 9, 10, 13–15, 19, 22, 24, 48], but not all [4, 11, 23, 26]. Perhaps CH can be seen as an extension of relational bullying which is more common among girls? [8]. In agreement with earlier research, girls also reported higher levels of SHC [18, 31, 33, 41] as well as more peer support [28, 29].

The protective influence of parental and friend support (measured as communication) against SHC in the context of peer victimization (CH) was investigated according to the main effect model and the stress-buffering model [25, 35]. Similar research has been conducted earlier on traditionally bullied children, but as far as we know, this is the first study on cyber victimized adolescents exploring main and stress-buffering effects of support from parents or friends on SHC.

Evidence was found for a generally beneficial effect (main effect) of both parental and friend support on the association between CH and SHC in both genders (H2). Furthermore, indications of a stress-buffering effect were seen for both parental and friend support among cyber harassed boys, while there were no indications of a stress-buffering effect for either type of support among girls (H3). These findings are in line with an earlier study on traditional bullying victimization (TBV), which found main effects for social support (parents, teachers, classmates, close friend) on depression among both boys and girls, and furthermore, a stress-buffering effect of parental and close friend support among peer-victimized boys [29]. The generally beneficial (main) effect of social support on psychosocial outcomes among victimized children has been consistently shown in earlier research on TBV [27–29, 32, 36–38], but findings regarding stress-buffering effects differ. Some earlier studies have reported stress-buffering effects among girls [32], and boys [29], respectively, some studies have reported stress-buffering effects among both genders [28, 37], while yet other studies have found no evidence of a stress-buffering effect [36, 38]. In the present study, stress-buffering effects of parental and friend support were seen among boys, but not among girls. It has been suggested that gender differences in

stress-buffering effects of social support could be due to mediating factors, such as different coping styles among boys and girls [29]. Earlier studies have shown that girls are more likely than boys to seek social support when faced with online problematic situations [49]. Seeking social support could be defined as both an emotion-focused and a problem-focused coping strategy, depending on the content of the social support received [50]. Social support is a broad concept covering several different aspects, such as communicating that a person is valued and accepted by others, thereby enhancing self-esteem (esteem support), helping the person to understand and cope with stressors (informational support), providing distraction from worries and social belonging (social companionship), and providing time and material support (instrumental support) [25]. The present study measured support as communication, which in a good relationship could be a proxy for all the above-mentioned aspects of support. However, in the present study we do not know the content of the support received. Girls have been shown to use more emotion-focused and ruminative coping than boys [51], and emotion-focused coping has been shown to be associated with more health complaints and depressive feelings among cyberbullied children [52]. Girls also report using more problem-focused coping than boys, but it is possible that these attempts at problem solving are less effective because rumination interferes [53]. There is evidence that boys recover faster than girls from the negative effects of victimization on symptoms of anxiety, depression, and self-esteem after cessation of victimization [54]. Perhaps boys benefit more from the support they do get and are more often encouraged to use distraction to cope with peer victimization [29].

One study found a significant mediating effect instead of a moderation effect of social support on depressive feelings among traditionally bullied children, with different patterns among boys and girls [55]. Victimized boys received very little support and hence suffered depression, while the mediation effects were more diffuse among girls and did not pertain so much to the type of involvement in bullying as to the subsequent lack of support. The present study did not investigate mediation effects, but it was much more common among cyber harassed boys to lack support of a close friend: 20 % of boys and 6 % of girls who had been cyber harassed several times had no close friend, compared to 6 % of boys and 4 % of girls not cyber harassed (data not shown). However, additional adjustment for close friend in analyses on friend support did not significantly affect the associations between CH and SHC or the interaction patterns among boys and girls (data not shown).

It is noteworthy that cyber victims do not always seek help from others, and when they do, they prefer friends over adults [1, 7, 8]. Usually, only a minority of parents

are told [7, 8], so the protective effect of easy communication with parents is probably due more to a generally supportive and caring relationship (main effect) than to specific communication about the cyber incident. Children prefer to discuss online problems with friends, as they fear that parents will invade their privacy or limit their online freedom [3, 49]. Having more friends has been shown to be protective in traditional bullying, but not in cyberbullying [2]. It may still be that adolescents find greater support in peers than in parents when negative experiences involve peers [28].

In line with earlier research [1, 4, 6, 8, 10, 11, 19, 20, 22] there was a substantial overlap of CH and traditional bullying victimization. It has been debated whether the negative effects of cyber victimization in reality might be due to the negative effects of simultaneous TBV [6, 11]. In the present study, further adjustment for TBV did not change the associations with SHC substantially, which indicates that victimization by CH has an effect of its own on SHC (H4). These results are in line with other cross-sectional studies [22, 23, 48] as well as a longitudinal study [50] showing evidence for a unique contribution of cyber victimization to psychological distress over and above the contribution of TBV. However, a large longitudinal Finnish study found that electronic victimization only leads to increases in depression when combined with TBV [11]. In this study the prevalence of electronic-only victimization was as low as 0.5 % (and the prevalence of combined electronic and traditional bullying victimization was 1.4 %), by a strict definition of cyber victims as being targeted more than once a month during the past couple of months. The researchers concluded that electronic-only victims seemed to be selected on a different basis than those targeted traditionally, that is, from among the relatively well-adjusted and socially accepted students who might have better coping skills to start with. The victim groups are thus defined differently in this study compared with the present study (which used a much wider definition) and probably differ in composition.

