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Mental health and social adaptation in adulthood

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Mobbeerfaringer i ungdomstiden - påvirkning av mental helse og sosial fungering i voksen alder

Hovedformålet med denne avhandlingen var å undersøke langtidseffekter av mobbing. Tidligere studier har vist at effekten av å bli mobbet eller å mobbe andre i barndommen og ungdommen påvirker psykisk helse og psykososial fungering senere i livet. Dette gjelder for de som er mobbere, de som blir mobbet og de som både er mobber/offer. Frem til nå har likevel de fleste longitudinelle studier vært gjort innenfor skolesystemet. Man vet lite om langtidseffekten av mobbing blant ungdom og hvordan dette påvirker den psykiske helsen til (unge) voksne. Spesielt vet vi lite om hvordan mobbing kan ha påvirket sosial fungering hos unge voksne. Mange undersøkelser er retrospektive og undersøker effekter fra offentlige registre (f.eks psykiatriske diagnoser eller kriminalitet). En kan med større sikkerhet si om det foreligger langtidseffekter av mobbing i ung voksen alder ved å bruke en prospektiv studie fra en representativ ungdomspopulasjon. Avhandlingen er basert på data fra en spørreundersøkelse i studien «Ungdom og Psykisk Helse» utført ved Regionalt kunnskapssenter for barn og unge - Psykisk helse og barnevern (RKBU Midt-Norge), tidligere Regionsenter for barn og unges psykiske helse Midt-Norge (RBUP Midt-Norge). Det representative utvalget av ungdommer i Midt-Norge var tidligere undersøkt i 1998 (T_1, n = 2464, snittalder 13.7 år, standardavvik (SA) = 0.58) og 1999–2000 (T_2, n = 2432, snittalder 14.9 år, SA = 0.60). I 2012, ble det utført en tolvårig oppfølgingsundersøkelse (T_4, n = 1266, snittalder = 27.2, SA = 0.59). Dataene består av selvrapport på alle tre tidspunkt. Utvalget ble på T_1 og T_2 bredt kartlagt med henhold til psykiske plager og psykososial fungering, familiefungering og somatisk helse. De samme instrumentene ble brukt i oppfølgingsundersøkelsen T_4 med noen få aldersbetingede tilpasninger. Analysene for artikkel I og II tar utgangspunkt i de fire gruppene som på T_1 eller T_2 hadde blitt mobbet, de som var både mobber/offer, de som var aggressive mot andre og ikke-involverte. Artikkel III ser på de som har blitt mobbet versus ikke-mobbet stratifisert på kjønn i forhold til selvmordstanker, selvskading og selvmordsforsøk. Justert for kjønn og foreldres sosioøkonomiske status, viser funn i artikkel I at de som blir mobbet, de som er både mobber/offer og de som er aggressive mot andre har en høyere sannsynlighet for å ha lavere utdanning som unge voksne sammenlignet med de som ikke var involvert i mobbing som unge. De som er aggressive mot andre i ungdommen hadde nesten 3 ganger så høy risiko av å være arbeidsledig, eller motta noen form for økonomisk støtte. De som er mobber/offer i ungdommen rapporterte nesten 3 ganger så høy oddsratio (OR) for å ha en generell dårlig helse. Som unge voksne, rapporterte de som var mobber/offer en 2.5 ganger økt risiko for smerte enn de som ikke var involvert i mobbing. Mobber/offer hadde nesten 3 ganger økt risiko for tobakksbruk og rapporterte lavere jobbfungering enn de som ikke var involvert i mobbing som unge. De som blir mobbet, de som er aggressive mot andre hadde mer enn en doblet risiko for illegal rusmiddelbruk enn de som ikke var involvert i mobbing som unge. Resultat fra artikkel II viser at alle de som er involvert i mobbing (de som blir mobbet, de som er både mobber/offer og de som er aggressive mot andre) hadde høyere gjenomsnittsskåre enn de som ikke var involvert i mobbing på skalaer i instrumentet «Adult Self-Report» (ASR), eksempelvis på skalaer for totale-, eksternaliserte- og internaliserte- og kritiske - problemer. Når en sammenlignet lav-til-moderat-skårere med høyskårere (innen 90. persentilen), fant vi at alle gruppene involvert i mobbing hadde høyere OR på ASR eksternaliserte- og internaliserte - psykisk helse problemer sammenlignet med de som ikke var involvert i mobbing som unge. Når vi justerer for effekten av psykisk helse i ungdommen finner vi at de som er blitt mobbet likevel har en høyere forekomst av depressive problemer i ung voksen alder enn de som ikke er

blitt mobbet som unge. Unge voksne som var mobbet rapporterte også redusert psykososial fungering og økt risiko for å søke hjelp for problemer relatert til psykisk helse det siste året og tidligere i livet enn de som ikke var involvert i mobbing som unge. Alle grupperinger involvert i mobbing rapporterte 4-8 ganger høyere risiko for hospitalisering grunnet psykisk helse siden tidlig ungdom, sammenlignet med de som ikke var involvert i mobbing som unge. Vårt hovedfunn fra artikkel III er at uavhengig av kjønn, er mobbing i ungdommen en sterk prediktor for selvmordsatferd og selvskading. Unge voksne menn som var mobbet i ungdommen hadde den høyeste risikoen for selvmordsforsøk og selvskading, mens unge voksne kvinner som var mobbet i ungdommen hadde høyest risiko for selvmordstanker. Konklusjonen er at det å identifisere og forebygge mobbing i tidlig ungdom har potensialet til å forbedre både psykososial fungering og psykisk helse i ung voksen alder. Mer spesifikt, dette kan bidra til å reduserer selvmordstanker, selvskading og selvmordsforsøk i ung voksen alder. Klinikere og annet helsepersonell bør adressere tidligere erfaringer med mobbing for å forhindre selvmordsatferd, både hos ungdom og unge voksne.

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Preface

The present thesis was written as part of the Youth and Mental Health Study (Sund, 2004), which is a longitudinal study conducted in central Norway that aims to address the risks and protective factors in the development of mental health in adolescents aged 12–15 years. The overall aim of this thesis is to study the course and potential outcomes of being bullied or being a bully from adolescence to adult age, with three measure points at the ages of 14 (T_1) and 15 years (T_2), with a follow-up investigation 12 years later (T_4), when the participants were 27 years old.

This thesis consists of three research papers. The results have also been presented at several local, regional, national, and international research conferences. In addition, this thesis includes an introductory summary that aims to place these three articles into a larger theoretical framework.

Acknowledgments

This thesis would not have existed without the help of my mentors. My first and foremost gratitude goes to my main supervisor, Anne Mari Sund. Ever since she graciously accepted me into her project - the Youth and Mental Health Study, she has been my source of intellectual stimulation and support. This thesis could not have been completed without her encouragement and enthusiasm for our work together. Thank you so much, Anne Mari! I would also like to thank my cosupervisor Anne Mari Undheim for her experience on bullying research and working with me on the thesis. I would also thank my cosupervisor Jan Wallander, for his patience and expert advice in all parts of the thesis. My gratitude also extends to Stian Lydersen for all his statistical knowledge and input. I would like to extend my thanks to the research assistants Audun Brunes, Nicolay Andreas Herud, Ida Sund Morken, and Ingrid Anna Teigen. Best wishes to you all. I would like to thank the Regional Centre for Child and Youth Mental Health and Child Welfare (RKBU) and the Faculty of Medicine and Health Sciences (MH) for having me a as a PhD candidate. A special thanks to all my fellow PhD students “in the attic” at the RKBU, for their great support in my time there. I would also thank those who financially supported this thesis, the Norwegian Extra Foundation for Health and Rehabilitation through EXTRA funds and the Liaison Committee between the Central Norway Regional Health Authority (RHA) and the Norwegian University of Science and Technology (NTNU). I want to thank my current employer the NTNU University Library for hiring my as subject specialist within psychology, and giving me time to finish the PhD work.

Finally, my hearty gratitude goes to my small family—particularly my love in life—Hanne Kjersti Skomsvoll and our son, Magnus Skomsvoll Sigurdson, who are an unwavering source of love and support. I thank them for accompanying me through this journey and making every minute of this privileged experience worthwhile.

Contents

List of Papers

I: Sigurdson, J., Wallander, J., & Sund, A. (2014). Is involvement in school bullying associated with general health and psychosocial adjustment outcomes in adulthood? *Child Abuse & Neglect*, *38*, 1607–1617.

II: Sigurdson, J. F., Undheim, A. M., Wallander, J. L., Lydersen, S., & Sund, A.M. (2015). The long-term effects of being bullied or a bully in adolescence on externalizing and internalizing mental health problems in adulthood. *Child and Adolescent Psychiatry and Mental Health*, *9*, 42.

III: Sigurdson, J. F., Undheim, A. M., Wallander, J. L., Lydersen, S., & Sund, A. M. (2018). The longitudinal association of being bullied and gender with suicide ideations, self-harm, and suicide attempts from adolescence to young adulthood: A cohort study. *Suicide and Life-Threatening Behavior*, *48*, 169–182.

Abbreviations

ASEBA - Achenbach System of Empirically Based Assessment

ASR – Adult self-report

CI – Confidence interval

DSM III–R – *Diagnostic and Statistical Manual for Mental Disorders*. 3rd edition revised

DSM IV – *Diagnostic and Statistical Manual for Mental Disorders*. 4th edition

MFQ – Mood and Feelings Questionnaire

n.s. – Nonsignificant

OR – Odds ratio

T_1 – Timepoint 1

T_2 – Timepoint 2

T_3 – Timepoint 3

T_4 – Timepoint 4

YSR – Youth self-report

Summary

The main purpose of this thesis was to investigate the long-term effects of bullying. Previous studies have shown that the effects of being bullied or bullying others during childhood and youth affect mental health and psychosocial functioning later in youth life. This applies to those who were being bullied, bully-victims, or who are aggressive toward others. However, most longitudinal studies to date have been performed within the education system. Little is known about the long-term effects of bullying among youth and how this affects mental health in (young) adulthood. In particular, we know little about how bullying may have affected social functioning in young adults. Many studies are often retrospective and examine the effects of public records (e.g., psychiatric diagnoses or criminal records). One can more strongly decide whether there are any long-term effects of bullying reported in young adulthood using a prospective study of a representative youth population. This thesis is based on the survey data from the Youth and Mental Health Study conducted by the Regional Centre for Child and Youth Mental Health and Child Welfare (RKBU Midt-Norge) formerly known as the Centre for Child and Adolescent Mental Health Central Norway (RBUP Midt-Norge). The representative sample of youth in central Norway was previously assessed in 1998 (T_1, n = 2464, Mean Age (MA) 13.7 years, SD = 0.58) and 1999–2000 (T_2, n = 2432, MA 14.9 years, SD = 0.60). In 2012, a 12-year follow-up study was performed (T_4, n = 1266, MA = 27.2, SD = 0.59). The data consist of self-reports at all three time points. The adolescents at T_1 and T_2 were broadly assessed with respect to their psychological distress and psychosocial functioning, family functioning, and physical health. The same instruments were used for the follow-up survey at T_4 with a few age-related adjustments. The analyses of Papers I and II were based on four groups assessed at T_1 and T_2, who were categorized as being bullied, bully-victims, aggressive toward others, or not involved. Paper III examines the being-bullied group with the not-involved group by gender in relation to suicidal ideation, self-harm, and attempted suicide. Adjusted for gender and parental socioeconomic status, the findings in Paper I showed that those who were being bullied, bully-victims, or who are aggressive towards others are more likely to have lower educational attainment as young adults compared with those not involved in bullying in youth. Those who were aggressive towards others in youth have an almost 3 times higher risk of being unemployed and/or receiving some form of social assistance. Those who were bully-victims in youth reported an almost 3 times higher odds ratio (OR) in having poor general health. As young adults, they

reported a 2.5 times increased risk of pain than those who were not involved in bullying. Bully-victims had almost 3 times increased risk for tobacco use and reported lower job functioning than those who were not involved in bullying. Those who were bullied and those who were aggressive towards others had more than a doubled higher risk for illegal drug use than those who were not involved in bullying. The results from Paper II showed that those involved in bullying (those who were bullied, bully-victims, or aggressive towards others) had higher mean scores than the not-involved group on the total adult self-report (ASR), i.e., in total, externalizing, and internalizing problems and the critical problem scales. When comparing low-to-moderate-scorers versus high scorers (90^{th} percentile), we found that all groups involved in bullying had higher OR of both ASR externalizing and internalizing mental health problems compared with the not-involved group. When we adjusted for the impact of mental health in youth, we found that those who were bullied still had an increased risk of depressive problems in young adulthood compared with the not-involved group. Youth who were bullied also reported reduced psychosocial functioning and increased risk to seek help for mental health problems last year and earlier in life compared with the not-involved group. All groups involved in bullying reported between 4–8 times higher risk of hospitalization since young adolescence because of a mental health problem compared with the noninvolved group. Our main finding from Paper III is that regardless of gender, being bullied in adolescence strongly predicts suicidal behavior and self-harm. Moreover, as young adults, bullied male adolescents had the highest risk of suicide attempts and self-harm, while formerly bullied adult women had the highest risk of suicidal ideation. In conclusion, detecting and preventing bullying in early adolescence has potential to improve both psychosocial functions and mental health in young adults. More specifically, this might reduce suicidal ideation, self-harm, and suicide attempts in young adulthood. Clinical practitioners and other health-care personnel should address past bullying experiences to prevent suicidal behavior in both adolescence and young adulthood.

1. Introduction

1.1. Background and aims of the thesis

1.1.1. Background

Health care personnel and researchers, as well as politicians are currently recognizing youth bullying as a significant and urgent public health issue (Wendelborg, Røe, Federici, & Caspersen, 2015). The seminal research by Olweus (1993) drew attention to bullying and its effects on its victims. Most of the studies regarding bullying, have studied short-term consequences of bullying in schools. Results have partly been influenced by the initial research question investigated, whether it is used a qualitative or quantitative approach, but also how bullying has been conceptualized and measured. The findings suggest that being bullied is related to low levels of psychological quality of life and high levels of mental health problems and adverse physical problems (Rigby & Slee, 1993; Undheim & Sund, 2010).

For many years, the public sector has used different political channels in attempts to prevent bullying (Einarsen, 2005). The background for this work was the increasing number of bullying cases reported by Norwegian schools. Simultaneously, concerns were raised worldwide related to the general mental health of young people (Patel, Flisher, Hetrick, & McGorry, 2007), the high numbers of secondary school "drop-outs" (Statistics Norway, 2008), and the high number of young people on a disability pension in early adulthood years (Gravseth et al., 2007). Surprisingly, almost no bullying-related studies have covered the transition period from adolescence to early adulthood when most people leave the educational system and enter the workforce. The main aim of this thesis is to explore the long-term consequences of bullying, among others, in relation to general health, adaptive functioning, mental health, and suicide. This was made possible using data provided by the Youth and Mental Health Study (Sund, 2004), which was conducted by RKBU Midt-Norge.

A definition of bullying

Olweus and Limber (2010) define bullying or victimization in terms of being bullied, intimidated, or victimized when a person is exposed, repeatedly and over time, to negative actions from more powerful peers. The following distinct groups are often used for researcher convenience in studies on bullying: 1) Being bullied, i.e., those who are the object of

aggression; 2) Being a bully, i.e., those who are aggressive towards others; 3) Bully-victim, i.e., those who have bullied others and were bullied themselves; and 4) Not involved, i.e., those who not have experienced either being bullied or were bullied by others. Bullying behavior may be manifested in various ways, e.g., as teasing, active exclusion from a social group, or physical assaults (Roland, 2002), and more recently through Short Message Services (SMS) and internet- media like YouTube, Facebook, Snapchat, Instagram, and Twitter.

Bullying prevalence

In Norway, it is estimated that as much as 60 000 children are involved in bullying, either as being bullied, perpetrator, or both (i.e., bully-victim) in primary school, which is approximately 10% of the population (Olweus & Breivik, 2017). The number of bullies is estimated to be around 3–4% (Olweus & Breivik, 2017). The Norwegian Directorate for Education and Training carries out a survey called *Elevundersøkelsen* ("The Pupil Survey"), which is compulsory for all Norwegian schools from the fifth grade in primary school to the last year of high school (ages 10 to 18). Some of the survey questions cover bullying. The definition of bullying used in the survey is: "Repeated negative or 'evil' behavior from one or more pupil directed against a pupil who is unable to defend him- or herself." Repeated teasing in an unpleasant way is also defined as bullying. For an action to be defined as bullying, it should be repeated at least 2–3 times per month. Within this definition, the reported prevalence of being bullied between 2007 and 2012 is between 3.6% and 4.3% and reasonably stable (Wendelborg et al., 2015). Data from "Elevundersøkelsen" (The pupil survey) is currently the widest and best indicator of school bullying in that age period in Norway. The variation in reported prevalence between Olweus and Breivik (2017) and Wendelborg and colleagues (2015) could be attributed to variations in age of participants, number of involved schools, time range of measurement and classification of bullying.

2. Theoretical background

2.1. Social ecological theory and the diathesis-stress model

Both social ecological theory (Bronfenbrenner, 1977) and the diathesis-stress model (Lazarus, 1993) have been used to explain how stressful life experiences, such as bullying,

interact with biology to influence the development of mental health problems. Social ecological theory (Bronfenbrenner, 1977) conceives human development as dynamic interrelations among various personal and environmental factors, such as neighborhoods, homes, schools, and the wider society. Bullying could be understood within this framework as not only the result of individual characteristics, but also influenced by individuals' multiple relationships with their peers, teachers, and families (Swearer & Hymel, 2015). Bronfenbrenner's (1979) ecological framework, which he called the "evolving scientific perspective of the ecology of human development," is useful to understand the impact of contextual influences on development. Bronfenbrenner outlined four levels of ecological contexts: i.e., the micro-, meso-, exo-, and macrosystems (*see figure 1*). The microsystem is the immediate setting containing the individual, such as the family. The next level, i.e., the mesosystem, comprises the interactions between several microsystems, such as interactions between family and school, or family and other social institutions, such as sports or other leisure activities. The exosystem is an extension of the mesosystem but does not contain the person, but rather environmental elements that influence the child's development, such as institutions. The final level, the macrosystem, comprises the patterns of the culture or subculture that could be seen as being institutional, such as the economic, social, educational, or legal cultures in society. Attitudes and beliefs within the exosystem, such as in the local community or macrosystem, as in the political systems of the wider community, may alleviate or hinder any bullying actions.