### Strengths and limitations

A strength of the present study is the large total population sample including the majority of the 9th graders in the county of Scania, which generates good statistical power and reduces selection bias. Another strength is the use of an outcome measure (HBSC-SCL) that has been widely used and is well validated [18, 40]. Furthermore, the data set included information on several potential confounding factors, such as parental occupation and origin, risk behavior (smoking and alcohol drinking), disability, and traditional bullying victimization (TBV). However, there were also some limitations to the present study. First, due to the cross-sectional nature of the survey, we cannot make causal inferences on the true associations

between cyber harassment (CH) and SHC. Second, only one general question on cyber victimization was used, asking for “cyber harassment” and not for “cyberbullying”, with different time frames for CH and TBV (past 12 months and past few months, respectively). Unresolved issues regarding how to define and measure cyber victimization complicate cross-study comparisons as well as comparisons between cyber victimization and TBV. The question on CH is new and has not been extensively validated [43]. Although harassment may be a broader concept than bullying, having been cyber harassed only once during the past year still showed significant associations with SHC. Even a short duration of being a cyber victim may have severe effects, given the potentially wide audience and the permanence of messages [1, 8]. In the present study there was no question on perpetration of peer victimization, which means that we do not know how many cyber victims were also harassing others in cyberspace, and bully-victims are known to have the poorest health outcomes compared to bullies, victims, and non-involved [1, 19, 20, 27]. The intensity and duration of bullying are important for the consequences of victimization [52, 55], but we had information only on frequency (once/several times) of CH and not on duration. Furthermore, we had no information on risky online behavior (such as posting personal information, and photos, and using a webcam to chat with strangers), which has shown significant associations with cyber victimization [4, 13].

The present study was a step in the direction of clarifying the moderating role of social support in cyber harassed adolescents. However, future research should delve deeper into what aspects of social support really matter, with further investigations regarding the observed gender differences. It is important and urgent to reach consensus on a definition of cyber victimization in future research. Agreeing on a static and comprehensive definition is, however, a challenging task, rendered even more difficult by the rapid advances in communications technology [10].

### Conclusions

In conclusion, victimization by cyber harassment is prevalent and associated with higher levels of SHC in 9th grade adolescents in Scania. Support from parents and friends (measured as easy communication) has a generally beneficial (main) effect for both boys and girls, while indications of a stress-buffering effect of parental and friend support were seen among boys only. Intervention programs focusing on the mechanisms behind peer victimization, aiming at improving the quality of peer and family relationships among children and adolescents, might reduce the incidence of victimization (from both traditional bullying and cyber harassment) and lower the prevalence of psychosomatic complaints among the young [11, 24, 32, 34, 41].

## Additional files

**Additional file 1: Table S1.** Estimated regression coefficients (95 % confidence intervals (CI)) for the association between cyber harassment, parental/friend support, and subjective health complaints (SHC) among 9th grade boys in Sweden, additionally adjusted for traditional bullying victimization. (DOC 17 kb)

**Additional file 2: Table S2.** Estimated regression coefficients (95 % confidence intervals (CI)) for the association between cyber harassment, parental/friend support, and subjective health complaints (SHC) among 9th grade girls in Sweden, additionally adjusted for traditional bullying victimization. (DOC 17 kb)

## Abbreviations

SHC: Subjective Health Complaints; HBSC-5CL: Health and Behaviour in School-aged Children Symptom Checklist; CH: Cyber Harassment; TBV: Traditional Bullying Victimization.

## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

MF, ML, and MR contributed to the conception and drafting of the work. MF analyzed the data and wrote the first draft of the manuscript. MF, ML, and MR contributed to the interpretation and the discussion of the results, and the revision of the content. All authors have read and approved the final manuscript.

## Authors' information

Not applicable.

## Availability of data and materials

Not applicable.

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# Paper III





Paper IV





RESEARCH ARTICLE

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# Experience of physical violence and mental health among young men and women: a population-based study in Sweden

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## Abstract

**Background:** In Sweden mental ill-health has increased among the young, especially among young women. Our aim was to investigate the association between experience of physical violence during the past year and self rated psychological health among young men and women.

**Methods:** The study population consisted of men (n = 2,624) and women (n = 3,569) aged 18–34 years who participated in the 2008 public health survey study in Skåne. The survey was a cross-sectional stratified random sample postal questionnaire study with a 54.1% participation rate. Associations were investigated by logistic regression models.

**Results:** The prevalence of poor psychological health was 18.9% among men and 27.7% among women. One in ten men and one in twenty women had experienced physical violence during the past year. Most men were violated in public places, while women were most often violated at home. Women who had experienced violence during the past year showed more than doubled odds of poor psychological health, odds ratio (OR): 2.66 (95% confidence interval (CI): 2.00, 3.53). Such an association could not be seen in men OR: 1.12 (95% CI: 0.85, 1.47). Adjustment for covariates (i.e. age, country of birth, socioeconomic status, economic stress, alcohol risk consumption, emotional support, instrumental support and generalized trust in other people) did not change the association found among women.

**Conclusion:** Violated women, but not men, showed nearly doubled odds of poor psychological health after multiple adjustments. There was also a gender difference regarding location of violence. Awareness of gender differences regarding context and mental impact of violence may assist public health workers in reducing the consequences of violence and to design preventive strategies.

**Keywords:** Physical violence, Psychological health, Trust, Epidemiology, Sweden

## Background

Exposure to violence is a public health issue with long term human and economic costs [1]. In the Swedish society there has been a marked increase of violence since the beginning of the 1980s according to crime statistics [1]. The risk of violence is highest among young persons (16–24 years), and higher among men than women [1]. Most violence experienced by men is perpetrated by

other men [1,2], primarily takes place in public spaces [1,3,4] and the perpetrator of a man is often unknown to the victim [1,2,5,6]. Men are more often hospitalized due to assault injuries and more often die as a result of violence than women [1], but four to five times as many women as men die as a result of partner violence [1]. Most violence experienced by women is perpetrated by men, primarily occurs at home [1,3] and the perpetrator is usually known to the woman [1,2,5,7]. Women abused by a partner are often exposed to repeated violence [8] and domestic violence has been shown to have serious consequences on physical and mental health, both in a short and long perspective [1,9]. Primarily due to costs

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of psychiatric treatment, male and female victims of violence have higher total healthcare costs than men and women not exposed to violence [10]. Still, many victims of violence have reported that they would have needed more health care [7,11]. Studies have found associations between exposure to violence and social factors such as economic stress [11], ethnicity [3], socioeconomic status [3,12], as well as psychosocial factors such as social support [3,13,14] and trust [3]. Furthermore, several studies have shown an association between alcohol risk consumption and exposure to violence [3,6,10,15].

In Sweden poor self reported psychological health is most prevalent among young women. The prevalence of poor self reported psychological health has increased over the last decades in surveys, reflected by an increase in the incidence of depression, anxiety and self-harm among young men and women in psychiatric hospital care statistics [16]. Poor psychological health has been shown to be associated with economic stress [17,18], ethnicity [17,18], socioeconomic status [17], emotional and instrumental support [18], trust [17-19] and alcohol risk consumption [20,21]. There are some earlier population-based studies on adults' experiences of physical violence and mental health measured as self reported psychological distress [2,6,7,11-14,22-24]. Five of these were conducted on both men and women [2,6,11,22,23] and five on women only [7,12-14,24]. Three were conducted on students [2,6,23] and two researched a younger population up to 45 years of age [11,22]. Three of these studies used the General Health Questionnaire 12 (GHQ-12) to evaluate psychological distress [6,14,23], while the others used a range of different instruments. GHQ-12 has the advantage of being an internationally well validated measure of psychological ill-health in the general population [25,26]. To the best of our knowledge, there is no earlier study that has investigated the associations between experience of physical violence and self rated psychological health measured by GHQ-12 in relation to social factors (socioeconomic status, ethnicity, economic stress) and psychosocial factors (emotional and instrumental support, trust) and alcohol use, in the same study.

The aim of this study was to investigate the association between experience of physical violence during the past year and self rated psychological health in relation to the above-mentioned factors in both men and women. Furthermore, the present study was to explore the setting of violence.

## Methods

### Study population

The 2008 public health survey in Skåne in southern Sweden was a cross-sectional stratified random sample study. The primary purpose of this public health survey was to map out the health situation in the general

population of Scania, Sweden, in the year 2008 [27]. A total of 28,198 persons aged 18–80 years answered the postal questionnaire, representing 54.1% of the net selection [27]. The present research study is a secondary study based on a subpopulation of those included in the public health survey, i.e. participants in the age interval 18–34 years, which included a total of 6,193 respondents (2,624 men and 3,569 women). The data from the stratified random sample study was weighted by various factors, e.g., age, sex and administration area through a weighting variable [27]. The differences between unweighted and weighted data were very small (data not shown). Ethical approval to conduct the research study was granted by the Ethical Committee at Lund University, Sweden (No. 2010/343).

## Definitions

### Dependent variable

*Self reported psychological health (GHQ-12)* included twelve items reflecting different aspects of psychological health, such as anxiety and depression, the ability to perform daily activities and the ability to cope with everyday problems during a time period of the last few weeks. Each item had four response categories, e.g. "Better than usual", "Same as usual", "Less than usual" and "Much less than usual". Scoring was according to the GHQ method (0,0,1,1) instead of the Likert method (0,1,2,3) [28]. The answers to the 12 items were dichotomized into "good" or "poor" psychological health. If three or more of the twelve items denoted "poor" psychological health, the respondent's general psychological health (GHQ-12) was defined as "poor". This cut-off has been widely used for many years in Sweden and in many studies abroad [27,29,30]. The GHQ12- instrument is the shortest (other GHQ measures contain for instance 28 or 60 items), but has been shown to be a very robust measure of psychological health [25].