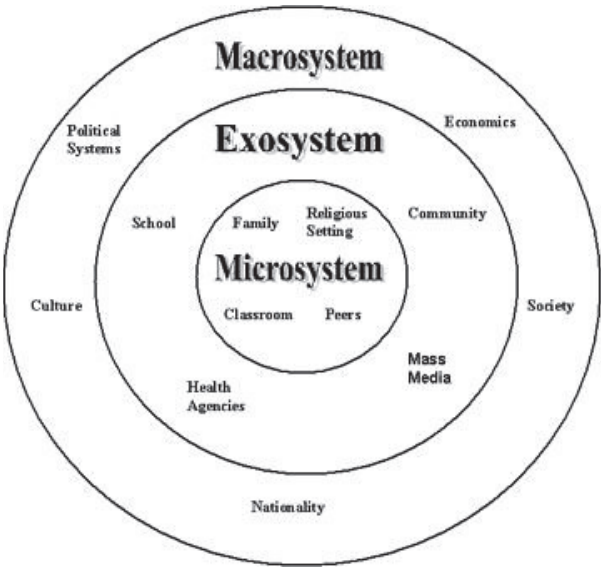


Figure 1. Bronfenbrenner's model of an ecological system

The diathesis-stress model suggests that cognitive and biological vulnerabilities (i.e., diatheses) in interaction with environmental stressors are important in understanding the development of psychopathology (Lazarus, 1993). Specifically, this theory purports that an individual's biological vulnerabilities or predispositions to some psychological disorders can be triggered by stressful life events. On the one hand, if the individual is resilient or has low biological vulnerability for a particular disorder, it would take extremely high levels of stress to trigger symptoms of that disorder. On the other hand, if the individual has high biological vulnerability to the disorder, then it would take lower levels of stress for symptoms to be exhibited. This process may create a diathesis that renders the individuals' mental health vulnerable to stress and may place them at greater risk of future psychiatric illness, including psychosis (Fosse & Holen, 2004; Trotta et al., 2013). The stress-diathesis model suggests that biological and cognitive predispositions, including mental illness, interact with negative life events. The ultimate negative outcome for the individual is suicide. Bullying can be a strongly negative life event (stressor), which could possibly precipitate suicidal ideation and in turn lead to suicide attempts.

2.2. A developmental framework for bullying

The onset of bullying is currently somewhat controversial (Vlachou, Andreou, Botsoglou, & Didaskalou, 2011). In recent years, studies focusing on bullying in preschool between 3 to 6 years old increased (Alsaker & Valkanover, 2001; Hanish, Kochenderfer-Ladd, Fabes, Martin, & Denning, 2004; Kirves & Sajaniemi, 2012), which set the onset of bullying at kindergarten age. In the developmental psychology context, bullying may already have begun early in childhood when individuals begin to assert themselves to establish social dominance over their peers. Early attempts at social dominance often start at the simplest level, such as hitting or biting others, but methods that are more refined develop over time. Among others, this observation led to the developmental model proposed by Bjørkqvist, Lagerspetz, and Kaukiainen (1992), which suggests that relational strategies for bullying become more prominent and frequent with increasing age within childhood and into adolescence as the influence of their peers takes on a stronger significance. In addition, dominance theory is relevant in explaining both aggression and bullying behavior during puberty. Social dominance can be seen as a relational variable, which assigns individuals into a hierarchy based on their access to resources (Pellegrini, Bartini, & Brooks, 1999), which typically are formed when new groups are created, i.e., at the beginning of school (Bjørklund & Pellegrini, 2002). As such, bullying could be a successful strategy for attaining and maintaining dominance in adolescence as individuals who are often leaders of peer cliques are found to be more attractive to the opposite sex (Pellegrini & Long, 2002).

Numerous changes characterize the developmental period known as adolescence. Physical changes occur with the onset of puberty in the form of rapid body growth and rapidly developing secondary sexual characteristics. Brain and cognitive development, including social cognitive development, continues throughout adolescence until the early twenties. In early adolescence, abilities to perceive or evaluate a situation might be present, but problem-solving abilities may not be fully developed. The frontal lobes responsible for logical and critical thinking are still immature, while the “emotional brain” is reacting quickly to critical situations (Eiland & Romeo, 2013). These reactions are emotional, might arouse anxiety and depressive feelings, and have behavioral equivalents, like aggression.

Other biological changes occur during the transition of youth from primary to middle schools. According to the stage termination hypothesis (Benoit, Lacourse, & Claes, 2013), children who physically mature earlier than normative may not have gained enough cognitive

or emotional maturity to successfully navigate the psychosocial consequences of pubertal maturation. The stage termination hypothesis predicts that early maturing girls and late maturing boys will be more distressed than their on-time peers of either sex. Off-time maturing adolescents may become bullying targets simply because they are different from their normally maturing peers (Jormanainen, Fröjd, Marttunen, & Kaltiala-Heino, 2014; Mendle, Turkheimer, & Emery, 2007).

Normative development in young adulthood

Some theorists have considered the transition period between adolescence to adulthood, which is conceptualized as "emerging adulthood" (Arnett, 2000). This period is marked by both challenges and opportunities, and individuals must move to a life outside of their family and struggle for more self-responsibility (Sroufe, Egeland, Carlson, & Collins, 2009). Erikson's (1963) psychosocial stage theory regards the life course as understandable from the perspective of stages of ego development. According to this theory, a crisis of psychological nature must be resolved before moving to the next stage, which has some implications in that the individual must achieve close relationships with others in adolescence to develop successfully from adolescence to young adulthood. Unsuccessful development may lead to social avoidance and isolation. Henry and Kloep (2007) argue that the concept of "emerging adulthood" is perhaps more suited to middle-class youths who may choose to prolong their adolescence. In the Norwegian context, however, emerging adulthood can be a useful conception of a distinct period, although development is more dynamic than can be demonstrated by stage theories. Norway is known to a have a large middle class (Kochhar & Cornibert, 2017). Like many other Western countries, it is a widespread belief in Norway that young adults should not establish themselves too early and should devote some of their early adult years to self-development, such as through travelling and education. Little is known about the normative development of behavioral and emotional problems in young adulthood in the general population. Empirically, longitudinal studies are needed to disentangle cohort, age, and time effects by showing whether the same changes with age are observed in different cohorts studied over different time periods (Farrington, 1991; Kraemer, Yesavage, Taylor, & Kupfer, 2000).

2.3. Peers and social ethical development

Peers play a special role in youth development. Even if the youth are in extensive contact with their parents, their interactions with peers are more free-spirited. Contact with peers opens doors for exploration and experimentation, which is particularly important for the development of social competence, social justice, and the ability to form relations with others outside the family. However, peer relations can have a negative impact and create a foundation for bullying. Researchers have identified two characteristics associated with being bullied in particular: i.e., lack of friends and peer rejection (Hodges, Malone, & Perry, 1997). Children and adolescents who are subject to bullying tend to have few friends, which may be a direct reason for being victimized by bullying. Some researchers have argued that behavioral vulnerability is the reason for why some are bullied only if the victim does not have some form of "social protection," such as having supporting friends and being generally liked by their peers (Hodges et al., 1997). Bullying is a form of aggression. Eron, Huesmann, and Zelli (1991) showed that aggression among children is both inherent and genetically conditioned. Those who bully others are typically aggressive; not just in relation to their peers, but also against their parents, teachers, and siblings. They have often a positive attitude to violence and little empathy for their victims (Goodman & Scott, 2005, p. 244).

Kohlberg and Hersh (1977) observed that moral reasoning is related to the individual's age and general cognitive reasoning; thus, morality develops alongside the cognitive and biological development of the individual. In the context of rapid bodily development and lack of ability to make socially considerate ethical decisions young adolescence is a vulnerable age, both in respect to being a bully or being exposed to bullying. Very few studies have investigated morality and bullying as a theme. One of those few is Thornberg, Thornberg, Alamaa, and Daud (2016), who investigated 10 elementary schools in Sweden using a questionnaire that explored different types of bullying behavior as repeated moral transgressions or other more conventional transgressions.

Thornberg et al. (2016) found that children judged bullying as wrong, independently of rules and as more wrong than all the other repeated transgressions. Clearly, youth are not passive recipients in the socialization process, but actively interpret their social experiences and reflect upon them. However, a minority of youths are not as competent in their reflections on their experience. Researchers have found that bullying behavior and bullying are negatively associated with empathy (Jolliffe & Farrington, 2006) and basic moral

sensitivity (Thornberg & Jungert, 2013), and positively associated with moral disengagement (Gini, Pozzoli, & Hymel, 2014).

3. Empirical background

3.1. Bullying – individual, age, and gender differences

Individual differences could contribute to explaining why some individuals bully others or why some may be more prone to being bullied. Individual differences are also relevant for the long-term effects of either being bullied or being a bully because individual aspects are suspected to be persistent over time. Traits such as conscientiousness and social desirability and optimism are viewed as persistent over time and connected to one's personality (Leary & Hoyle, 2009). Thus, it is unlikely that an individual who is introverted with low-self-esteem in youth does not have these features in later adulthood.

Some researchers have focused on which individuals defend or support the victim and who are prone to this behavior. Children with strong attitudes against bullying are known to be empathetic (Caravita, Di Blasio, & Salmivalli, 2009; Gini, Albiero, Benelli, & Altoè, 2007), emotionally stable (Tani, Greenman, Schneider, & Fregoso, 2003), and have good cognitive abilities (Caravita et al., 2009). Bullied children are suggested to be inclined to have low self-esteem (Meltzer, Vostanis, Ford, Bebbington, & Dennis, 2011), be introverted and lack assertiveness (Beran & Violato, 2004), and have low social skills (McLaughlin, Hatzenbuehler, & Hilt, 2009; Turner, Finkelhor, & Ormrod, 2010). Why these characteristics arise among the being-bullied group has been debated extensively. It is currently generally acknowledged that genetic and social factors are involved. Longitudinal studies have found that factors related to the home environment are associated with and possibly lay the groundwork for the risk of being bullied, such as child maltreatment (Copeland, Shanahan, Costello, & Angold, 2009), domestic violence in the home (Baldry & Winkel, 2003), parental depression (Beran & Violato, 2004), and low socioeconomic status (SES) (Wolke & Lereya, 2015).

A report on bullying worldwide concluded that the rates for bullying others are far higher for boys (Craig & Harel, 2001). Nevertheless, victimization shows small gender differences overall. However, Craig and Harel (2001) noted that gender differences could vary between age groups and no consistent pattern emerged. In a larger perspective across countries, the incidence of bullying others appears to be overall more frequent among boys. Twenty countries indicated that the peak age for bullying others (as measured as one incident in the previous couple of months) is 13 years and most of the bullying occurs between the ages of

11 and 13 (Craig & Harel, 2001). As such, gender is an important factor to consider when assessing bullying.

Gender is not only associated with bullying behavior, but also with the potential outcomes of this behavior, such as mental health problems and suicidal behavior. In adolescence, girls' and boys' mental health problems are profoundly gender-skewed with more boys displaying externalizing problems (e.g., conduct problems and attention-deficit hyperactivity disorder), whereas girls typically display internalizing problems (e.g., depression, anxiety, and eating problems) (Klomek, Marrocco, Kleinman, Schonfeld, & Gould, 2007; Parada, 2006; Roland, 1999), which suggests that mental problems associated with bullying experiences may differ between genders. Research also suggests that girls bully other girls often by means of indirect and interpersonal aggression (Roland, 1999). Hence, findings from research on boys' bullying cannot be generalized to girls' bullying. The lack of studies investigating the long-term consequences of bullying for girls is unfortunate. More research should address this topic.

3.2. Bullying outcomes – mental health issues

Being bullied is known to be associated with a wide range of mental health problems. Bullying victims have more internalizing (anxiety and depression) problems and are more insecure than other peers in general (Olweus & Limber, 2010). Individuals who are aggressive and bully others show externalizing (aggression and conduct) symptoms (Kumpulainen & Rasanen, 2000), while research findings concerning internalizing symptoms are less consistent (Klomek et al., 2007). Both international (Kim, Leventhal, Koh, Hubbard, & Boyce, 2006) and Scandinavian studies (Sourander et al., 2016) have shown that there are negative effects of being bullied or being a bully in childhood with respect to poor mental health and psychosocial adaptation. Current research indicates that the effects of bullying others as a child have an impact on childhood, but this effect also extends beyond this time frame. For example, a worrisome consequence for adolescents who bully others is their susceptibility to future problems of violence and delinquency in adolescence (Bender & Lösel, 2011). Research indicates that bully-victims are the most vulnerable group, most often experiencing behavioral and emotional difficulties, and are at particular risk of unfortunate long-term outcomes (Wolke & Lereya, 2015). However, most longitudinal studies concerning bullying have assessed mental health problems with all measure points only within the educational system (Hemphill et al., 2011).

Studying the long-term effects of bullying is an emergent field and few studies have been published before this decade. As a notable exception, Sourander et al. (2007) investigated the predictive value of being bullied or being a bully at age 8 for psychiatric disorders in early adulthood. They found that being a bully frequently predicted antisocial personality, substance abuse, and depressive and anxiety disorders. Being bullied predicted anxiety disorders and bully-victim status predicted antisocial personality and anxiety disorder. However, the sample only included boys under medical examination during enrollment in the Finish obligatory military service and also had no measurement points within adolescence. If involvement in bullying influences mental health in youth, it is plausible that there will be an effect on mental health in later life. Researchers recently identified internalizing problems, particularly anxiety and depression, in young (Copeland, Wolke, Angold, & Costello, 2013) and middle adulthood (Takizawa, Maughan, & Arseneault, 2014). These findings indicate that bullying should be taken seriously as a risk factor for later mental health problems.

3.3. Bullying outcomes – psychosomatic and somatic problems

Emerging evidence shows that the effects of school bullying can have long-lasting effects on physical health. A meta-analysis of the association between psychosomatic problems and bullying found that individuals who were bullied during their youth had significantly higher risk for psychosomatic problems than did their peers (Gini & Pozzoli, 2009). Problems commonly reported in childhood included headaches, abdominal pain, nausea, recurrent upper respiratory tract infections, sore throats, and palpitations (Rigby, 1998; Williams, Chambers, Logan, & Robinson, 1996; Wolke, Woods, Bloomfield, & Karstadt, 2001). However, long-lasting effects into adulthood were also reported. It is becoming increasingly apparent that the physiological mechanisms through which early life stress affects endocrine function and inflammatory processes may be the very same mechanisms that contribute to the poor psychological health outcomes associated with bullying even in adulthood (Takizawa, Danese, Maughan, & Arseneault, 2015).

3.4. Bullying outcomes – traumatic experiences

In general, being bullied is assumed to be a negative life event, in line with other incidents like abuse, losses, and other acute and chronic stressors (Horesh, Klomek, & Apter, 2008; Hove, Assmus, & Havik, 2016). Evidence suggests that bullying victims can suffer from posttraumatic stress disorder (PTSD) and PTSD symptoms (Idsoe, Dyregrov, & Idsoe,

2012). In the past few decades, the PTSD construct has been demonstrated as a useful framework for understanding many clinical phenomena, which has shifted the notion of PTSD from being a disorder limited to war veterans to a more general syndrome affecting many victims of all violence and abuse. PTSD and PTSD symptoms represent an impairing mental health problem in adolescent populations. At a broad diagnostic level, PTSD is characterized by direct and/or indirect exposure to a traumatic event (i.e., threatened death, injury, violence, or threats to the self or others) that results in a host of functionally impairing, trauma-related symptoms. Crucial symptoms are intrusive recollections of the event, avoidance of trauma-related stimuli, marked physiological arousal, and mood-related changes, which persist for longer than a month following the event(s) (American Psychiatric Association, 2013). A situation frequently leading to PTSD problems is being in a hostage situation or a war (Cantor & Price, 2007). In adolescents specifically, PTSD and PTSD symptoms may manifest as difficulties with concentration, separation anxiety, and difficulty communicating with others about their traumatic experiences (Perrin, Smith, & Yule, 2000). Patients with PTSD have an increased risk of suicide (Vujanovic, Bakhshaie, Martin, Reddy, & Anestis, 2017).

3.5. Bullying outcomes – increased risk of suicidality

In research terms, bullying and a focus on suicidality and related behavior were connected from the very beginning. Olweus (1991) began his seminal research based on three independent suicides related to bullying, which received much attention in the Norwegian media. Suicidal ideations refer to thoughts of harming or killing oneself. A suicidal attempt is an action by a person with intent to die and is a strong predictive factor for repeated suicide attempts and complete suicide. Suicidal intent is the extent to which a suicidal person wishes to die. Suicidal intent has four features: a) belief about the intent; b) preparation before the attempt; c) prevention of discovery; and d) communication (Bridge, Goldstein, & Brent, 2006). Individuals with the highest levels of suicidal intent express a strong wish to die. This indicates evidence of planning, their timing often indicates a strategy to avoid detection, and they communicate the intent of their suicide ahead of time (Losey, 2011), Suicidal behavior resides on a spectrum where having thoughts about death and committing suicide are on the opposite extreme ends of this continuum (Bridge et al., 2006). Both self-harm and suicide attempts are forms of self-injurious behavior, but are often set apart based on frequency, intention, and lethality (Hamza, Stewart, & Willoughby, 2012).