### Independent variables

The age interval 18–34 years was analyzed in this study. Age adjustments in tables were conducted with age as a continuous variable within the age interval 18–34 years.

*Born in Sweden/born in other Scandinavian countries/born in the rest of Europe/born outside Europe.* The participants were categorized according to place of birth.

*Socioeconomic status (SES)* by occupation included the employed categories higher non-manual employees, medium level non-manual employees, low level non-manual employees, skilled manual workers and unskilled manual workers as well as self-employed/farmers. The groups outside the workforce comprised the unemployed, the early retired (for health or early retirement entitlement in the employment contract reasons), students, and persons on long term sick leave. Furthermore, there was the group unclassified.

*Alcohol risk consumption* was estimated by an index of three questions: how often you drink alcohol, how much alcohol you typically drink and how often you drink a large amount on one occasion. The index can take a point value between 0 and 12. Alcohol risk consumption was defined as 8–12 points for men and 6–12 points for women. Additionally, those who had been intoxicated 2–3 times a month or more often were defined as alcohol risk consumers. These questions have been used by the National Public Health Reports of Sweden to define alcohol risk consumption [31].

*Emotional support* was assessed with the question “Do you feel that you have one or several persons who can give you sufficient personal support to handle the stress and problems of life?”. The four alternative answers were: “Yes, I am absolutely certain to get such support”, “Yes, possibly”, “Not certain”, and “No”. The item was dichotomized, and the three latter alternatives were classified as low emotional support.

*Instrumental support* was assessed with the question “Can you get help from one or several persons in case of illness or practical problems (to borrow things, repair things, write a letter, get advice or information)”? This item had similar alternative answers as emotional support and was dichotomized correspondingly.

*Economic stress* was assessed with the item “How often during the past twelve months have you had problems paying your bills?” with the four alternative answers: “Never”, “Occasionally”, “Every second month” and “Every month”.

*Generalized (horizontal) trust in other people* was appraised by the item “Generally, you can trust other people” with the four alternative answers: “Do not agree at all”, “Do not agree”, “Agree”, and “Completely agree”. These alternatives were dichotomized with the two first alternatives indicating low trust and the two latter high trust. This item has been used with four optional answers in most previous investigations collapsing the alternatives in the same way [17,32].

*Experience of physical violence* during the past year was assessed with the question: “Have you at any time during the past twelve months been exposed to physical violence?” with the alternatives “Yes” and “No”.

*Location of physical violence* during the past year was assessed with the supplementary question: “If yes, where did this occur? You may tick several options” with the alternative answers: “At work/at school”, “At home”, “In somebody else’s home/in the neighborhood”, “In a public place/at a venue/on a train, bus, subway” and “Somewhere else”.

### Statistics

The prevalence (%) of poor self rated psychological health, age, country of birth, socioeconomic status, economic

stress, alcohol risk consumption, emotional support, instrumental support and trust were stratified by sex in the two groups who had, alternatively had not, experienced physical violence during the past year (Table 1). The odds ratios with 95% confidence intervals (ORs, 95% CI) of poor self rated psychological health were calculated in a bivariate model stratified by sex and according to age, country of birth, socioeconomic status, economic stress, alcohol risk consumption, emotional support, instrumental support, horizontal trust and experience of physical violence during the past year using logistic regression modeling (Table 2). Age-adjusted and multiple adjusted odds ratios and 95% confidence intervals of poor self rated psychological health according to experience of physical violence during the past year were calculated for men and women using logistic regression modeling (Table 3). Adjustments were made for age, country of origin, socioeconomic status, economic stress, alcohol risk drinking, emotional support, instrumental support and trust. The statistical analyses were performed using IBM SPSS Statistics version 19.

### Results

In this study 223 men and 174 women reported experience of physical violence during the past year, which corresponds to a prevalence of 9.7% for men and 5.0% for women (data not shown).

Table 1 displays the prevalences of different variables in 18–34 year old men and women who had, alternatively had not, experienced physical violence during the past year. Men who had been violated were often younger (18–24 years), were born in Sweden, were unskilled manual workers or unemployed, had economic stress, alcohol risk consumption, lower emotional and instrumental support and lower generalized trust in other people. A similar pattern was seen for women apart from country of origin. Women who had experienced physical violence during the past year reported poor psychological health at much higher levels, 50.5% compared to 26.5% among women not violated. Such a difference could not be seen among men for whom the corresponding figures were 20.7% and 18.8%, respectively.

Table 2 displays the prevalences and odds ratios of poor self rated psychological health in bivariate analyses. Women 18–24 years had poorer psychological health than women 25–34 years. Analysis by age showed that young women 18–21 years had the highest prevalence of poor psychological health with a peak of more than 40%, twice the rate of men the same age (Figure 1). Men born outside Europe had significantly higher odds of poor psychological health compared to men born in Sweden, while this pattern was not significant for women. Socio-economic status showed a strong association with psychological health with generally higher odds of poor



**Table 1 Characteristics (%) of men and women exposed (yes) and unexposed (no) to physical violence during the past year**

	Men		Women	
	Physical violence		Physical violence	
	Yes	No	Yes	No
<b>Psychological health</b>				
Good	79.3	81.2	49.5	73.5
Poor	20.7	18.8	50.5	26.5
<b>Age</b>				
18-24	68.7	38.8	54.5	40.3
25-34	31.3	61.2	45.5	59.7
<b>Country of origin</b>				
Sweden	89.8	81.5	82.1	81.4
Other Nordic countries	1.1	2.4	0.9	2.4
The rest of Europe	2.7	9.1	7.5	8.1
Outside Europe	6.5	7.0	9.4	8.1
<b>Socioeconomic status</b>				
Higher non-manual	4.5	9.0	1.4	7.3
Medium non-manual	2.5	12.0	9.1	15.1
Lower non-manual	4.5	4.7	8.7	8.4
Skilled manual	12.9	11.4	13.9	8.5
Unskilled manual	21.8	15.2	22.1	14.5
Self-employed/farmer	2.2	4.0	0.5	2.3
Early retired	0.3	0.4	1.4	0.5
Unemployed	10.4	6.0	11.1	6.4
Student	23.8	23.0	22.1	26.6
Unclassified	16.8	13.6	8.7	9.4
Long term sick leave	0.3	0.6	1.0	1.0
<b>Economic stress</b>				
Never	64.2	74.1	48.1	65.2
Occasionally	26.8	18.1	28.1	24.7
Half the year	3.4	4.4	14.3	5.4
Every month	5.6	3.4	9.5	4.8
<b>Alcohol risk consumption</b>				
No	46.5	71.1	59.0	79.6
Yes	53.5	28.9	41.0	20.4
<b>Emotional support</b>				
High	62.0	68.2	48.8	75.2
Low	38.0	31.8	51.2	24.8
<b>Instrumental support</b>				
High	73.9	79.5	68.2	80.4
Low	26.1	20.5	31.8	19.6

**Table 1 Characteristics (%) of men and women exposed (yes) and unexposed (no) to physical violence during the past year (Continued)**

Trust (horizontal)	Men		Women	
	Yes	No	Yes	No
High	42.7	60.5	37.2	56.1
Low	57.3	39.5	62.8	43.9

Prevalences (%) of psychological health, age, country of origin, socioeconomic status, economic stress, alcohol risk consumption, emotional support, instrumental support and trust among men and women who had/had not experienced physical violence during the past year. Men (n = 2,624), women (n = 3,569), and total (n = 6,193) aged 18–34 years. The public health survey in Skåne 2008.

psychological health among those outside the workforce. For example, unemployed men and women showed more than doubled odds of poor psychological health compared to non-manual employees in higher positions. The odds of poor psychological health were higher among those with economic stress. Alcohol risk consumption was associated with poor psychological health among women OR = 1.49 (95% CI: 1.27, 1.75), but not among men OR = 0.87 (95% CI: 0.73, 1.04). Furthermore, psychosocial factors showed strong associations with poor psychological health among both men and women. The odds of poor psychological health were higher among those with low emotional support, low instrumental support and low trust. While women who had experienced violence during the past year showed more than doubled odds of poor psychological health, such a pattern could not be seen in men.

Table 3 shows the associations between exposure to physical violence and poor psychological health. The results showed significantly higher odds ratios of poor self rated psychological health among women with experience of physical violence during the past year compared to women unexposed to such violence throughout the age- and multiple adjusted logistic regression analyses. For example, in the age-adjusted model the odds ratio of poor self rated psychological health among women with experience of physical violence compared to women with no such experience was 2.66 (95% CI: 2.00, 3.53). Identical analyses showed no such associations in men with an age-adjusted OR of 1.12 (95% CI: 0.85, 1.47).

Figure 2 displays the setting of the exposure to physical violence. Some participants had experienced physical violence several times and in different locations, so the percentages add up to more than 100%. Most men (61%) had been violated in a public place (including streets, venues and transportation by bus, train or subway). Most women had been violated at home (37.7%) or in a public place (32%). Stratifying by age showed that younger women (18–24 years) were most often violated in public places, while somewhat older women (25–34 years) were most often violated at home. Among men

**Table 2 Bivariate analyses of sociodemographic factors, psychosocial factors, alcohol risk consumption, and exposure to physical violence in relation to poor self rated psychological health**