Gender differences may be evident both in relation to bullying and suicidal ideation and self-harm in adolescence. There is a commonly expressed "gender paradox in suicide," which refers to the higher rates of suicidal ideation and behavior among women than in men. However, mortality from suicide attempt is lower for women than for men (Canetto & Sakinofsky, 1998). More specifically, women have a higher rate of attempted suicide than do men in adolescence, but this rate decreases in young adulthood (Griffin et al., 2016, Thompson & Light, 2011). In contrast for men, the rate of attempted suicide remains fairly constant when age is controlled (Griffin et al., 2016, Canetto & Sakinofsky, 1998). Suicidal ideations are consistently endorsed at a higher rate by girls than boys in adolescence (Cha et al., 2018; Kokkevi, Rotsika, Arapaki, & Richardson, 2012; Kandel, Raveis, & Davies, 1991; Reinherz et al., 1993).

3.6. Knowledge gap

Although bullying is one of the most frequent forms of victimization in childhood and adolescence, and the potential harmful personal and social effect of bullying may last well into adulthood, these potential long-term effects have been studied to a surprisingly small extent. This suggests that the mental health and general health outcomes of being involved in bullying from adolescence onward to early adulthood are not adequately understood. Some researchers who attempted to close the knowledge gap as shown above performed retrospective investigations instead of a prospective investigation, as in the present study. Follow-back investigations are useful for addressing possible connections between adolescent and adult behavior, but cannot provide valid data in terms of predictive risk that is achievable in a prospective study (Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006). Furthermore, bully-victims are a less-studied group compared with the other groups involved in bullying. Researchers suggest that this group has the most adverse outcomes in adolescence and adulthood (Farrington & Ttofi, 2011; Juvonen, Graham, & Schuster, 2003). Following those involved in bullying over an extended time would strengthen the evidence of the longitudinal effects of bullying.

3.7. Conceptual model of negative outcomes among those involved in bullying

Figure 2 illustrates a conceptual model of the mechanism involved in the negative outcomes among those involved in bullying as either being bullied, bully-victims, or

aggressive toward others. In part drawn from Wolke and Lereya (2015), this model shows which outcomes are empirically based for each of the groups involved in bullying.

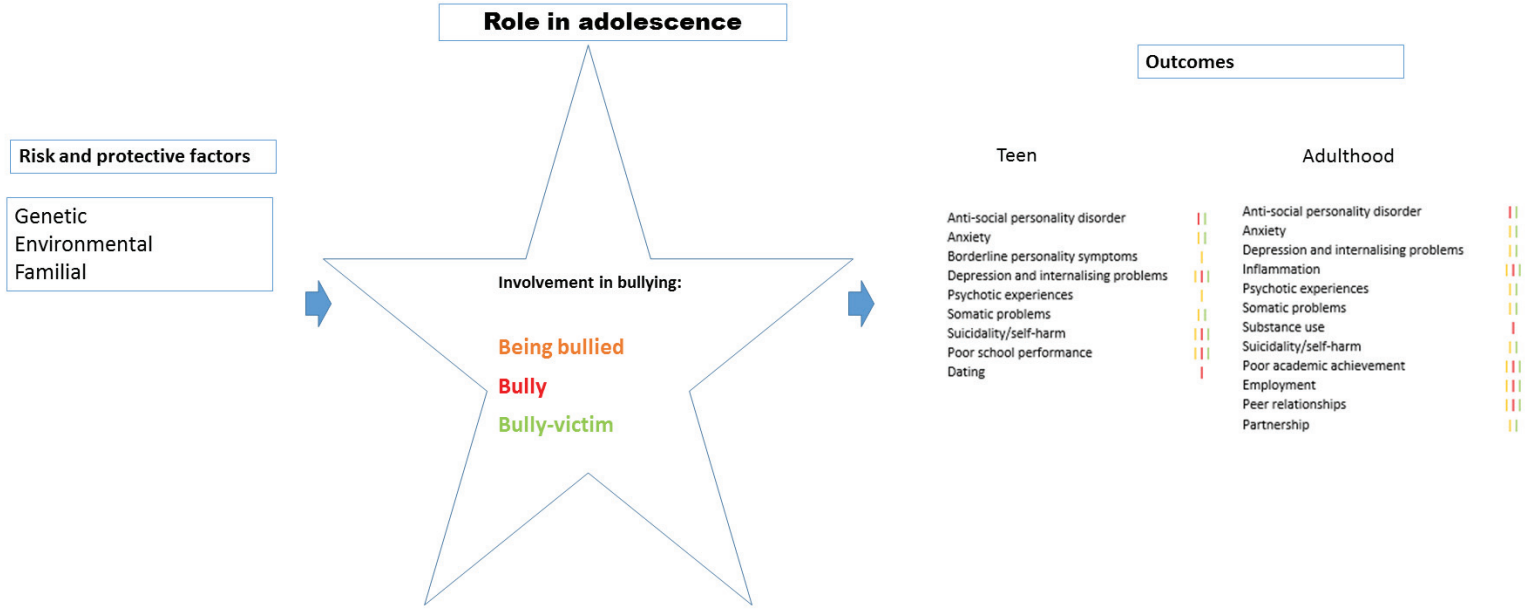


Figure 2. Illustration of some possible outcomes of those being victimized by bullying (partly drawn from Wolke and Lereya (2015).

Understood within the models presented earlier, involvement in bullying, as either as victim, perpetrator, or both, can be seen as a negative life event or trauma. When mixed with certain vulnerabilities (i.e., cognitive, biological, and social) this could contribute to the development of internalizing and externalizing psychopathology and impaired social relationships (Swearer & Hymel, 2015) and health (Copeland et al., 2014). Young adolescents who are involved in bullying may have characteristics that make them more vulnerable to mental health problems. For example, individuals who are aggressive toward others could initially have more externalizing problems and the being-bullied group could have more introverted, nonassertive behaviors.

3.8. Main aims of the thesis

The overall aim is to study the course and potential outcomes of being bullied/being a bully from adolescence to adult age, with three measure points at ages 14 years (T_1) and 15 years (T_2), and with a follow-up investigation 12 years later (T_4), when the participants were approximately 27 years old. A further aim is to prospectively examine potential associations between bullying experiences at 14–15 years and mental health, general health, and psychosocial adjustments in adulthood at 27 years. The respondents will be categorized into four distinct groups (being bullied, aggressive toward others, bully-victim, or not involved) to assess their mental health, general health, and social adaptation outcomes. Gender and SES were used as control variables in considering their effect on the relationship between the independent and dependent variables. Another aim is to examine the concurrent and longitudinal associations between being bullied and suicidal ideation, self-harm, and suicide attempts between the two genders.

The specific aims of Paper I

The specific aims of Paper I were to examine whether there are differential risks among the being-bullied, bully-victim, and aggressive-toward-others groups compared with the not-involved group in bullying during adolescence (T_1 or T_2) for:

1. Lower educational attainment, being unemployed, living alone, and producing a child in young adulthood.
2. Poorer general health and increased reported pain (bodily pain, headaches) and substance use (alcohol, tobacco, and legal and illegal drugs).

3. Reduced quality of social functioning with friends, partner, family, and at work or in school.

The specific aims of Paper II

The following research aims were investigated in the present study:

1. How do experiences of being involved in bullying in adolescence (at T_1 or T_2) affect later broadband internalizing and externalizing, and other more specific domains of mental health problems?
2. Do those being involved in bullying show lower psychosocial functioning levels compared with the not-involved group?
3. Do those being involved in bullying in adolescence receive more help for mental health problems and have more hospitalization episodes compared with the not-involved group?

The specific aims of Paper III

The following research aims were investigated in the present study:

1. Examine the association of being bullied (at T_1) with suicidal ideation in adolescence and young adulthood for both genders.
2. Examine the association of being bullied (at T_1) with self-harm and suicide attempts in adolescence and young adulthood for both genders.

4. Material and methods

4.1. Study design and sample

The Youth and Mental Health Study (Sund, 2004) is a longitudinal study conducted in central Norway (Trøndelag) that aims to address risk and protective factors in the development of mental health in adolescents. The present thesis is a longitudinal study based on the original sample in the Youth and Mental Health Study, which further extends the study to young adult ages and specifically examines the effect of bullying experiences in adolescence.

4.2. Sample and assessment points

Data material

In 1998, a representative sample of 2813 students (98.5% attending public schools) from 22 schools in central Norway (Trøndelag) was drawn with a probability according to school size (proportional allocation) from a total population of 9292 children aged 12–15 years. The sample was divided into four strata: (1) Trondheim city (n = 484, 19.5%); (2) Trondheim suburbs (n = 432, 17.5%); (3) coastal region (n = 405, 16.4%); and (4) inland region (n = 1143, 46.4%) (Sund, 2004).

Sample and assessment points

The baseline data (T_1) assessing mental and physical health were collected in 1998 from 2464 adolescents with a mean age of 13.7 (SD = 0.58, range 12.5–15.7) and 50.8% were girls. The sample was reassessed with an identical questionnaire 1 year later (T_2) with 2432 respondents at the mean age of 14.9 years (SD = 0.6, range 13.7–17.0), and 50.4% were girls. At T_2, whereas 104 (4.3%) participants from T_1 did not participate, 72 new participants were added from the same schools. Data in the two first waves were gathered through questionnaires completed during two school hours. Teachers and other staff assisted the students when necessary. At T_2, a subsample (n = 345) was invited to complete interviews using the Kiddie Schedule for Affective Disorders and Schizophrenia (present and lifetime versions) (Kaufman et al., 1997). Five years later, this interview subsample was reassessed (T_3) using the same interview instrument (n = 242) (for a study involving this subsample, see

Nrugham, Holen, & Sund, 2010). The T_3 subsample was not used in the present study because of its relatively small size compared with the main sample.

The follow-up study at 27.2 years (T_4)

Individuals participating at T_1 or T_2 (N = 2532) were selected for a follow-up survey during spring 2012 (T_4). At T_4, 96 participants were not eligible because of death (n = 13) or no identifiable home address (n = 87), which resulted in 2440 participants who were invited to this follow-up investigation, of whom 1266 (51.9%) participated, 56.7% were girls, and the mean age was 27.2 years (SD = 0.59, range 26.0–28.2) (see the flowchart in *figure 3*). The Regional Committee for Medical Research Ethics in Central Norway approved all data collection waves (i.e., T_1 and T_2 combined).

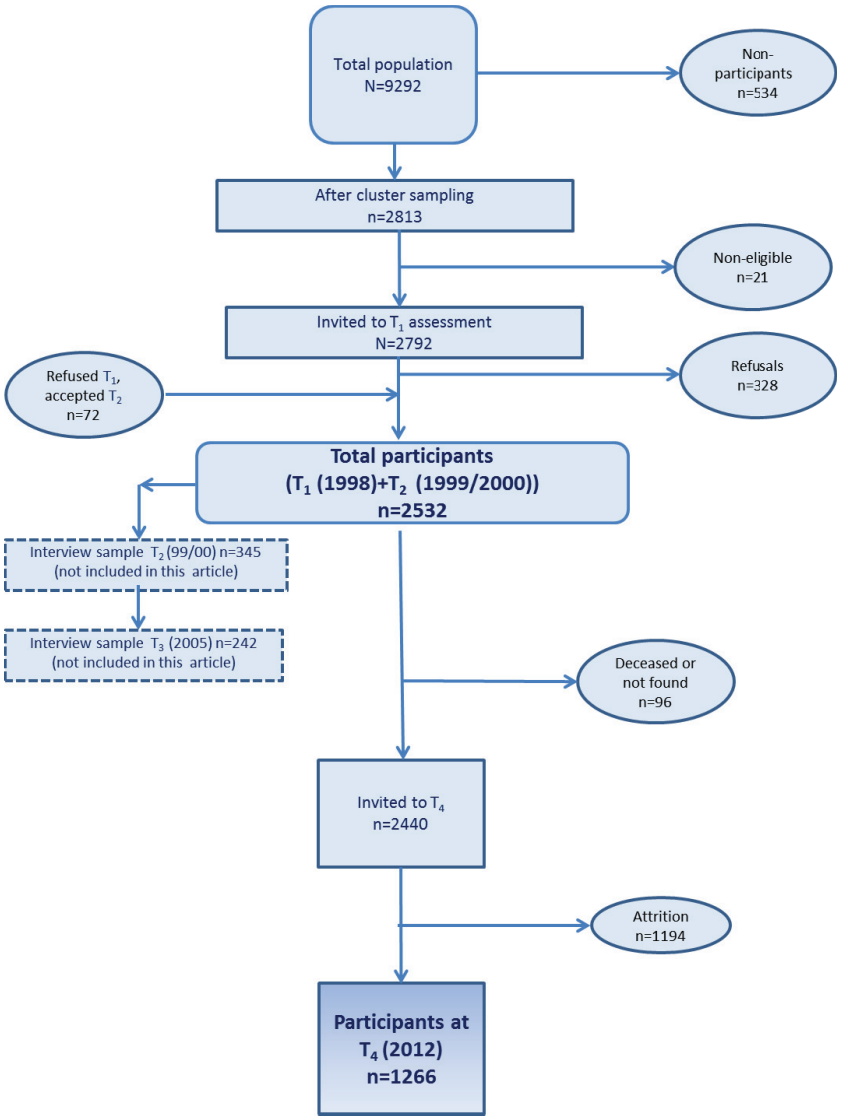


Figure 3. Subject recruitment and attrition in the Youth and Mental Health Study

4.3. Measurement instruments

The same overall instruments administered in 1998 and 1999/2000 (T_1 and T_2) were re-administrated in 2012 (T_4) using identical questions with age-appropriate adaptations. The data were collected electronically except for six individuals responded using paper surveys.

4.3.1. Measures used only in adolescence (assessed at T_1 and T_2)

Youth Self Report (YSR): The YSR from the Achenbach System of Empirically Based Assessment (ASEBA) (Achenbach, 1991b) is a widely used self-report measure of emotional and behavioral problems among adolescents aged 11–18 years, which has been translated into Norwegian (Kvernmo & Heyerdahl, 1998). The YSR consists of 103 problem items rated on a 3-point scale ("not true," "somewhat or sometimes true," "very true or often true") for the previous 6 months.

Being bullied: Participants were asked if they have ever been: 1) teased; 2) physically assaulted; or 3) frozen out of friendships at or outside school during the last 6 months. They responded using a 5-point scale ("never," "1–2 times," "about once a week," "2–3 times a week," and "more often") (Alsaker, 2003). Following Roland (2002), responses were dichotomized to "about once a week" and more frequently (1) and "1-2 times" and "never" (0).

Aggressive toward others: Four questions from the youth self-report (YSR) (Achenbach, 1991b) addressed aggressive behavior: i.e., "I treat others badly," "I physically attack people," "I tease others a lot," and "I threaten to hurt people." Responses for the aggression questions were dichotomized to "very often or often true" = 1 and "not true" or "sometimes true" = 0. Since these items did not differentiate aggression toward peers from other people (e.g., parents or teachers), this variable was considered being aggressive toward others rather than bullying others. The YSR is reported to have a good validity and test–retest reliability (Achenbach, 1991b). In our sample (T_1 and T_2), the internal consistency measured by Cronbach's alpha is reported to be .89 on the sum score scale (Undheim & Sund, 2010).

Classification of groups and covariates involved in adolescent bullying

Being bullied: One hundred fifty-eight (185) participants reported being bullied "about once a week," or more frequently in one or more of the three items within the last 6 months at either T_1 or T_2.

Aggressive toward others: Eighty-seven (87) participants reported being aggressive "very often" or "often" toward others in one or more of the four YSR items within the past 6 months at either T_1 or T_2.

Bully-victims: Thirty-nine (39) participants met the classification of being bullied and being aggressive toward others as defined above within the last 6 months at either T_1 or T_2.

Not involved: Nine hundred eighty-two (982) participants were not classified as being bullied, aggressive toward others, or bully-victims at both T_1 and T_2.

Socioeconomic status: SES was measured by adolescents' reports of their parents' jobs in addition to an open question about what their parents for work, which were classified according to the ISCO-88 (Hoffmann & Scott, 1990) into professional leader, upper middle class, lower middle class, primary industry, and manual workers. Father's job was used unless the adolescent lived with the mother only, in which case the mother's job was used. A table of the SES distribution among the various bullying groups and the total sample is shown in Section 5.1.

Ethnicity: Ethnicity was measured at T_1 by adolescents' reports of their parents' origin countries. A distinction was made between respondents with one or two parents of Norwegian background and those having both parents with a non-Western background. Only a small proportion of the sample reported a non-Norwegian ethnicity: i.e., 1220 (98.3%) participants had one or both parents from Norway. A table of the ethnicity distribution among the various bullying groups and the total sample is shown in Section 5.1.

4.3.2 Measures used in both adolescence and adulthood (at T_1,T_2, and T_4)

The Mood and Feelings Questionnaire (MFQ): (Angold, 1987) was administered to measure depressive symptoms in greater detail. The MFQ is a 33-item questionnaire originally designed for children and adolescents aged 8–18 years to report depressive symptoms as specified by the *Diagnostic and Statistical Manual for Mental Disorders* (3rd edition) – Revised criteria (American Psychiatric Association, 1987), including affective, melancholic, vegetative, cognitive, and suicidal symptoms. The individual was asked to report each symptom for the preceding 2 weeks using a 3-point scale ("not true" = 0, "sometimes true" = 1, and "true" = 2), which results in a total summed score ranging between 0 and 68. High scores represent high depressive symptom levels. In the present sample, 3-week and 2-month test–retest reliabilities at T_1 were reported to be r = .84 and .80, respectively (Sund, Larsson, & Wichstrøm, 2003).