	Men		Women	
	%	OR (95% CI)	%	OR (95% CI)
<b>Age</b>				
18-24	19.6	1.00	31.9	1.00
25-34	18.3	0.92 (0.78–1.09)	24.9	0.70 (0.61–0.81)
<b>Country of origin</b>				
Sweden	18.1	1.00	27.2	1.00
Other Nordic countries	16.3	0.85 (0.47–1.53)	25.8	0.93 (0.59–1.47)
The rest of Europe	20.9	1.20 (0.91–1.60)	30.8	1.19 (0.93–1.52)
Outside Europe	26.3	1.62 (1.21–2.17)	30.9	1.20 (0.94–1.53)
<b>Socioeconomic status</b>				
Higher non-manual	20.3	1.00	23.2	1.00
Medium non-manual	14.7	0.68 (0.46–1.00)	22.9	0.98 (0.70–1.38)
Lower non-manual	15.4	0.72 (0.44–1.18)	26.9	1.21 (0.84–1.74)
Skilled manual	12.1	0.54 (0.36–0.80)	22.6	0.96 (0.66–1.39)
Unskilled manual	14.2	0.65 (0.46–0.93)	27.2	1.24 (0.89–1.71)
Self-employed/farmer	13.5	0.61 (0.35–1.07)	27.2	1.23 (0.72–2.10)
Early retired	16.7	0.85 (0.20–3.69)	55.0	4.14 (1.66–10.37)
Unemployed	37.0	2.30 (1.56–3.38)	45.6	2.76 (1.92–3.97)
Student	21.4	1.06 (0.77–1.47)	28.7	1.33 (0.98–1.80)
Unclassified	21.1	1.05 (0.74–1.48)	23.5	1.02 (0.71–1.46)
Long term sick leave	45.5	3.11 (1.27–7.61)	74.4	9.28 (4.35–19.82)
<b>Economic stress</b>				
Never	16.4	1.00	23.2	1.00
Occasionally	19.2	1.22 (0.98–1.51)	31.2	1.50 (1.28–1.77)
Half the year	38.4	3.19 (2.28–4.45)	43.8	2.60 (1.98–3.42)
Every month	42.7	3.80 (2.65–5.45)	49.5	3.28 (2.46–4.38)
<b>Alcohol risk consumption</b>				
No	19.5	1.00	25.8	1.00
Yes	17.5	0.87 (0.73–1.04)	34.1	1.49 (1.27–1.75)
<b>Emotional support</b>				
High	13.9	1.00	21.5	1.00
Low	29.2	2.55 (2.16–3.02)	45.4	3.03 (2.61–3.51)
<b>Instrumental support</b>				
High	16.2	1.00	23.4	1.00
Low	29.0	2.10 (1.75–2.53)	45.0	2.68 (2.29–3.15)
<b>Trust (horizontal)</b>				
High	15.0	1.00	21.1	1.00
Low	24.1	1.80 (1.52–2.12)	35.6	2.08 (1.81–2.39)
<b>Experience of physical violence during the past year</b>				
No	18.8	1.00	26.5	1.00
Yes	20.7	1.13 (0.86–1.47)	50.5	2.81 (2.12–3.72)

Prevalences (%) and odds ratios (OR, 95% CI) in bivariate analyses of poor self rated psychological health according to age, country of origin, socioeconomic status, economic stress, alcohol risk consumption, emotional support, instrumental support, trust and experience of physical violence during the past year. Men (n = 2,624) and women (n = 3,569) aged 18–34 years. The public health survey in Skåne 2008.

**Table 3 Associations of exposure to physical violence and poor psychological health in multiple adjusted analyses**

Men				
Violence	OR (95% CI) <sup>a</sup>	OR (95% CI) <sup>b</sup>	OR (95% CI) <sup>c</sup>	OR (95% CI) <sup>d</sup>
No	1.00	1.00	1.00	1.00
Yes	1.12 (0.85–1.47)	1.14 (0.86–1.49)	1.20 (0.91–1.58)	1.02 (0.76–1.36)
Women				
Violence	OR (95% CI) <sup>a</sup>	OR (95% CI) <sup>b</sup>	OR (95% CI) <sup>c</sup>	OR (95% CI) <sup>d</sup>
No	1.00	1.00	1.00	1.00
Yes	2.66 (2.00–3.53)	2.66 (2.00–3.54)	2.73 (2.05–3.63)	2.41 (1.79–3.23)
Men				
Violence	OR (95% CI) <sup>e</sup>	OR (95% CI) <sup>f</sup>	OR (95% CI) <sup>g</sup>	OR (95% CI) <sup>h</sup>
No	1.00	1.00	1.00	1.00
Yes	1.06 (0.79–1.42)	1.00 (0.74–1.35)	1.00 (0.74–1.34)	1.00 (0.72–1.31)
Women				
Violence	OR (95% CI) <sup>e</sup>	OR (95% CI) <sup>f</sup>	OR (95% CI) <sup>g</sup>	OR (95% CI) <sup>h</sup>
No	1.00	1.00	1.00	1.00
Yes	2.29 (1.70–3.08)	1.85 (1.36–2.52)	1.83 (1.34–2.50)	1.70 (1.24–2.33)

<sup>a</sup>Adjusted for age.

<sup>b</sup>Adjusted for age and country of origin.

<sup>c</sup>Adjusted for age, country of origin, and socioeconomic status.

<sup>d</sup>Adjusted for age, country of origin, socioeconomic status and economic stress.

<sup>e</sup>Adjusted for age, country of origin, socioeconomic status, economic stress and alcohol risk consumption.

<sup>f</sup>Adjusted for age, country of origin, socioeconomic status, economic stress, alcohol risk consumption and emotional support.

<sup>g</sup>Adjusted for age, country of origin, socioeconomic status, economic stress, alcohol risk consumption, emotional support and instrumental support.