Suicidal ideations were assessed on a scale using five items, including four items from the MFQ (Angold, 1987). The four items from MFQ were: "I thought that life was not worth living," "I thought about death or dying," "I thought my family would be better off without me," and "I thought about killing myself." To these items, one item was added from the Center for Epidemiologic Studies Depression Scale (CES-D) (Andrews, Lewinsohn, Hops, & Roberts, 1993): "I would have killed myself if I had known a way of doing it." These questions were measured at T_1, T_2, and T_4. All items were rated on a 3-point scale ("not true" = 0, "sometimes true" = 1, and "true" = 2). The Scale for Suicide Ideation is scored from 0 to 10. Due to the skewed nature of the Scale for Suicide Ideation, it was truncated to a 4-point ordinal scale (none, 0 = 0; low, 1–1.5 = 1; moderate, 1.5–6 = 2; severe, 6–10 = 3).

Self-harm was measured by the question: "Have you ever deliberately taken an overdose of pills or in any other way tried to hurt yourself?" Responses were: "No, never," "Yes, once," and "Yes, several times." This item originates from a national survey, Young in Norway (Wichstrøm, 2000), and measures self-harm. In the analyses, this variable was dichotomized to "Yes, once" and "Yes, several times" = 1 and "No, never" = 0.

Suicide attempts were measured by the question: "Have you ever tried to commit suicide?" Responses were: "No, not really," Yes, once," and "Yes, several times." This item originates from the Young in Norway national survey (Wichstrøm, 2000). In the analyses, this variable was dichotomized to "Yes, once" or "Yes, several times" = 1 and "No, never" =

0. All persons, except for two cases with missing responses, who had answered “yes” on the question about suicide attempts, had also answered “yes” to the question about self-harm. Table 1 shows the frequencies and distribution of answers on suicide attempts for the whole sample.

4.3.3 Measures used only in the follow-up study (T_4) at 27.2 years

General health, mental health and other health outcomes

General health was measured by asking: “How do you evaluate your own health?” (Bowling, 2005). Responses were given on a 4-point scale: “poor” = 0; “not so good” = 1; “good” = 2; and “very good” = 3. These responses were dichotomized into “poor” and “not so good” = 1 or “good” and “very good” = 0.

ASR - Adult Self Report (corresponding to YSR, used at T_1 and T_2) (The ASEBA system) (Achenbach, 2003) assessed adult psychological problems at a mean age 27.2 years. ASR is the adult extension of the YSR addressing behavioral, emotional, and social problems, using the same response options. The ASR was selected because ASEBA has empirically based scales and has been shown to correlate with clinical diagnoses (Achenbach, 1991; Achenbach, Bernstein, & Dumenci, 2005; Achenbach & Rescorla, 2003; Sourander et al., 2005). The 120 items include broadband problem scales for internalizing (anxious/depressed, withdrawn, and somatic complaints), externalizing (rule-breaking, aggressive behavior, and intrusive problems), attentional problems (concentration problems or disorganized behavior), and critical items (the sum of 19 items).

Critical items consist of specific atypical behaviors, which may be a concern regardless of whether they reflect internalizing or externalizing problems. These types of behavior are considered critical items and contain “problems clinicians may be particularly concerned about,” such as “breaking things belonging to others,” “unhappy, sad, or depressed,” “can’t get mind of certain thoughts” and “self-harming” (Achenbach & Rescorla, 2003). A total problem score across all items can also be calculated.

Psychosocial functioning related to state of mind was measured with four questions (Sund, 2004). A general question with a timeframe within the last year was: “When you are worried or sad (having emotional or psychiatric problems), do you not function as well as usual?” Responses were “true,” “somewhat true,” and “not true.” Three additional questions addressed different psychosocial functional areas: “Have you had to reduce/quit leisure

activities due to a psychiatric problem for a while in the last year?" "Have you been absent from school/work because of emotional or psychiatric problems?" and "Have you had interpersonal problems caused by these problems during the last year? Response categories for these three questions were: "no," "less than 1 week," "between 1 and 4 weeks," or "more than 4 weeks." Each question regarding psychosocial functioning were treated as dichotomous variables in the descriptive analyses and as ordinal variables in the logistic analyses.

Received help for mental health problems was measured by one question about receiving any help due to mental health problems during the last year, and one question asking about receiving any help due to mental health problems earlier in life. These questions had 11 response categories differentiating between types of help (i.e., psychologist or school health nurse). The 11 categories were dichotomized to a yes/no response. In addition, a yes/no question asked whether participants had ever been hospitalized because of mental health problems. This question was recoded based on a follow-up question about the hospitalization timeframe to identify whether participants were hospitalized after young adolescence (T_2).

Other health indicators

Headache: Participants responded to the statement: "I have a physical problem without known medical cause." Among others, responses included "headaches." Responses were made on a 3-point scale for the previous 6 months ("not true," "somewhat or sometimes true," "very often true or often true"), which were dichotomized to "very often or often true" = 1 versus "not true or sometimes true" = 0. This item was obtained from the ASR problem scale (Achenbach & Rescorla, 2003).

Tobacco use: Participants were asked: "In the past 6 months, about how many times per day did you use tobacco (including smokeless tobacco)?" Responses were dichotomized into "never reported tobacco use during the last 6 months" = 0 and "tobacco use once or more during the last 6 months" = 1. This item was obtained from the ASR problem scale (Achenbach & Rescorla, 2003).

Alcohol use: Considering the previous 6 months, participants responded to the statement: "I drink too much alcohol and get drunk." Responses were dichotomized to "very often or often true" = 1 and "not true" or "sometimes true" = 0. This item was obtained from the ASR problem scale (Achenbach & Rescorla, 2003).

Illegal drug use: Participants were asked: “In the past 6 months, on how many days did you use drugs for nonmedical purposes (including marijuana, cocaine, and other drugs, except alcohol and tobacco)?” Responses were dichotomized into “never reported illegal drug use during the last 6 months” = 0 and “illegal drug use once or more during the last 6 months” = 1. This item was obtained from the ASR problem scale (Achenbach & Rescorla, 2003).

Bodily pain: Participants were asked: “Do you have problems with frequent pain in the body (except menstrual cramps)?” with individual scoring for head, stomach, or legs/arms, and responses for each area were coded as “yes” = 1 or “no” = 0. This item was developed for the Youth and Mental Health Study (Sund, 2004).

Legal drugs use: Participants were asked: “Do you use any legal drugs now?” Responses were coded as “yes” = 1 or “no” = 0. This item was developed for the Youth and Mental Health Study (Sund, 2004).

General adaptation, work and education outcome measures

Cohabitation and parenting status: Participants were asked “Who do you live with now?” Possible responses were “I live alone,” “I live with other adults (not family or partner),” “I live with spouse/partner,” “I live with spouse/partner and children,” “I live with own child,” “I live with parents/other relatives,” or “I live with siblings.” Determinations were made regarding living with a partner as well as having a child. This item was developed for the present wave of the Youth and Mental Health Study.

Job, income and education status: Participants’ job status was measured using a question produced for the present study: “What do you do now?” Thirteen response choices indicated job status and were combined into four categories: “working fulltime/part-time,” “disability/social benefits/unemployed,” “parental leave/living home/sick leave,” and “student.” Income was measured by asking: “What was your income in 2011, including all sources?” The responses were made possible using an open field. Education was measured by the question: “What is your highest education today?” from the ASEBA adult forms (Achenbach & Rescorla, 2003), with responses ranging from “Have not completed primary school” to “University/college > 4 years.”

ASR adaptive functioning scales

ASR adaptive functioning scales: Five ASR adaptive scales were used to measure quality of relations to friends, spouse/partner, family, job, and education during the last 6 months (Achenbach & Rescorla, 2003). The friend adaptive scale consists of four items regarding number of friends and number of interactions during a month and quality of friendship on a 3-point scale (i.e., "none" = 0, "2–3" = 1, "2 or 3" = 2, "4 or more" = 3). The spouse/partner scales consist of eight items regarding live-in spouse/partner satisfaction. The job scale consists of eight items regarding satisfaction and worry regarding work relations and situation. The education scale consists of five items regarding satisfaction and worry about educational achievements and relations to other students. Spouse/partner, job, and education was rated on a 3-point scale: "not true" = 0, "sometimes or sometimes true" = 1, and "very true or often true" = 2. The family scale consists of nine items regarding relational quality among close family members and relatives rated on a 3-point scale ("worse than average" = 0 to "better than average" = 2). The mean score for the family adaptive scale and sum scores on the rest of the scales were standardized to compare the differences between the groups, where lower scores indicate poorer adaptive functioning.

4.5. Statistics

Analyses were completed using IBM SPSS Statistics for Windows (versions 21–24; IBM SPSS, Armonk, NY, USA). The significance level was set to .05 and the exact *p*-value was reported in most of the results. Ninety-five percent confidence intervals (CI) are reported where relevant. Gender and parental SES were used as covariates. The prevalence of adolescents having a non-Norwegian ethnicity was low; therefore, ethnicity was not included in the analyses.

4.4.1 Statistics in paper I

Controlling for gender and parental SES at T_1, unadjusted and adjusted logistic binary analyses and ordinal and nominal logistic analyses were used to examine associations between classifications of bullying involvement in adolescence and young adult outcomes. Chi-square analyses were performed to assess differences between responders and nonresponders and assessment of differences among the bullying groups. Analyses of variance were performed to assess group differences on income and ASR adaptive functioning scales.

4.4.2 Statistics in paper II

One-way between-groups analyses of covariance were conducted to compare outcomes measured with continuous scales among the four bullying involvement groups. Participants' gender and parental SES level were used as the covariates in this analysis. For the ordinal outcome variables, logistic regression analyses were used to compare the three bullying involvement groups, using the noninvolved group as a reference. Ninety-five percent CIs were computed. Hochberg's step-up procedure was used for multiplicity adjustment. The Hochberg procedure is generally recommended before the more conservative Bonferroni correction (Dmitrienko & D'Agostino, 2013). For the remaining analyses, we have not adjusted for multiple hypotheses as recommended by Rothman (2014). In addition, cut-off points corresponding to the 90th percentile were used as indicators of possible mental health problems in the clinical range. This cut-off point is widely used in psychiatric epidemiology (Achenbach & Edelbrock, 1983; Sund, Larsson, & Wichstrøm, 2001). Binary logistic regression analyses were used to test for the strengths of the associations between the different bullying groups, being a high-scorer (90th percentile) versus low-to-moderate-scorer on mental health outcomes, and receiving help for mental health problems.

4.4.3 Statistics in paper III

First, the frequency of suicidal ideation, self-harm, and suicide attempts for each time-point is reported according to groups classified by bully and gender ("female, not bullied," "female, bullied," "male, not bullied," or "male, bullied"). Differences in suicidal ideation, self-harm, and suicide attempts for each time-point between the being-bullied and not-involved groups was assessed using Pearson chi-square test for binary data and linear-by-linear test for ordinal data. We calculated the risk difference among those involved in bullying versus not involved divided by gender to assess the impact of the association between exposure to bullying in adolescence and the occurrence of suicidal ideation, self-harm, and suicidal attempts. The main analyses were performed using generalized linear mixed models (GLMMs) (Demidenko, 2004). We performed three sets of analyses for each dependent variable, i.e., suicidal ideation, self-harm, and suicide attempts, respectively. The GLMMs also provided an intragroup analysis to assess significant changes over time by the different groups. We used an ordinal logistic GLMM with suicidal ideation categorized into four categories and binary logistic models for self-harm and suicidal attempts. A time index with the three time points and parental SES were included as categorical covariates. Gender

and bullied status were included as binary covariates. To obtain a realistic model with all possible interaction effects, we included all two- and three-way interactions among these covariates. A random effect for each individual was included in the model. The results were reported separately for men and women.

4.4.4 Interactions

In Papers I and II, the data were checked for interaction effects before the main analyses. Preliminary analyses in Papers I and II found no such interaction effects for the covariates of gender, parental SES, and ethnicity. Thus, interaction effects were not included in the final model in our main analyses. In Paper III, we found interaction effects between bullying and gender on suicidal ideation, self-harm, and suicide attempts; therefore, we included all two- and three-way interaction among these covariates to obtain a realistic model with all possible interaction effects.

4.4.5 Attrition

Attrition due to follow-up is a great concern in longitudinal studies; therefore, we aimed to investigate any nongeneralizability due to attrition at T_4 in Papers I–III. The responders at T_4 were compared with the nonresponders at T_4 on gender, parental SES, ethnicity, and bullying classifications as assessed at T_1 or T_2. The responders at T_4 were characterized by more women than nonresponders (56.9% vs. 44.4%, χ^2 (1) = 39.44, $p < .001$) and fewer with non-Norwegian ethnicity (1.7% vs. 3.6%, χ^2 (1) = 8.79, $p = .003$). There were also parental SES differences between responders and nonresponders (χ^2 (4) = 27.20, $p < .001$). Subsequent chi-square goodness-of-fit tests showed that parental upper middle class was overrepresented among responders (33.6% vs. 25.5%, χ^2 (1) = 17.19, $p < .001$) whereas workers were underrepresented (34.1% vs. 41.8%, χ^2 (1) = 5.93, $p < .015$). In the total sample, the attrition rate for T_4 was 48.1%. Specifically, the attrition rate for T_4 among the groups involved in bullying was: being bullied (47.3%), bully-victim (40.0%), and aggressive toward others (56.7%). The chi-square tests for each subgroup involved in bullying showed no significant difference in proportional rates between those participating at T_4 compared with those not participating.

5. Results

5.1. Description of the sample

The total study sample of all participants at T_1 and/or T_2 and T_4 (N = 1266) comprised a 56.7% majority of women. Table 1 shows the bullying type by gender among those reported being bullied (n=158), demonstrating that boys were more often than girls being physical assaulted. Tables 2 and 3 show the demographic characteristics in young adulthood (T_4) related to bullying involvement in adolescence. Twenty-two point four (n = 284) reported being involved in any type of bullying at T_1 or T_2, 12.5% (n = 158) being bullied, 6.9% (n = 87) being aggressive toward others, 3.1% (n = 39) being a bully-victim, and 77.5% (n = 982) reported not being involved in bullying in any form at T_1 or T_2. There was a significant gender difference across all bullying groups (χ^2 (3) = 22.08, $p < .001$). Compared with the not-involved group, the being-bullied group had a higher proportion of women (66.5%), while a majority of men were bully-victims (66.7%) or aggressive toward other (57.5%). A total of 1220 (98.3%) had one or both parents from Norway and there were no significant differences among the groups in ethnicity (χ^2 (3) = 3.55, $p = 3.15$).

Table 1: Bullying type stratified by gender reported more than once a week or more frequently during the last 6 months at T_1 (n=158)

		Bullying type		
		Teased	Frozen out of friendships at school or on the way to school	Physically assaulted
Gender	Female n (%)	106 (8.7)	47 (3.9)	17 (1.4)
	Male n (%)	90 (7.7)	38 (3.3)	32 (2.8)
Chi square		.74	.61	5.41
Significance		NS	NS	p=.02

Table 2: Demographic variables assessed at 27 years (T_4) among the bullying groups and the total sample

Variable at 27 years	Not involved (*n* = 982)	Being bullied (*n* = 158)	Bully-victim (n = 39)	Aggressive toward others (n = 87)	Total sample (N = 1266)
Age [*M* (*SD*)]	27.23(.59)	27.16(.60)	27.39(.55)	27.20(.63)	27.22(.59)
Gender (%)					
Men	42.7	33.5	66.7	57.5	43.3
Women	57.3	66.5	33.3	42.5	56.7
Ethnicity [%(n)]*					
One or both parents from Norway	98(938)	100(158)	97.4(38)	98.9(86)	98.3(1220)
Both parents from other country	2(19)	0(0)	2.6(1)	1.1(1)	1.7(21)
Income [K NOK (n)[1]]	298.66	282.78	290.27	297.30	296.36
Cohabitation status [%(n)]					
Live-in-partner	64.8 (636)	52.5(83)	51.3(20)	55.2(48)	62.2(787)
No live-in partner	35.2(346)	47,5(75)	48.7(19)	44.8(39)	37.8(62.2)
Have a child [%(n)]	31.4(307)	26.9(42)	34.2(13)	25.6(22)	30.5(384)
Level of completed education [%(n)]					
Primary/Secondary school	2.3(22)	5.3(8)	2.6(1)	9.6(8)	3.2 (39)
High school	32.6(309)	40.1(61)	68.6(24)	47(39)	35.6 (433)
University/college < 4 years	35.1(332)	30.3(46)	17.1(6)	20.5(17)	32.9 (401)
University/college > 4 years	30(284)	24.3(37)	11.4(4)	22.9(19)	28.3 (344)
Job status [%(n)]					
Disability/Social help/Unemployed	6(57)	9.7(15)	11.4(4)	12.2(10)	7 (86)
Mat. Leave/Living at home/Sick Leave	10.8(103)	12.3(19)	11.4(4)	9.8(8)	11 (134)
Student	12.6(120)	11(17)	2.9(1)	13.4(11)	12.2 (149)
Working fulltime/part-time	70.6(672)	66.9(103)	74.3(26)	64.6(53)	69.8 (854)

*Assessed at T1

Table 3: Psychosocial and mental health variable assessed at 27 years (T_4) among the bullying groups and the total sample

Variable at 27 years	Not involved (*n* = 982)	Being bullied (*n* = 158)	Bully-victim (n = 39)	Aggressive toward others (n = 87)	Total Sample (N = 1266)
Poor general health [%(n)]	15.7(154)	21.5(34)	30.8(12)	20.7(18)	18.7(218)
Legal drug use [%(n)]	14.2(139)	22.2(35)	17.9(7)	12.6(11)	16.6(192)
Bodily pain [%(n)]	22.2(218)	35.4(56)	33.3(13)	19.5(17)	26.2(304)
Headache [%(n)]	30.5(300)	42.4(67)	23.1(9)	23(20)	31.3(396)
Tobacco use [%(n)]	35.5(327)	39.7(60)	64.9(24)	54.3(44)	38.2(455)
Problematic alcohol use[%(n)]	18.7(184)	22.8(36)	20.5(8)	26.4(23)	19.8(251)
Illegal drug use [%(n)]	5.7(53)	9.9(15)	16.2(6)	17.2(15)	7.5(89)
Reduced functioning (Y/N) [%(n)]	40.6(371)	55.4(82)	44.4(16)	44.7(34)	39.7(503)
Reduced leisure activities (Y/N) [%(n)]	6.3(58)	10.1(15)	2.8(1)	13.2(10)	6.6(84)
Absence from school/ work (Y/N) [%(n)]	7.9(72)	8.8(13)	13.9(5)	10.5(8)	7.7(98)
Affected interpersonal relations (Y/N) [%(n)]	8.2(75)	10.8(16)	13.9(5)	7.9(6)	8.7(102)
ASR Total problem – high scorers (Y/N) [%(n)][1]	8.1(79)	17.1(8)	20.5(8)	19.5(17)	8.8(112)
ASR Externalizing – high scorers (Y/N)[1] [%(n)][1]	9.3(91)	13.9(22)	23.1(9)	20.7(18)	11.1(140)
ASR Internalizing – high scorers (Y/N)[1] [%(n)][1]	8.2(80)	16.5(26)	23.1(9)	18.4(16)	10.3(131)
ASR Attention – high scorers (Y/N)[1] [%(n)][1]	9.9(97)	12.7(17)	23.1(9)	19.5(17)	11.1(140)
ASR Critical Items – high scorers (Y/N)[1] [%(n)][1]	9.1(89)	17.1(27)	33.3(13)	18.4(16)	11.5(145)
MFQ Depressive s. – high scorers (Y/N)[1] [%(n)][1]	8.8(86)	16.5(26)	12.8(5)	16.1(14)	10.3(131)
Received mental health help last year (Y/N) [%(n)]	28.2(277)	39.2(62)	28.2(11)	35.6(31)	30.1(381)
Received mental health help earlier (Y/N) [%(n)]	33.1(325)	48.7(77)	38.5(15)	41.4(36)	35.8(453)
Psychiatric hospitalization since T_2 (Y/N) [%(n)]	1.5(15)	5.1(8)	7.7(3)	9.2(8)	2.7(34)

[1] Dichotomized being a high-scorer (90th percentile) versus low-to-moderate-scores on mental health outcomes in young adulthood.

5.2. Paper I

Title: *Is involvement in school bullying associated with general health and psychosocial adjustment outcomes in adulthood?*

To examine whether there are differential risks among the being-bullied, bully-victim, and aggressive-toward-others groups compared with the not-involved group in relation to prospective associations of self-reported general health (including bodily pain, headache) and psychosocial adjustment (i.e., lower educational attainment, being unemployed, social functioning with work, friends, partner, and family) in young adulthood.

We found that those who were being bullied, bully-victims, or aggressive towards others are more likely to have a lower educational attainment as young adults compared with the

group not involved in bullying during youth (bullied, OR = 1.64 [95% CI 1.18, 2.26], p = .003; bully-victim, OR = 3.24 [95% CI 1.65, 6.35], p = .001; and aggressive toward others, OR = 2.33 [95% CI 1.52, 3.58], p < .001). Those who were aggressive towards others in youth had almost 3 times higher risk of being unemployed and/or receiving some form of social assistance (OR 2.73 [95% CI 1.29, 5.75], p = .017). Those who were bully-victims in youth reported almost 3 times higher OR to have poor general health (2.83 [1.33, 6.05], p < .001) and they reported a two and a half times increased risk of pain as young adults (2.45 [1.17, 5.11], p < .001) than those who were not involved in bullying. Bully-victims had an almost 3 times increased risk for tobacco use (OR 2.66 [95% CI 1.30, 5.44], p = .007) and reported lower job functioning than those who were not involved in bullying ($F(3,1184)$ = 10.99, p < .001). Those who were bullied and those who were aggressive towards others had a more than double higher risk for illegal drug use than those who were not involved in bullying (OR = 2.33 [95% CI 1.52, 3.58], p < .001).

5.3. Paper II

Title: *The long-term effects of being bullied or a bully in adolescence on externalizing and internalizing mental health problems in adulthood*

Our main aim in Paper II was to identify how experiences of being involved in bullying in adolescence affect later broadband internalizing and externalizing, and other more specific domains of mental health problems as assessed with ASR and the MFQ. A secondary aim was to examine if those being involved in bullying show lower psychosocial functioning levels compared with the not-involved group. A tertiary aim was to examine if those being involved in bullying in adolescence received more help for mental health problems and had more hospitalization days compared with the not-involved group. When adjusting for gender and parental SES the results showed that those involved in bullying (those who were bullied, bully-victims, or aggressive towards others) had higher mean scores than the not-involved group on the ASR total-, externalizing-, and internalizing problems and the critical problem scales (all p < .001). When comparing low-to-moderate scorers versus high scorers (≥ 90^{th} percentile), we found that all groups involved in bullying had higher OR of both ASR externalizing and ASR internalizing mental health problems compared with the not-involved group with OR ranges 1.68–4.25 (all p < .05). When we adjusted for the impact of mental health in youth, we found that those who had been bullied still had an increased risk of

depressive problems in young adulthood compared with the not-involved group. Those who were bullied also reported reduced psychosocial functioning (OR = 1.69 [95% CI 1.21, 2.36], $p = .002$) and increased risk of seeking help for mental health problems during the previous year (OR = 1.63 [95% CI 1.15, 2.33], $p = .007$) and earlier in life compared with the not-involved group (OR = 1.94 [95% CI 1.38, 2.74], $p < .001$). All groups involved in bullying reported between 4–8 times higher risk of hospitalization since young adolescence because of mental health problems since youth compared with the not-involved group (being bullied, OR = 3.94 [95% CI 1.58, 9.82], $p = .003$; bully-victim, OR = 8.13 [95% CI 2.14, 30.88], $p = .002$; and aggressive toward others, OR = 8.63 [95% CI 3.84, 22.00], $p < .001$).

5.4. Paper III

Title: *The longitudinal association of being bullied and gender with suicide ideations, self-harm, and suicide attempts from adolescence to young adulthood: a cohort study*

We expected that those who reported being bullied had an elevated prevalence of suicidal ideation, self-harm, and suicide attempts at all assessment points. Our first aim was to examine the longitudinal association of being bullied (at T_1) and the development of suicidal ideation through adolescence to young adulthood. A secondary aim was to examine the longitudinal association of being bullied (at T_1) and the development of self-harm and suicide attempts from adolescence to young adulthood.

When assessing the prevalence of self-harm among those who reported being bullied, we found that in adolescence, bullied women have a high prevalence of self-harm (20.5% at T_1 and 27.2% at T_2) compared with their not-bullied female peers (6.0% and 13.3%, respectively). Self-harm among women remained at a high level in young adulthood. Men bullied during adolescence have a high prevalence of self-harm in adolescence (7.2% at T_1 and 15.2% at T_2) compared with their peers who were not bullied (2.1% and 4.2%, respectively). In contrast, when assessing the prevalence of suicide attempts in adulthood, bullied women have a higher prevalence than do girls who were not bullied and bullied boys in adolescence.

In Paper III, we calculated the absolute risk measure in terms of risk difference among those involved in bullying versus the not-involved group divided by gender to assess the absolute impact of the association between exposure to bullying in adolescence and the occurrence of suicidal ideation, self-harm, and suicide attempts. We chose to show both

absolute and relative effect measures because when assessed alone, relative measures, such as ratios, can be misleading and exaggerate clinical differences (Citrome, 2009). The risk differences on the outcome measures were overall larger for women than for men (except for suicide attempts in young adulthood).

In term of ORs as a relative effect measure, bullied women have the highest ORs of suicidal ideation and self-harm in both adolescence and adulthood of all the assessed groups in the OR range 1.91–4.07 (all $p < .05$). Perhaps the most surprising finding was that bullied men were those with the highest OR for suicide attempts in young adulthood (OR = 6.06 [95% CI 2.25, 16.36], $p < .001$), while this was not significant for women. Transition from adolescence to adulthood may be more difficult for bullied men due to poorer coping skills (e.g., substance use, social avoidance, lack of social support) which in turn may increase the risk of negative outcomes among bullied men in young adulthood. Overall, in Paper III, we find those exposed for bullying report higher risk of suicidal ideation, self-harm, and suicide attempts than their peers who were not bullied.

6. Discussion

6.1. Methodological considerations

6.1.1. Sample, sampling, and attrition rate

Although the response rate was excellent at both T_1 and T_2, it was moderate at T_4. A common misconception is that low response rates leads to invalid data, which is only an issue if the sample is systematically different from the population that should be reflected in the sample. The central characteristics in the target population during the first two data waves were compared with national data (Sund, 2004). No major differences were found between the sample and national data for the relevant age group in relation to age, gender, or ethnicity. A nonresponder analysis (n = 327) found that there were significantly more boys and younger adolescents among nonresponders at the first assessment (T_1) (for details, see Sund, 2004, pp. 31–32).

However, there was a large dropout from adolescence to T_4 at 27 years, which could lead to skewness among the responders compared with those who did not respond at T_4. This could potentially lead to over- or underestimation of the results. Attrition analyses showed that even though there were small differences between the responders and nonresponders at T_4 regarding gender, parental SES, and ethnicity, there were no differences in attrition associated with differential bullying involvement at T_1/T_2. However, since the attrition at T_4 was substantial, this could have led to biases in different directions. Participants might be better functioning in general by possibly being more conscientious, which could lead to falsely weakening the results and increasing the risk for a type 2 error. In addition, if the nonresponders across groups were well functioning and too busy to participate, this might bias the results and increase the risk for a type 1 error. In conclusion, the T_4 sample is large and heterogeneous, and includes variations in gender and demographic markers, which suggests that the sample is valid and it is possible to generalize the study findings to the target population.

6.1.2. Self-report

The majority of the findings in the present thesis rely on self-reports. Using both online and paper questionnaires was considered a feasible method for the present study, which allowed us to reach many respondents relatively efficiently considering the time and

economic resources dedicated to the study. The quality of the results may have improved if we had used multiple sources, such as parental informants, peers, and teacher information in the study. However, relying on only self-report data may decrease the reliability of the information. For various reasons, respondents might give inaccurate information, be biased, or give socially conforming answers. However, when confidentiality and anonymity are granted, as in the present study, self-report has been shown to have high reliability and validity (Brener, Billy, & Grady, 2003).

6.1.3. Longitudinal design

In this thesis, the focal point is bullying involvement in adolescence and outcomes in young adulthood. Choosing the right methodological design is essential to answering the research questions in the thesis. Choosing a longitudinal design provides several advantages, the primary being that the effect over time can be studied better than in a cross-sectional design. A longitudinal design is an observational research method in which data is gathered for the same subjects repeatedly over a period of time, while a cross-sectional design involves collecting data simultaneously from groups of individuals representing different ages or stages of development. Thus, cross-sectional research can only measure the prevalence and correlates of a factor of interest at a certain point in time, while longitudinal research measures prevalence at several points in time, which identifies changes in prevalence over time.

A longitudinal study can be either prospective or retrospective. In retrospective studies, both the exposure and the outcome have already occurred when the study is initiated. In contrast, in a prospective study at least the outcomes lay ahead when the study is initiated, while exposure may have already occurred. The advantages of a longitudinal design compared to a cross-sectional design are well documented (Cozby & Bates, 2015). Especially when prospective, longitudinal design can provide information on possible causation, prognosis, stability, and change (Rutter, 1994). However, the quality of the information provided is also dependent on the chosen measurements and analyses.

6.1.4. Causality

Statistical methods such as logistic regression and mixed-model analyses were used in the analysis of the survey data. Although this thesis uses terms such as “predictor variables” and “risk factors,” this does not imply an interpretation of these as causal factors. The best

way to assess causal factors is by using experimental designs, e.g., randomized, controlled trials, because causality is simpler to test in closed and relatively controlled systems, with few variables at hand. A prerequisite of using experimental designs is the ability to manipulate independent variables. This type of condition often occurs in the natural sciences, but rarely in the social sciences (Ringdal, 1987). There are several issues within bullying research, which make the establishment of adequate experimental randomized controlled studies difficult. From an ethical perspective, it is difficult to expose one group to bullying while having an unexposed group to use as a control. It is nearly impossible to create a condition with the occurrence of this behavior in a controlled experimental setting. The best alternative to studying bullying is in its natural setting. However, the caveat is uncertainness about the causal factors. Outcome variables such as general health, mental health problems, and suicide attempts usually have a multitude of potential causes. To narrow down the causal agents of these outcomes, it would be necessary to control the potential variables that could cause differences in these outcome variables.

6.1.5. Confounding

Confounding refers to the interference by a third variable that distorts the association being studied between two other variables because of its strong relationship with them (O'Toole Miller-Keane, 2003). We included gender and parental SES as control variables and considered also using ethnicity as a control variable. We suspect these variables to be confounding variables; therefore, we want to remove their effect on the dependent variable and assess the direct effect of the exposure on the outcome. In addition, we presume that ethnicity and gender exert their effects through innate or genetically determined biological mechanisms. For example, gender is a confounding factor for being bullied as an exposure as well as suicidal ideation as an outcome because women have an increased likelihood of having both the exposure and the outcome.

In the present study, we controlled for parental SES, which may be an indicator for education, income, and social class. Contextual factors like the family and the home environment will possibly influence both the origin of bullying and later outcomes. SES is potentially associated with both being bullied and being a bully; it is also consistently associated with present and possibly later mental health (Jansen et al., 2012). Parental psychology, family atmosphere, environment, and level of conflict between the child and the parents could also be relevant. Finally, the onset of mental health problems in young people

might be triggered by a set of negative life experiences. The nature of these experiences may be more acute (such as the death of a relative) or more chronic (such as a chronically sick ill parent), which was not controlled for in the present study.

The present study does not consider some possible confounding factors, which may be both a cause and effect of bullying. For instance, educational achievements or learning disabilities may increase the probability of being bullied or bullying others. Educational achievements in school are strongly related to later educational attainment (Dubow, Huesmann, Boxer, Pulkkinen, & Kokko, 2006). Contextual factors are also important, such as the school system; i.e., the size of the school, class size, whether the school has an anti-bullying program, and other relevant factors. However, it is beyond the scope of this research to assess these issues in depth. Furthermore, these factors may interact and mutually influence each other. More longitudinal and experimental research is needed to clarify whether these problems are antecedents or consequences of involvement in bullying.

6.1.6. Type I and II errors

The sample in this investigation is relatively large. However, there are small numbers of some groups of interest in the sample (e.g., bully-victims), which may make statistical decisions prone to error. Quantitative research is usually about testing hypotheses, often by comparing a null hypothesis (H_0), which is a statement of no difference or no relationship, with an alternate hypothesis (H_1), which states that the difference between conditions is due to or associated with the independent variable. The alternate hypothesis is also known as the research hypothesis, which covers the possible outcomes not covered by the null hypothesis. Thus, there are four possible outcomes, where two are erroneous. These two errors are called type I and II errors. A type I error is defined as a decision to reject the null hypothesis when the null hypothesis is true. A type II error is defined as a decision to retain (or fail to reject) the null hypothesis when the null hypothesis is false. The risk for type II error decreases as the number of participants in an investigation increases. The risk for type I or II errors is related to the chosen significance level. If one chooses a low significance level (i.e., .01 or .001), the risk of type II error increases, which results in retaining the null hypothesis and rejecting the research hypothesis. In this study, we chose to set the significance level at .05 to prevent type II errors. However, one problem with doing this is that in preventing a type II error, the likelihood of type I errors increases. Generally, a type I error is considered more problematic than a type II error due to the conservative nature of research. However,

choosing a very strict significance level (i.e., .001) could also be problematic in that valuable results are obscured. A significance level at .05 may provide a balance between making either a type I or II error in our research. To enable researchers to assess the strengths (or possible weaknesses) of our results we have reported the true *p*-value (often with CIs) in all of our main results.

6.1.7. Other methodological limitations

The group "aggressive toward others" as an operational defined group includes most likely a majority of male bullies, as data show in table 2, there is a majority of boys (57.5%) versus girls (42.5%) in this group. Hence, there is a limitation with our study that the measure for being aggressive toward others, which does not involve some specific forms of bullying (e.g., relational aggression), such as spreading rumors or excluding individuals from social groups, that have been found to be more characteristic of female bullies (Archer & Coyne, 2005).

A limitation to the assessment of bullying involvement was that it was measured only in the last 2 years of middle school. Ideally, we would have preferred to know whether the person had been bullied at any time in childhood and further follow these adolescents after middle school and possibly during their first years of high school to get an even better understanding of the developmental trajectories of involvement in bullying. This was not performed because of economic constraints. However, several studies have shown that involvement in bullying peaks at the end of middle school, followed by a decline as high school proceeds (Archer & Coyne, 2005; Peskin, Tortolero, & Markham, 2006). Thus, since bullying is at its peak during this period, it was a suitable time frame for researching bullying exposure.

6.2. General discussion

This study investigated a 12-year time span, which is a long developmental period marked by substantial maturation and changes for the individual. Although there are significant associations between bullying involvement in adolescence and health and functioning in adulthood, the risk should be considered overall to be medium to high based on the size of the ORs obtained (the OR range of the findings in Papers I–III is in the range of significant adjusted results indicating two to eight times increased risk). The wide CIs show that there is also a good deal of variation within the groups involved in bullying, which

suggests that there are a multitude of both positive and negative intervening factors that may influence the long-term effects of bullying involvement.