<sup>h</sup>Adjusted for age, country of origin, socioeconomic status, economic stress, alcohol risk consumption, emotional support, instrumental support and trust.

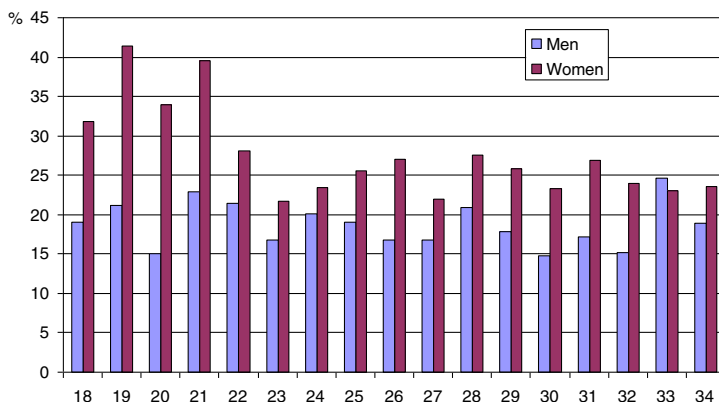
Age-adjusted and multiple adjusted odds ratios (OR, 95% CI) of poor self-rated psychological health according to experience of physical violence during the past year. Men (n = 2,624) and women (n = 3,569) aged 18–34 years. The public health survey in Skåne 2008.

there was no age difference regarding location of violence (data not shown).

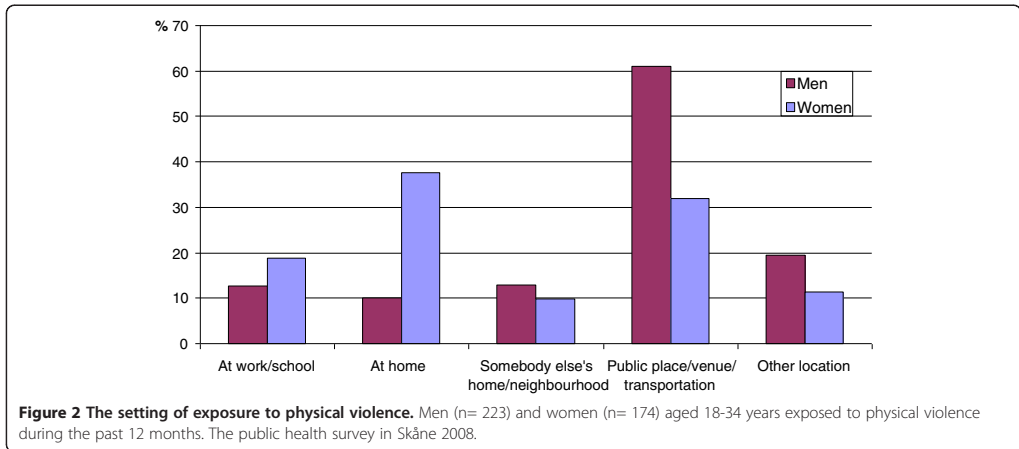
**Discussion**

The present study showed associations between experience of physical violence during the past year and self-rated psychological health in women, but not men, aged 18–34 years. This is in accordance with results from

some of the earlier population-based studies on psychological health and violence that included both men and women. A Danish study showed more than doubled odds of symptoms of anxiety and depression in women, but not men, who had been exposed to physical violence during the past year [22]. An Italian study of university students showed more than doubled odds of psychological distress in women, but not men, who had been



**Figure 1 Prevalence of poor psychological health (GHQ-12) by age.** Men (n = 2,624) and women (n = 3,569) aged 18–34 years. The public health survey in Skåne 2008.



exposed to a high degree of intimate partner violence (IPV) [23]. Some population studies have shown associations between violence and psychological distress in both men and women, but to a higher degree in women. A Swedish study of 17-year old students showed increased odds of psychological distress in girls and boys who had experienced physical violence during the past 12 months, OR: 2.68 for girls and OR: 1.90 for boys [2]. Another Swedish study on adults showed much higher odds of anxiety in women than men who had been exposed to physical violence or threats of violence during the past 12 months [11]. A Finnish study of university students showed that exposure to violence (life-time prevalence) was strongly associated with poor mental health in both men and women, with higher symptom levels in female victims [6]. Furthermore, population-based studies excluding men have shown significant associations between psychological distress and experience of violence in women [7,12-14,24].

In consistency with earlier research we found strong associations between poor self rated psychological health and socioeconomic status (especially not being part of the workforce) and psychosocial factors among both men and women [17]. Furthermore, men of non-European origin reported poor psychological health more often than men born in Sweden. A similar but not significant pattern was seen among women. Earlier studies have shown that mental ill-health is more common among foreign-born compared to native-born Swedes, mainly due to poorer socio-economic living conditions [33].

In our study alcohol risk consumption was associated with poorer self rated psychological health among women but not among men. Studies have shown bi-directional relationships between high alcohol consumption and both anxiety disorders [20] and depression [21]

among men and women. The paralleled increases of alcohol consumption and poor mental health in young people over the last 20 years, with a poorer development among women in both respects [16], may point to a connection.