6.2.1. Impairment across groups

Children and adolescents can have different involvements in bullying, whether as victims, perpetrators, or bully-victims. The findings in the present study regarding these groups will be discussed in the following paragraphs.

Being bullied

Our findings in Paper I showed that compared with the not-involved group, adults who were bullied in adolescence reported lower education, less frequently cohabitating with a live-in partner, poorer general health, higher levels of bodily and headache pain, and more use of illegal drugs. Almost half of the being-bullied group reported that they did not have a live-in partner, which is consistent with the research literature that reported that the being-bullied group often have few friends or a poor social network (Arseneault, Bowes, & Shakoor, 2010). Interestingly, the being-bullied group also reported higher levels of poor general health and pain as well as illegal drug use. It is possible that the being-bullied group partly used high levels of illicit substances to relieve their health and pain symptoms, which is consistent with the self-medication hypothesis (Earnshaw et al., 2017), i.e., people use substances to relieve uncomfortable emotional states. In Paper II, we found that the being-bullied group reported more depressive symptoms, even after adjusting for baseline mental health. Furthermore, we found that when adjusted for gender, parental SES, and baseline mental health, the being-bullied group had an increased risk of being high scorers (above the 90th percentile) on total and internalizing problems. Finally, this group was more prone to have received help for mental health problems both during their lifetime and in the last year than were the other groups. To our knowledge, no study has reported this finding previously. There are many potential explanations for why being bullied may affect later mental health outcomes (Wolke, Copeland, Angold, & Costello, 2013) as well as self-reported somatic health (Sigurdson, Wallander, & Sund, 2014). Changes in hypothalamic–pituitary–adrenal axis activity and altered cortisol responses related to stressful events, such as bullying experiences, may not only increase the risk for developing mental health problems (Harkness, Stewart, & Wynne-Edwards, 2011), but also increase the risk to illness by interfering with immune responses (Segerstrom & Miller, 2004). Being exposed to bullying may also change

cognitive responses to threatening situations (Mezulis, Abramson, Hyde, & Hankin, 2004) and lead to cognitive distortion associated with impaired mental health (Owens, Skrzypiec, & Wadham, 2014). In Paper III, the being-bullied group was studied longitudinally in relation to suicidal ideation, self-harm, and suicide attempts, and we found high levels of these factors. For further discussion of this finding, please see Section 6.2.

Bully-victims

The results from Paper I showed that bully-victims in adolescence reported lower education, low job functioning, poor general health, higher experiences of pain, and high levels of tobacco use as adults when compared with the not-involved group. In Paper II, we found a higher risk of both externalizing and internalizing mental health problems compared with the not-involved group.

Although the being-bullied group has the largest frequency of adverse outcomes in the unadjusted analysis when we consider the findings from Papers I and II, bully-victims had higher scores or ORs for adverse mental health outcomes (except depression) than the being-bullied group. For example, bully-victims reported increased ORs for having attentional problems later in life, which could well explain some of their work–life problems. Furthermore, critical ASR items remained significant in the adjusted analyses; i.e., items that indicate deviant behavior, cognition, or emotional states and are markers for clinical concern. The bully-victim group had almost double the OR for having critical problems than the being-bullied group. Another finding regarding this group is the high risk of being hospitalized due to mental health problems based on the self-report as young adults. However, since there is no information at what time-point this hospitalization took place, it is difficult to conclude whether this group is significant more vulnerable for lasting serious psychopathology than the other bullying groups. Research on bully-victims suggest that they often come from dysfunctional families and have preexisting behavioral problems, which could explain some of their problems later in life (Sourander et al., 2009). The small size of the bully-victim group implies that inferences should be drawn with caution. Future research is needed with larger samples to explore this group, especially considering their mental health and psychosocial functioning.

Aggressive toward others

Our findings show that the aggressive-toward-others group also had a higher risk of being unemployed and receiving any kind of social help, and subsequently reported higher levels of tobacco use and lower job functioning in young adulthood than the not-involved group. These findings extend the previous results (Sourander et al., 2007), which demonstrated that the aggressive-toward-others group is susceptible to future delinquency problems. A four-item scale was used in Papers I and II to define the aggressive-toward-others group, while other studies often used a single question. Previous researchers described a pattern of externalizing problems in perpetrators and internalizing problems in victims (i.e., Ivarsson, Broberg, Arvidsson, & Gillberg, 2005); however, our research suggests that this pattern is not so clear cut. In Paper II, we found elevated levels of both externalizing and internalizing problems in the aggressive-toward-others group. When adjusting for prior mental health problems as well as gender and parental SES in adolescence, the aggressive-toward-others group had significant higher total problems and internalizing problems. Further, our analyses confirmed that the aggressive-toward-others group is strongly affected by externalizing symptoms.

Those who bully others are often strong and healthy children and adolescents (Wolke et al., 2001) who may be socially competent (e.g., good in reading emotions) (Woods, Wolke, Nowicki, & Hall, 2009), and may have high social status, although they are disliked by their victims because they are frightening and intimidating (Juvonen et al., 2003). A possible link between an aggressive trait and depression and other internalizing problems may be mediated through present relational problems or increased alcohol use. Panak and Garber (1992) found a covariation between aggression and depression, and it is believed that peer rejection mediates this relationship. Depression in adulthood might also be linked to rumination and remorse over one's own earlier behavior. Our categorization of bullies and bully-victims is complicated by the fact that we do not have a clear measure for bullying others, but rather for aggression toward others. However, we regard bullies as a group within the larger aggressive-toward-others group because bullying is a form of aggression.

6.2.2. Bullying involvement as a predictor of psychosocial functioning in adulthood

A crucial goal for emerging adults is establishing a coherent sense of identity (Arnett, 2000; Erikson, 1963). An individual developing successfully as a young adult generally must achieve close relationships with others in adolescence and function well in the society.

Psychosocial functioning is a key concept within clinical psychiatry, although it lacks a good unified definition (Ro & Clark, 2009). Psychosocial functioning contains both the concept of 'psychosocial,' involving both psychological and social aspects and functioning, i.e., "An umbrella term encompassing all body functions, activities, and participation" (WHO, 2001, p. 3). Problems that occur in one's psychosocial functioning can be referred to as a "disability," which the World Health Organization (WHO) defines very similar to functioning as "an umbrella term for impairments, activity limitations, or participation restrictions" (WHO, 2001, p. 3).

When examining functioning in various life areas in Paper I, the being-bullied group reported significantly poorer relationships with their live-in spouse/partner than the not-involved group. Emotional vulnerability in childhood victims of bullying has been suggested to be connected to social withdrawal (Boivin, Petitclerc, Feng, & Barker, 2010), which may in turn heighten the risk for poor or no partner/spouse relations in adulthood because of a distrust of others and a difficulty handling difficult emotions. No significant associations were found regarding having a child and being involved in bullying. There is some evidence that women who are bully-victims and bullies give birth earlier than those not exposed for bullying in adolescence (Lehti et al., 2011). However, the previous study measured childbearing age 20 in contrast to our study, which measured childbearing at age 26–27. This discrepancy could imply that childbearing effects may even out over time.

In Paper II, we found that adolescent bullying involvement would predict poorer psychosocial functioning in young adulthood, including reduced leisure activities, more absences from school/work, and affected interpersonal relations. Our results partly confirmed this finding; i.e., the being-bullied group reported reduced general psychosocial functioning as young adults compared with the not-involved group, and both the being-bullied and aggressive-toward-others groups reported reduced leisure activities. A generally reduced psychosocial functioning in young adulthood could be caused by social vulnerability and trust issues caused by past bullying experiences (Schäfer et al., 2004), which is partially supported by a study showing that shame may have a mediating role between those victimized in adolescence and adjustment problems in later adulthood (Strøm, Aakvaag, Birkeland, Felix, & Thoresen, 2018).

6.2.3. Involvement in bullying and mental health outcomes

The findings in Paper II showed that after controlling for gender and parental SES level, all groups involved in bullying in adolescence reported higher levels and higher ORs of being a high scorer of mental health problems in adulthood. This includes broadband total, externalizing, and internalizing problems compared with the not-involved group. This is in line with other research (e.g., Arseneault et al., 2010). When adjusted for baseline mental health (i.e., ASR and MFQ), the ORs for a high level of depressive symptoms in adulthood were only retained among the being-bullied group, which had a threefold increased risk compared with the not-involved group. This finding indicates the longstanding detrimental effects of negative childhood experiences.

Concerning the critical ASR items, both the being-bullied and bully-victim groups showed an increased risk, with bully-victims having the highest risk. Being bullied showed a specific harmful effect on later mental health, possibly by interfering with a normal adolescent development. Being bullied might cause individuals to distrust peers, fail to acquire problem-solving abilities, stall their healthy individuation process, and hinder the acquisition of sound coping strategies when meeting challenges later in life. These individuals may possibly resort to aggressive retaliation. A recent study of the present baseline sample (T_1 and T_2) showed that experiencing stress in different areas might reduce task-oriented coping and foster emotional coping, partly mediated by depression (Undheim & Sund, 2017).

Compared with the not-involved group, all three bullying groups had more involvement with mental health services. All groups showed an increased risk of hospitalization since adolescence (OR 3.94–8.63), which indicates the prevalence of severe psychopathology or dysregulation in all groups, at least at one time-point. However, since the timing of the hospitalization is unknown, its significance is unclear. Nevertheless, it is well known that depression might have a chronic or relapsing pattern from adolescence to adulthood, while behavioral problems typically peak in adolescence and may dissipate over the years (Rutter, Kim-Cohen, & Maughan, 2006). Continuous externalizing problems and the high percentage of receiving mental health problems among those being bullied and aggressive toward others underline the vulnerability of these groups.

6.2.4 Being bullied and risk for suicidal ideation, self-harm, and suicide attempts

Paper III investigated whether being bullied in adolescence was associated with suicidal ideation, self-harm, and suicide attempts in adolescence and young adulthood. We hypothesized that the being-bullied group would have elevated prevalence of suicidal ideation, self-harm, and suicide attempts at all assessment points. Because gender differences may be evident in relation to bullying, suicidal behavior and self-harm in adolescence, we investigated gender as a moderating factor. There is a commonly expressed 'gender paradox' in suicide, which refers to the observation of greater rates of suicide ideation and behavior in women than in men, yet mortality from suicide attempts is lower for women than for men (Canetto & Sakinofsky, 1998). More specifically, women have a higher rate of attempted suicide than do men in adolescence, but their rate decreases in young adulthood (Thompson & Light, 2011). In contrast for men, the rate of attempted suicide remains fairly constant when age is controlled for (Canetto & Sakinofsky, 1998).

The notions of -intergender variation and the -gender paradox were supported by our data. Both genders exposed to bullying in adolescence had higher rates of reported suicidal ideation, self-harm, and suicide attempts in adolescence and adulthood than those not involved in bullying. However, when assessing intergender variations, bullied women had the highest ORs (2.00–4.07) of suicidal ideation, self-harm, and suicide attempts in all groups. We also found that the observed risk difference was larger among women than among men on the outcome measures at all time-points except suicide attempts in young adulthood. However, the context of these increased risks may not be revealed in the present study. These outcomes might be related to the increased prevalence of both depressive states and personality disorders among young adult women compared with young adult men (Grilo, Becker, Fehon, & Walker, 1996).

A surprising finding was that bullied men have slightly decreasing levels of suicidal ideation and increasing rates of self-harm and suicide attempts from adolescence to young adult age, while bullied women have stable or decreasing levels in the comparable time periods, which are well below their male counterparts for suicide attempts in young adult age. However, this finding contrasts with the finding that women more commonly reported suicide attempts in the general population than did men (Hjelmeland & Bjerke, 1996). Transition from adolescence to adulthood may be more difficult for bullied men due to poorer coping skills (e.g., substance use, social avoidance, lack of social support) which in turn may

increase the risk of negative outcomes among bullied men in young adulthood. Bullied men may have increased risk of a destructive outcome such as suicide attempts or even suicide in young adulthood. The finding that bullied men in young adulthood have highest rates of suicide attempts in the present study is to our knowledge a new finding that may have important implications for the prevention of suicidal behavior.

In their longitudinal twin study, Kendler, Myers, and Prescott (2005) found that women reported more global social support than did men. Bullied men could have increased risk of a destructive outcome, such as suicide attempts or even suicide in young adulthood. The transition from adolescence to adulthood may be more difficult for bullied men compared with bullied women due to poorer coping skills (e.g., substance use, social avoidance, lack of social support), which may in turn increase the risk of negative outcomes among bullied men in young adulthood.

In our analyses, there seems to be a fairly strong association between being bullied and suicidal ideation, self-harm, and suicide attempts for both genders in adolescence. Moreover, being bullied in adolescence strongly predicts suicidal ideation and self-harm among women and suicide attempts for men 12 years later. Therefore, it is important to prevent bullying in early adolescence because it can possibly inhibit the development of suicidal ideation, self-harm, and suicide attempts in young adulthood. Inquiries about past bullying victimization should be routinely performed in the clinical setting, especially with known suicidality in the patient, regardless of gender.

Barzilay et al. (2017) recently investigated bullying victimization and suicide ideation among adolescents in 10 European countries, and found that bullying victimization was a strong predictor for suicidal ideation. An interesting finding is that different bullying types were gender related (with boys using physical and verbal means and girls using relational means) and each type had a different association with the outcome. Specifically, physical victimization was associated with suicide ideation and relational victimization was associated with suicide attempts. A weakness in our study is that we did not differentiate between different forms of bullying in our analyses, which could have contributed to increased understanding of why there are different outcomes in relation to self-harm and suicide attempts in adulthood after bullying in adolescence.

6.2.5. Bullying as a stressful and potential traumatic event

As noted in the Introduction, the being-bullied group was suggested to be inclined to suffer from trauma from their bullying experiences. Childhood trauma and negative life events are significantly involved in the development of depression in adolescence (Horesh et al., 2008; Negele, Kaufhold, Kallenbach, & Leuzinger-Bohleber, 2015). To understand why there are longitudinal negative effects of bullying, such as suffering from depression or PTSD, it is useful to draw on Janoff-Bulman's (1989) cognitive theory, which hypothesizes that traumatic events change the victim's fundamental thoughts and beliefs about the world, other people, and him- or herself. This cognitive theory was developed with accidents, wars, and serious abuse in mind, but being exposed to bullying has been proposed as a near-equal risk factor for changing one's fundamental beliefs (Mikkelson & Einarsen, 2002). Although there is little empirical research on the subject (especially in the school setting), there is empirical evidence that those who were bullied experience high levels of PTSD symptoms (Mikkelson & Einarsen, 2002; Mynard, Joseph, & Alexander, 2000; Tehrani, 2004). Tehrani (2004) found that 44% of the victims had strong symptoms of posttraumatic stress; however, this study was performed in a workplace environment. In a study among 331 adolescents attending English secondary schools, 40% reported being bullied once or more often in their school period. Among the being-bullied group, 31% indicated clinically significant levels of posttraumatic stress using the Impact of Event Scale (Mynard et al., 2000). Bullying can be traumatizing for the victim because it creates a gap between their self-conception and self-value (Glasø, Nielsen, Einarsen, Haugland, & Matthiesen, 2009). Hence, bullying can create or increase negative self-emotions and view of the world in line with Janoff-Bulman's (1989) theory.

While the present research did not fully explore bullying as a traumatic event per se, our findings suggest that young adults who have been exposed to bullying in adolescence are more likely to suffer from depression. Klomek et al. (2007) found that being exposed for bullying or bullying others is significantly associated with depression as an outcome. Others found that the being-bullied group is more likely to suffer from psychotic experiences (Wolke & Lereya, 2015). As bullying exposure is on a scale from mild to severe, it is unlikely that all individuals exposed to bullying in adolescence experience trauma afterwards. However, it is also likely that the impact of bullying for some is so severe that they are likely to develop PTSD symptoms. Behavioral, cognitive, and emotional systems of the brain develop

gradually during childhood and adolescence. This includes both self-regulation, emotional processing, and executive functioning (Cicchetti & Curtis, 2006; Idsoe et al., 2012). Bullying can influence the development of executive functioning, including response inhibition, organization and planning, and attention span (Idsoe et al., 2012). The longitudinal effects of bullying on the development of these biopsychosocial systems are not known, but trauma and its effects may be important to investigate in understanding how potential harmful effects can be reduced.

6.2.6 Summary

Considering the findings from this thesis, all groups involved in bullying experienced several problems in both mental health and psychosocial adjustment 12 years later. The results indicated that all groups involved in bullying in some form or another in adolescence reported higher levels of mental health problems in adulthood, including broadband total, externalizing, and internalizing problems, and possibly severe psychiatric problems compared with the not-involved group. All groups involved in bullying reported more signs of mental health problems. The being-bullied group specifically reported lowered daily function in many areas and increased levels of depressive symptoms, suicidal ideation, and self-harm without and with suicidal intent reported in adolescence and young adulthood. There were some other variations in specific problems, such as the being-bullied group experiences problems in spouse/partner relationships, and the aggressive-toward-others and bully-victim groups experience lower job functioning. The being-bullied group reported increased use of mental health services and increased suicidality.

Few Scandinavian and international studies have investigated the long-term effects on involvement in bullying; therefore, it is important to map problems occurring many years afterwards and more specifically identify which areas are of concern. However, the period from early adolescence to 27 years is a long developmental period marked by substantial maturation and changes for the individual. Although there are significant associations between bullying involvement in adolescence and health and functioning in adulthood, the risk is best considered to be modestly increased based on the size of the ORs obtained. There is also a good deal of variation within the groups involved in bullying as illustrated by the wide Cis, which suggests that there are a multitude of positive and negative intervening factors that may influence the long-term effects of bullying involvement.