Those who are socially and/or economically disadvantaged are much more likely to experience violence [3,10]. This might in part be due to the fact that they are often restricted to live in neighborhoods with higher crime rates [34] and that problems with financial resources are linked to a range of negative outcomes including violence [3,35]. The fact that socioeconomic status is associated with both violence and psychological health has been taken into account by adjusting for socioeconomic status as a confounder in the analysis. Alcohol is a risk factor for violence [15,36], but neither a necessary nor sufficient cause [37,38]. It plays a larger part in situational violence than in controlling violence in intimate relationships [39]. Being violated may cause serious damage to basic trust. In our study a higher proportion of men and women who had been violated reported low trust compared to men and women who had not been exposed to violence.

Our results showed that men were most often violated in public places including streets, venues, buses, trains and subways. Women were most often violated at home, although younger women (18–24 years) were also most often violated in public places. This could be a reflection of different life styles in the two age groups. In a Swedish study, foreign-born women 18–64 years reported twice as much exposure to physical violence in the home compared to Swedish-born women [40].

The severity of symptoms may be influenced by the victim-offender relationship [2,6]. Violence against women often occurs in a private, isolated context including an

intimate relationship to the perpetrator, while the perpetrator of men often is unknown. Physical abuse among women is often combined with sexual and/or emotional abuse, whereas physical abuse among men often occurs in isolation [5]. Women are less able to protect/defend themselves against perpetrators [41] and often have concerns on how to protect their children [42]. Furthermore, social and economic inequalities make it harder for women to leave an abusive partner [22]. A Swedish study showed that 22% of women aged 18–24 years had experienced some type of violence (physical, sexual or threats of violence) during the past year, and 85% worried about becoming victims of violence [38]. There might be some connection between the concurrent high prevalence of worrying about violence and the high prevalence of poor psychological health among young women in Sweden, as worrying is negatively related to psychological health [43].

The impact of violence on men's health needs to be further explored. Abuse against men is highly prevalent in Sweden. A population-based study showed that 68% of Swedish men had experienced threats of violence and/or violence at some point during their lifetime and 14% during the past 12 months. The most common forms of violence were threatening or aggressive language and physical assaults, and many men had been victimized several times [4]. Victimization of men has been shown to be associated with health issues such as alcohol use problems [6,23,44]. It is possible that other measures than GHQ-12 might better capture psychological consequences of violence among men.

#### Strengths and limitations

The current study is subject to some limitations. Firstly, the study is cross-sectional. A cross-sectional design makes it formally hard to infer causality, although such studies may well form at least part of causal inferences. Secondly, we had only one question on physical violence and one on location, but none on frequency or relationship to the perpetrator. Thirdly, in our study 9.7% of the men and 5.0% of the women 18–34 years reported experience of physical violence during the past year. This is in line with 12% of the men and 6% of the women 16–24 years reported in The Swedish National Public Health Surveys statistics 2006–2008 [45], which used the same single question on physical violence. However, this is probably an underestimation. Studies with several detailed questions on physical violence have reported considerably higher figures; 28% of the men and 11% of the women 16–24 years in a Danish national health interview survey [22], and 25% of the boys and 15% of the girls in a Swedish study of 17 year old high school students [2]. Earlier studies have also stated that violence against women is heavily underreported [1,8]. For example, the Swedish National Council for Crime Prevention

has estimated that 75–80% of the cases of domestic violence go unreported [46].

We have explored the association between poor psychological health and violence, but of course there could be other factors contributing to emotional distress that we lack information on in this study (e.g., relationship problems, illness in the family, the demise of loved ones). The item we have used to measure generalized trust in other people is self rated and thus might be difficult to validate, but it has been used in many previous investigations [32]. Strengths of this study are the large population sample, the use of the well-validated GHQ-12 measure to assess psychological health and the use of a questionnaire to assess exposure to violence [47]. Although there are more complex GHQ-12 instruments (with for example 28 and 60 items) to measure psychological health, there is little difference in validity [26,28]. Furthermore, the GHQ-12 measure, as well as the question used to assess experience of physical violence, has been validated by the National Institute of Public Health and by Statistics Sweden [29].

#### Conclusions

In this study women, but not men, aged 18–34 years, who had experienced physical violence during the past year showed more than doubled odds of poor psychological health. The association between experienced physical violence and poor psychological health found in women persisted, although attenuated, after adjustment for covariates. There was a gender difference regarding location of violence, as men were mostly violated in public places while women were most often violated at home. It is well known that domestic violence has serious consequences on physical and mental health, both in a short and long perspective. Mental ill-health and violence are both important public health issues and the impact of violence on mental health should be further explored among both genders. Awareness of gender differences regarding context and mental impact of violence may assist public health workers in reducing the consequences of violence and to design preventive strategies.

#### Competing interests

The authors declare that they have no competing interests.

#### Authors' contributions

MF, ML and MR have contributed to the conception and drafting of the work. MF has analyzed the data and written the first draft of the manuscript. MF, ML and MR have contributed to the interpretation and the discussion of the results, and the revision of the content. All authors have read and approved the final manuscript.

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