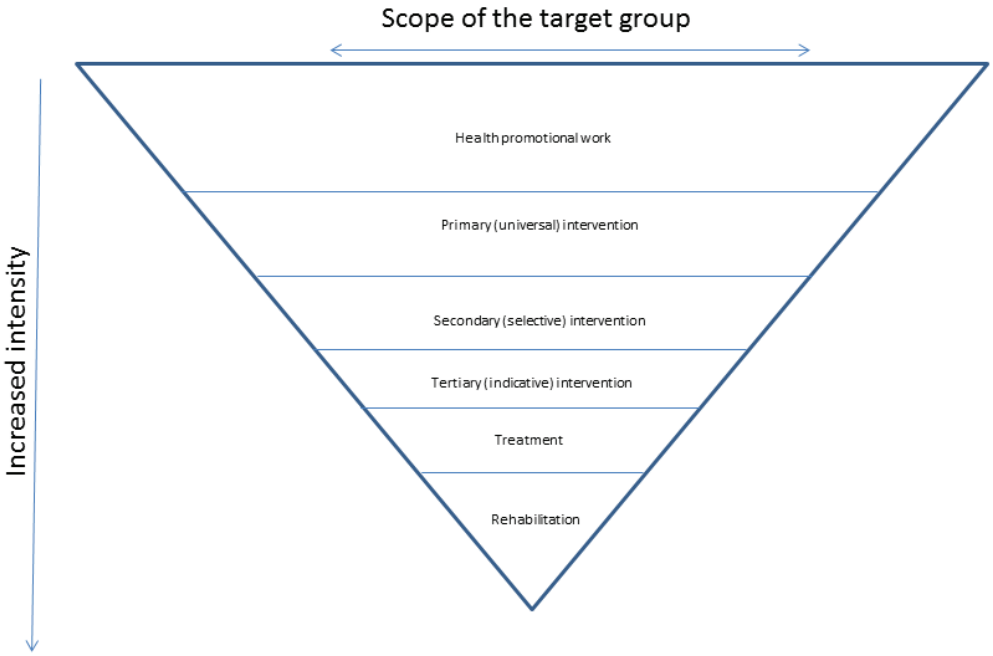
6.3. The need for intervention and future research

6.3.1. What can we do about bullying?

This thesis and earlier research has shown that there are both short- (Olweus & Limber, 2010; Smokowski & Kopasz, 2005; Undheim & Sund, 2010) and long-term (Copeland et al., 2009; Wolke et al., 2013) consequences of bullying. Hence, given the significant burden from involvement in bullying, it is important to discuss how to prevent bullying. In 2002, the Norwegian government implemented a "manifesto against bullying" (Tikkanen & Junge, 2004). In January 2016, this was changed to a "partnership against bullying" (in Norwegian, *partnerskap mot mobbing*), which is planned to be a more committed agreement encompassing 12 of the most central organizations in the Norwegian school system ("Nytt partnerskap mot mobbing", 2016).

The funnel model (Caplan, 1964) is useful in assessing the mode of intervention during discussions of intervention programs. It conceptualizes interventions as a funnel with sections from "health-care promotional work" to "rehabilitation." The intensity of targeting the individual increases with each subsequent section in the model (see *figure 3*). Caplan (1964) expanded the concept of intervention using the following terms for primary (universal), secondary (selective) and tertiary (indicative) interventions. Primary (universal) interventions aim to prevent disease or injury before it ever occurs, e.g., by addressing a whole school. In the case of bullying, this could be prevention campaigns, such as the Olweus (1994) program (see below). Secondary (selective) interventions aim to reduce the impact of a disease or injury that has already occurred in selected groups of individuals considered at risk, e.g., dealing with a violent incident such as school fighting or a severe teasing episode in the classroom. Tertiary (indicative) interventions are strategies and efforts directed against single persons, where risk factors or concrete problems were already observed or experienced. This could be specific efforts targeting either a bully, victim, or bully-victims, depending on the context of the occurrence.

Figure 3: Funnel approach to intervention in schools (Kokkersvold, 1993).



An ecological approach to bullying may also be fruitful. Bullying is a social phenomenon and always occurs in a social context. In the case of school bullying, 85% of bullying incidents occur with peers (Pepler, Wendy, Craig, Atlas, & Charach, 2004). Bronfenbrenner (1977, 1979) pioneered the examination of context in the developmental influences at different levels (i.e., family, schools, community, society, and culture). Considering this contextual view, interventions should target the peer group at the multiple levels. An example of this is the teacher stopping the bullying in progress, instructing the bully to stop, and telling the bystanders to behave differently. In addition, family interventions are implemented at the microsystem level. Examples are to raise the awareness of bullying among parents and children, encourage parents to surveil social media use among children and youth, increase the communication in the family about the topic, and ensure good communication between

families and schools. In a broader context, or at a mesosystem level, bullying can stem from problems in school climate and is not simply a student's response to a particular environment (e.g., school). Bullying is better considered as an interaction between the peer group and the environment. Finally, cultural and political tendencies at the macro level might fuel hate and harassment against ethnic or sexual minorities or children who are "different." An ecological approach to prevent bullying should use a full range of intervention targets that occur simultaneously on different ecological levels (Conyne & Cook, 2004) from micro to macro levels.

Following Bronfenbrenner's (1977) ecological perspective, one of the criteria for evaluating the impact of interventions is whether the intervention has increased the resources at the targeted level when implemented. Because the transfer of skills is so important from an ecological perspective, it is important that bullying interventions use the help of current research. Further, an ecological perspective means that people on site should be involved in the creation and delivery of the interventions. The Olweus Bullying Prevention Program (Olweus & Limber, 2010) has such an ecological perspective. As a comprehensive intervention, the Olweus Bullying Prevention Program is probably the most widely recognized program addressing bullying. The program targets students in elementary and middle school and relies on teachers and school staff for implementation. The program prompts school personnel to create a school environment that is characterized by warmth and involvement, has firm limits on unacceptable behavior, consistently applies nonhostile consequences to violations of rules, and allows adults to act as both authority figures and role models. Initially implemented in Norway, Olweus and Limber (2010) reported that the program was associated with substantial reductions (50% or more) in the frequency with which students reported being bullied and bullying others. In addition, Olweus (1993) reported significant reductions in students' reports of general antisocial behavior and significant improvements in the social climate of the school. The program effects appeared to be cumulative, with some effects stronger at 20 months follow-up than at 8 months after intervention. An early program replication (Whitney, Rivers, Smith, & Sharp, 1994) also reported positive results. Although reductions in bullying were significant (decreasing 16% to 35%). These effects were smaller than those found in the original study. Recently, a Cochrane systematic review concluded that intervention programs targeting whole school populations against bullying has a good but modest effect (Langford et al., 2015).

Ttofi and Farrington (2011) performed a meta-analysis of 53 scientific evaluations with a focus on bullying programs. Four types of research design were included: a) randomized experiments; b) intervention–control comparisons with before-and-after measures of bullying; c) other intervention–control comparisons; and d) age cohort designs. This meta-analysis showed that school-based programs have positive effects. Bullying and harassment were reduced by 20–23% and 17–20% on average, respectively. The most effective programs had the largest intensity and included meetings, firm disciplinary methods, and improved playground supervision.

6.3.2. Clinical implications

This thesis shows that bullying has potentially serious implications for bullies and their targets. Our finding suggest that all groups involved in bullying had adverse mental health outcomes in adulthood compared with the not-involved group. Thus, preventing bullying as early as possible is vital. Furthermore, those involved in bullying have a four to over eight times higher risk of psychiatric hospitalization than the not-involved group, which indicates that those involved in bullying are overrepresented in psychiatric health care. The overrepresentation of psychiatric hospitalization among those with past bullying experiences is in line with other research (Fosse & Holen, 2004; Sourander et al., 2016). In a retrospective investigation, Fosse and Holen (2004) observed that almost half (46%) of the patients from an adult psychiatric outpatient clinic in Norway reported to have been bullied in childhood. The overrepresentation of psychiatric hospitalization among those involved in bullying is an indicator that the mental health impact can be severe. On the one hand, it was not possible to discern at what age the hospitalization occurred in the present study. Those who were bullied in adolescence frequently reported receiving help for a psychiatric problem within the previous year and during their lifetime at the age of 27, which suggests that longstanding negative effects on mental health are probably based on past bullying experiences.

General health outcome, somatic symptoms, and drug use later in life were also associated with past bullying experiences, which indicates that clinicians in all fields should be aware of the negative health impacts of bullying. Furthermore, we found a strong connection between being bullied and suicidality during both adolescence and young adulthood. From the clinicians' perspective, suicide is the worst potential outcome for their patients and if bullying experiences contribute to increased risk of suicidal behavior; this should be considered in the clinical setting. Clinicians have important roles in identifying at-

risk patients, screening for psychiatric comorbidities, and counselling families. Clinicians could otherwise miss essential information if past bullying experiences are overlooked; therefore, clinical practitioners and other health-care personnel should be urged to address past bullying experiences to prevent suicidal behavior in both adolescence and young adulthood. Inquiries about past bullying victimization should be implemented in the clinical setting, especially with known suicidality in the patient, regardless of gender. It is important to prevent bullying in early adolescence to reduce suicidal ideation, self-harm, and suicide attempts in young adulthood.

6.3.3. Future research

Future research should focus on clarifying how the different groups involved in bullying are vulnerable in the long term, especially bully-victims, who were a relatively small group in our sample with large variations in outcomes. Many of the findings in the unadjusted analyses disappeared when the analyses were controlled for baseline mental health at T_1, which might be caused by a small group size, with differences not reaching significant levels, and because long-term outcomes in this group were strongly related to mental health problems already apparent at the age of 14. Future research with larger samples should explore bully-victims, considering their mental health and psychosocial functioning.

Future research should also investigate the continuity of bullying from adolescence to young adulthood. A small percentage (1.3%) in our sample reported being bullied continuously from adolescence to adulthood, but because we do not have any continuous measurements, it is difficult to assess how persistent the bullying was in high school or the years after. Smith et al. (2003) suggested that school pupils who consistently cannot cope with bullying are more at risk for later problems in the workplace. The results also suggest important contextual or environmental effects on risks of victimization, such as that the being-bullied group had a lower education level than did the not-involved group. Further research should differentiate between different forms of bullying, which could in part contribute to the understanding why there are different outcomes in relation to self-harm and suicide attempts in adulthood after the effect of bullying in adolescence (Barzilay et al., 2017). Bullying behavior evolves as technology and society develops. Although cyberbullying research is slowly maturing, continuous research is needed to study the new forms and functions of bullying (Menesini & Spiel, 2012). Finally, intervention research is important. When implementing antibullying programs, concurrent research should be more

strongly emphasized than today. Randomized controlled interventions with a municipality or school as the unit is an approach that could produce more knowledge about evidence-based interventions.

6.3.4. Conclusion

The findings from this thesis should be communicated to youth, parents, health-care planners, and school authorities in their efforts to minimize bullying in adolescence. Given the serious implications that those involved in bullying as being bullied, bully-victims, or aggressive towards others are more vulnerable for poorer outcomes in young adulthood, including lower educational attainment, mental health, and adaptive functioning, than the not-involved group, it is imperative that bullying is considered seriously in the youth environment.

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Papers I-III

Paper I

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Is involvement in school bullying associated with general health and psychosocial adjustment outcomes in adulthood?☆

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ABSTRACT

The aim was to examine prospectively associations between bullying involvement at 14–15 years of age and self-reported general health and psychosocial adjustment in young adulthood, at 26–27 years of age. A large representative sample ($N = 2,464$) was recruited and assessed in two counties in Mid-Norway in 1998 (T_1) and 1999/2000 (T_2) when the respondents had a mean age of 13.7 and 14.9, respectively, leading to classification as being bullied, bully-victim, being aggressive toward others or non-involved. Information about general health and psychosocial adjustment was gathered at a follow-up in 2012 (T_4) ($N = 1,266$) with a respondent mean age of 27.2. Logistic regression and ANOVA analyses showed that groups involved in bullying of any type in adolescence had increased risk for lower education as young adults compared to those non-involved. The group aggressive toward others also had a higher risk of being unemployed and receiving any kind of social help. Compared with the non-involved, those being bullied and bully-victims had increased risk of poor general health and high levels of pain. Bully-victims and those aggressive toward others during adolescence subsequently had increased risk of tobacco use and lower job functioning than non-involved. Further, those being bullied and aggressive toward others had increased risk of illegal drug use. Relations to live-in spouse/partner were poorer among those being bullied. Involvement in bullying, either as victim or perpetrator, has significant social costs even 12 years after the bullying experience. Accordingly, it will be important to provide early intervention for those involved in bullying in adolescence.

Bullying is one of the most frequent forms of victimization in childhood and adolescence. The potential harmful personal and social effects of bullying may last well into adulthood (Allison, Roeger, & Reinfeld-Kirkman, 2009; Copeland, Wolke, Angold, & Costello, 2013; Wolke, Copeland, Angold, & Costello, 2013). Olweus and Limber (2010) defines bullying or victimization in terms of being bullied, intimidated, or victimized when a person is exposed, repeatedly and over time, to negative actions from more powerful peers. Bullying behavior may be manifested in various ways, for example, as teasing,

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active exclusion from a social group, or physical assaults (Roland, 2002). For research purposes bullying involvement is often classified as: (a) Being bullied – those who are the object of aggression, (b) Being a bully – those who are aggressive toward others, (c) Bully-victim – those who bully others and are bullied themselves, and (d) Non-involved – those who neither are experiencing being bullied nor being aggressive toward others.

Traditionally, research and policy in relation to bullying have been focused on the school setting. The European Commission proposal for a European Council Recommendation on early school leaving stressed the need for "anti-violence and anti-bullying approaches" (Council of the European Union, 2011). As an extension, concern has also been raised about young people's mental health in general (Patel, Flisher, Hetrick, & McGorry, 2007), in terms of the high numbers of "drop-outs" from school (De Ridder et al., 2012) and young adults on disability pension (Gravseth et al., 2007). Surprisingly, almost no research has addressed the effects bullying involvement may have during the transition period from adolescent to early adulthood when most people move from the educational system to work-life.

Several studies (Kim, Leventhal, Koh, Hubbard, & Boyce, 2006; Kumpulainen, Rasanen, & Puura, 2001) have shown negative effects from being bullied or being a bully in childhood on mental health in early adulthood, but few have investigated broader psychosocial adaptation and general health and functioning. The Great Smokey Mountain study (Wolke et al., 2013) reported that those being exposed to bullying in adolescence, as either a bully or victim, had elevated risks for poverty, poor mental and physical health as well as poor social relationships in young adulthood at ages 19–26 years. These risks were persistent even after controlling for family hardship and childhood psychiatric disorders. These findings provide evidence that negative effects of bullying also are evident in young adulthood that extend beyond mental health problems. However, just as the findings from this study are not generalizable to the United States population, the reported prevalence rates of bullying are considerably higher than reported, for example, in Norway (Roland, 1999; Undheim & Sund, 2010). This suggests that the magnitude of harmful personal and social effects of bullying in adulthood may vary across countries.

Only a few studies have examined the long-term effects of bullying on broader health outcomes. Cross-sectional studies have reported elevated psychosomatic problems from those being subject to bullying (Ghandour, Overpeck, Huang, Kogan, & Scheidt, 2004; Løhre, Lydersen, Paulsen, Mæhle, & Vatten, 2011). Bullying was significantly associated with health-related quality of life in Australian adults (over 18 years of age.), after adjusting for demographic variables, in three areas: general health, physical role functioning, and bodily pain (2009). However, bullying was measured retrospectively, which could introduce differential recall bias among different age groups. Nonetheless, the potential impact on general health from being bullied should be further explored.

In contrast, a larger body of research has investigated the association between bullying involvement and substance use in adolescence (Carlyle & Steinman, 2007). Cross-sectional studies suggest that bully-victims and bullies report higher levels of substance use during adolescence. There are, however, few longitudinal studies. Wolke et al. (2013) showed indications of increased illegal drug use at age 19–26 in association with being a bully at adolescence, but this disappeared when controlling for family and child psychiatric factors. Sourander et al. (2007) reported an increased risk for a substance abuse disorder at age 23 among those who were bullied, bully-victims, and bullies at age eight. However, this sample only included males undergoing medical examination during enrollment at the Finish obligatory military service and lacked measuring points during adolescence when bullying involvement manifest increased prevalence (Sourander et al., 2007).

Much of the foundations for later adult life are laid during the transition period between adolescence to adulthood, conceptualized as *emerging adulthood* by Arnett (2000), which is marked by both challenges and opportunities. According to Erikson (1963), an individual developing successfully as a young adult must achieve close relationships with others in adolescence; unsuccessful development may lead to social avoidance and isolation. Although emerging adulthood may pertain more to middle-class youth, as Hendry and Kloep (2007) have suggested, this age period is characterized by an inherent instability for most young adults (e.g., often changing job, educational paths, living situation; Arnett, 2006). This may lead those who come to this stage with vulnerabilities into experiencing ill-being and maladaptive functioning.

More generally, outcomes of interest should extend to general health because of the interrelations of emotional and behavioral adjustment with health and disease during the life course (Kashani & Breedlove, 1994). Individuals facing the same exposure to risk display different vulnerability and protective mechanisms, which may strengthen or weaken the effect of the risk exposure (Rutter, 1987). This is especially important with bullying because there are variations in emotional regulation and display patterns among victims of bullying (Mahady Wilton, Craig, & Pepler, 2000). Following the transitional perspectives to Arnett (2000) and Erikson (1963), it is plausible that poor interpersonal relations in adolescence disturb successful adaptation to young adulthood (Pardini & Loeber, 2008).

Cross-sectional research on school bullying has shown that victims fare less well regarding peer social adaptation than peers without bullying involvement (Boulton, 2013). Less is known about long term social outcomes in young adults. There is some evidence that males and females who have been bullies or bully-victims in childhood have an increased risk of becoming parents at younger age in adulthood than non-involved peers; however, there was no association with being bullied and parenthood (Lehti et al., 2011, 2012). Being a young father or mother is not necessarily a negative occurrence, but it represents an atypical development that may be related to past bullying involvement.

Although bullying is one of the most frequent forms of victimization in childhood and adolescence and that harmful personal and social effect of bullying may last into adulthood, these long-term effects have rarely been studied. Consequently, the psychosocial adaptation and general health outcomes from being involved in bullying from adolescent to early adulthood are not adequately understood. Some of the research trying to cover this gap of knowledge may be biased because it is based on retrospective report. Follow-back investigations are useful for uncovering possible connections between adolescent and

adult behavior but are not adequate for predicting possible risk. Prospective longitudinal research into the effects of bullying involvement is much needed.

The main aim of the present study is to examine prospectively associations between bullying involvement at 14–15 years of age and self-reported general health and psychosocial adjustment in young adulthood, at 26–27 years of age. We will consider three distinct types of bullying involvement and one group of non-involved in adolescence: (a) being bullied, (b) bully-victim, (c) being aggressive toward others and (d) non-involved. We hypothesize that those being bullied, bully-victim, and aggressive toward others (hereby described collectively as involved in bullying) in adolescence are at higher risk for poor outcomes in education, work, health, social relations, and other general life domains compared with those who were not involved in bullying. Specific aims were to examine whether there are differential risks among those being bullied, bully-victim, and aggressive toward others compared to non-involved in adolescence for: (a) lower educational attainment, being unemployed, living alone, and producing a child in young adulthood; (b) poorer general health and increased reported pain (bodily pain, headache) and substance use (alcohol, tobacco, legal and illegal drugs); and (c) reduced quality of social functioning with friends, partner, and family and at work or in school.

Method

Original Sampling Procedure

The Youth and Mental Health Study (Sund, 2004) is a longitudinal study conducted in Mid-Norway that seeks to address risk and protective factors in the development of mental health in adolescents aged 12–15 years. In 1998, a representative sample of 2,792 students (98.5% attending public schools) from 22 schools in two counties of Mid-Norway (South- and North-Trøndelag) was drawn with a probability according to size (proportional allocation) within four strata: (a) City of Trondheim ($n = 484$, 19.5%), (b) Suburbs of Trondheim ($n = 432$, 17.5%), (c) Coastal region ($n = 405$, 16.4%), and (d) Inland region ($n = 1143$, 46.4%). (See Sund, Larsson, and Wichstrøm (2003) for a detailed description of the sample.)

Sample and Assessment Points

Baseline data (T_1) were collected in 1998 from 2,464 adolescents (88.3% response rate, 50.8% female) with a mean age of 13.7 ($SD = 0.58$, range: 12.5–15.7). The sample was reassessed one year later (T_2) with 2,432 respondents at mean age 14.9 years ($SD = 0.6$, range: 13.7–17.0), and 50.4% were female. At T_2, whereas 104 (4.3%) from T_1 did not participate, 72 new participants were added from the same schools. Data in the two first waves were gathered through questionnaires completed during two school hours. At T_2 a subsample ($n = 345$) was invited to complete interviews using Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime version (Kaufman et al., 1997). Five years later this interview subsample was reassessed (T_3), using the same interview instrument ($n = 242$). Individuals participating at T_1 or T_2 ($N = 2{,}532$), were selected for a follow-up survey during the spring 2012 (T_4). At T_4, 92 were not eligible because of death ($n = 13$) or no identifiable home address, resulting in 2,440 participants being invited to this follow-up investigation. Of these, 1,266 (51.9%) participated, 56.7% were female, and the mean age was 27.2 years ($SD = 0.59$, range: 26.0–28.2). All waves of data collection (T_1 and T_2 combined) were approved by the Regional Committee for Medical Research Ethics in Mid-Norway.

Measures in Adolescence (T_1 and T_2)

Being bullied: Participants were asked if they have ever been (a) teased, (b) physical assaulted, or (c) frozen out of friendships at school or on the way to school during the last 6 months. Responses were on a 5-point scale (*never, 1–2 times, about once a week, 2–3 times a week*, and *more often;* Alsaker, 2003). Following Roland (2002), responses were dichotomized to *about once a week* and *more frequently* (1) and 1–*2 times* and *never* (0).

Aggressive toward others: Four questions from the Youth Self Report (YSR; Achenbach, 1991) addressed aggressive behavior: "I treat others badly," "I physically attack people," "I tease others a lot," and "I threaten to hurt people." The YSR from the Achenbach System of Empirically Based Assessment (ASEBA; Achenbach, 1991) is a widely used self-report measure of emotional and behavioral problems among adolescents aged 11–18 years, which has been translated into Norwegian (Kvernmo & Heyerdahl, 1998). Besides sociodemographics and questions on social adaptation, the YSR consists of 112 problem items rated on a 3-point scale (*not true*, *somewhat or sometimes true*, and *very true or often true*) for the previous six months. Responses for the aggression questions were dichotomized to *very true or often true* (1) and *not true* or *sometimes true* (0). Because these items did not differentiate aggression toward peers from other people (e.g., parent, teacher), this variable was termed *aggressive toward others* rather than bullying others.

Socio-economic status (SES) was measured by adolescents' report at T_1 of mother's and father's occupation, in addition to an open question about what their parents did at work, and classified according to the ISCO-88 (International Labour Organization, 1990) into professional leader, upper middle class, lower middle class, primary industry, and manual workers. Father's occupation was used unless the adolescent lived with the mother only, in which case mother's occupation was used.

Ethnicity was measured at T_1 by an adolescents' report about parents' origin. A distinction was made between respondents with one or two parents of Norwegian background and those with both parents with a non-Western background.

Classification and Size of Adolescent Bullying Involvement Groups

Being bullied ($n = 158$): Reports of being bullied *about once a week* or *more frequently*, on one or more of the three items within the last six months at either T_1 or T_2.

Aggressive toward others ($n = 87$): Reports of being aggressive *very true* or *often true* toward others, on one or more of the four YSR items, within the past six months at either T_1 or T_2.

Bully-victim ($n = 39$): Met classification of being bullied *and* being aggressive toward others, by the definitions above, within the last six months at either T_1 or T_2.

Non-involved ($n = 982$): Not classified as being bullied, aggressive toward others, or bully-victim at both T_1 or T_2.

Outcome Measures in Young Adulthood (T_4)

The instruments administered in 1998 and 1999/2000 (T_1 and T_2) were re-administered to 1,266 participants in 2012 (T_4), albeit with age appropriate adaptations. In addition to questions developed for the Youth and Mental Health Study, health outcomes and social adaptation was measured using the Adult Self Report (ASR; Achenbach & Rescorla, 2003) ASR is a self-report form equivalent to the YSR (Achenbach, 1991) but adapted for adults aged 18–59 years (Achenbach & Rescorla, 2003). ASR comprises a problem scale with 123 items rated on a 3-point scale similar to the YSR including a question about alcohol use, with the addition of five adaptive functioning scales, questions on tobacco and illegal drug use, and sociodemographics. The internal consistency and test-retest stability of the ASR scales are reported to be good (Achenbach & Rescorla, 2003).

Cohabitation and Parenting Status. Participants were asked, "Who do you live with now?" Possible responses were "I live alone," "I live with other adults (not family or partner)," "I live with spouse/partner," "I live with spouse/partner and children," "I live with own child," "I live with parents/other relatives," and "I live with siblings." Determinations were made regarding living with a partner as well as having a child. This item was developed for the T_4 wave of the Youth and Mental Health Study.

Occupation and Education Status. Occupation status was measured from a question asking: "What do you do now?" There were 13 response choices indicating occupation status, which were combined into four categories: Working full-time/part-time, disability/social assistance/unemployed, Maternity leave/living home/sick leave, and Student. Education was measured by the question: "What is your highest education today?" from the ASR (Achenbach & Rescorla, 2003), with response ranging from have not fulfilled primary school to for or more years of university/college.

General Health Outcome. General health was measured by asking, "How do you evaluate your own health?" (Bowling, 2005). Responses were given on a 4-point scale: 0 = *poor*, 1 = *not so good*, 2 = *good*, and 3 = *very good*, which were dichotomized into *poor* or *not so good* (1) and *good* or *very good* (0).

Other Health Indicators. Bodily pain: Participants were asked: "Do you have problems with frequent pain in the body (head, stomach or legs/arms)?" responding 1 = yes or 0 = no. This item was developed for the Youth and Mental Health Study (Larsson & Sund, 2007).

Legal drugs use: Participants were asked: "Do you use any legal drugs now?" responding 1 = yes or 0 = no. This item was developed for the Youth and Mental Health Study (Sund, 2004).

Headache: Participants responded to the statement: "I have a physical problem without known medical cause," which was followed by, among others, the specification of headaches. Responses were made on a 3-point scale for the previous six months (not true, *somewhat or sometimes true*, and *very true or often true*), which were dichotomized to 1 = *very true or often true* and 0 = *not true or sometimes true*. This item was from the ASR problem scale (Achenbach & Rescorla, 2003).

Tobacco use: Participants were asked: "In the past 6 months, about how many times per day did you use tobacco (including smokeless tobacco)?" Responses were dichotomized into 0 = *never reported tobacco use during the last six months* and 1 = *tobacco use once or more during the last six months*. This item was from the ASR (Achenbach & Rescorla, 2003).

Alcohol use: Participants responded to the statement "I drink too much alcohol and get drunk" for the last six-months. Responses were dichotomized to 1 = *very often or often true* and 0 = *not true* or *sometimes true*. This item was from the ASR problem scale (Achenbach & Rescorla, 2003).

Illegal drug use: Participants were asked: "In the past 6 months, on how many days did you use drugs for nonmedical purposes (including marijuana, cocaine, and other drugs, except alcohol and tobacco)?" Responses were dichotomized into 0 = *never reported illegal drug use during the last six months* and 1 = *illegal drug-use once or more during the last six months*. This item is from the ASR (Achenbach & Rescorla, 2003).

Adaptive Functioning. Five ASR adaptive scales were used to measure quality of relations to friends, spouse/partner, family, job and education during the last six months (Achenbach & Rescorla, 2003). The friend adaptive scale consists of four items regarding number of friends and number of interactions during a month and quality of friendship on a four point scale from (i.e., 0 = *none* to 3 = *4 or more*).

The spouse/partner scales consists of eight items regarding live-in spouse/partner satisfaction. The job scale consists of eight items regarding satisfaction and worry regarding work relations and situation. The education scale consists of five items regarding satisfaction and worry about educational achievements and relations to other students. Spouse/partner, job

and education was rated on a three point scale, 0 = *Not true*, 1 = *sometimes or sometimes true*, and 2 = *very true or often true*. The family scale consists of nine items regarding relational quality among close family members and relatives rated on three point scale (0 = *worse than average* to 2 = *better than average*). The mean score for family adaptive scale and sum scores on the rest of the scales were standardized to compare differences between the groups, where lower scores indicate poorer adaptive functioning. Because all scales were not relevant for all individuals, the numbers participating did not add up to the total study sample.

Statistical Analyses

Unadjusted and adjusted logistic binary and ordinal and nominal logistic analyses were used, to examine associations between classification of bullying involvement in adolescence and young adult outcomes, controlling for gender and parent SES at T_1. The prevalence of ethnicity among the different bullying groups was low, hence it was not included as a covariate. Chi-square analyses were carried out to assess differences between responders and non-responders and assessment of differences among the bullying groups. ANOVAs were performed to assess group differences on income and ASR adaptive functioning scales. Analyses were completed using IBM SPSS Statistics V. 21. Significance level was set to the .05 level.

Results

Sample Characteristics

The total study sample (N = 1,266) comprised a majority of 56.7% females. Table 1 shows demographic characteristics in young adulthood (T_4) related to bullying involvement in adolescence, where 22.4% (n = 284) reported being involved in any type of bullying at T_1 or T_2, 12.5% (n = 158) being bullied, 6.9% (n = 87) being aggressive toward others, 3.1% (n = 39) being a bully-victim, and 77.5% (n = 982) reported not being bullied, aggressive toward others, or a bully-victim at T_1 or T_2.

There was a significant gender difference across all bullying groups, χ^2 (3) = 22.08, p < .001. Compared to non-involved, the being bullied group had a higher proportion of females (66.5%), while a majority was male in the bully-victim (66.7%) and aggressive toward other (57.5%) groups. A total of 1,220 (98.3%) had one or both parents from Norway and there were no significant differences among the groups in ethnicity, χ^2 (3) = 3.55, p = 3.15. Reported incomes were not significantly different among the groups.

Table 1
Demographic characteristics as young adults (T_4) in different bullying involved groups in adolescence (T_1 and T_2).

Variable	Non-involved (n = 982)	Being bullied (n = 158)	Bully-victim (n = 39)	Aggressive toward others (n = 87)	Total sample (N = 1266)
Age [*M* (*SD*)]	27.23 (.59)	27.16 (.60)	27.39 (.55)	27.20 (.63)	27.22 (.59)
Gender (%)					
Males	42.7	33.5	66.7	57.5	43.3
Females	57.3	66.5	33.3	42.5	56.7
Ethnicity [%(*n*)]					
One or both parents from Norway	98 (938)	100 (158)	97.4 (38)	98.9 (86)	98.3 (1220)
Both parents from other country	2 (19)	0 (0)	2.6(1)	1.1(1)	1.7(21)
Income [K NOK(*n*)[a]]	298.66	282.78	290.27	297.30	296.36
Cohabitation status [%(*n*)]					
Live-in-partner	64.8 (636)	52.5 (83)	51.3 (20)	55.2 (48)	62.2 (787)
Not live-in partner	35.2 (346)	47.5 (75)	48.7 (19)	44.8 (39)	37.8 (62.2)
Have a child [%(*n*)]	31.4 (307)	26.9 (42)	34.2 (13)	25.6 (22)	30.5 (384)
Level of completed education [%(*n*)]					
Primary/Secondary school	2.3 (22)	5.3 (8)	2.6 (1)	9.6 (8)	3.2 (39)
High school	32.6 (309)	40.1 (61)	68.6 (24)	47(39)	35.6 (433)
University/college <4 y	35.1 (332)	30.3 (46)	17.1 (6)	20.5 (17)	32.9 (401)
University/college >4 y	30(284)	24.3 (37)	11.4 (4)	22.9 (19)	28.3 (344)
Occupation status [%(*n*)]					
Disability/social help/unemployed	6(57)	9.7 (15)	11.4 (4)	12.2 (10)	7(86)
Mat. leave/living at home/sick leave	10.8 (103)	12.3 (19)	11.4 (4)	9.8 (8)	11 (134)
Student	12.6 (120)	11(17)	2.9 (1)	13.4 (11)	12.2 (149)
Working fulltime/part-time	70.6 (672)	66.9 (103)	74.3 (26)	64.6 (53)	69.8 (854)
Poor general health [%(*n*)]	15.7 (154)	21.5 (34)	30.8 (12)	20.7 (18)	18.7 (218)
Legal drug use [%(*n*)]	14.2 (139)	22.2 (35)	17.9 (7)	12.6 (11)	16.6 (192)
Bodily pain [%(*n*)]	22.2 (218)	35.4 (56)	33.3 (13)	19.5 (17)	26.2 (304)
Headache [%(*n*)]	30.5 (300)	42.4 (67)	23.1 (9)	23(20)	31.3 (396)
Tobacco use [%(*n*)]	35.5 (327)	39.7 (60)	64.9 (24)	54.3 (44)	38.2 (455)
Problematic alcohol use [%(*n*)]	18.7 (184)	22.8 (36)	20.5 (8)	26.4 (23)	19.8 (251)
Illegal drug use [%(*n*)]	5.7 (53)	9.9 (15)	16.2 (6)	17.2 (15)	7.5 (89)

[a] *Note*: K NOK, Norwegian kroner in thousands; Mat., maternal leave

Missing Due to Follow-up

The responders at T_4 were compared with the non-responders on gender, parental SES, ethnicity, and bullying classification assessed at T_1/T_2. The responders were characterized by more females than non-responders 56.9% versus 44.4%, $\chi^2(1) = 39.44$, $p < .001$., and fewer with non-Norwegian ethnicity 1.7% versus 3.6%, $\chi^2(1) = 8.79$, $p = .003$. There were also parental SES differences between responders and non-responders, $\chi^2(4) = 27.20$, $p < .001$. Subsequent chi-square goodness of fit tests showed that upper middle class was overrepresented in the T_4 sample 33.6% versus 25.5%, $\chi^2(1) = 17.19$, $p < 001$ and workers were underrepresented in the sample 34.1 versus 41.8, $\chi^2(1) = 5.93$, $p < .015$, no other of the SES categories were significantly different between responders and non-responders.

Comparison of Bullying Involvement with Non-Involvement

The distributions of the outcome variables across the groups with different bullying involvement are shown in Table 1. The results from a series of univariate logistic regressions (Table 2), both unadjusted odds ratios (*OR*) and adjusted odd ratios (*AOR*) for gender and parent SES showed that being bullied, bully-victim and aggressive toward others had a higher risk of lower education than non-involved, among which being bully-victims had the highest risk (bullied *AOR*: 1.64, 95% CI [1.18, 2.26]; bully-victim *AOR*: 3.24, 95% CI [1.65, 6.35]; and aggressive toward others *AOR*: 2.33, 95% CI [1.52–3.58]). Those in the being bullied group reported less frequently cohabitating with a live-in partner, *AOR*: 0.54, 95% CI [0.38–0.77] compared to the non-involved group.

Those being bullied reported poorer general health pain (*OR*: 1.51, 95% CI [0.99, 2.30], more bodily pain (*AOR*: 2.05, 95% CI [1.40, 2.99]), legal drug use (*AOR*: 1.67, 95% CI [1.09, 2.58]), and headache pain (*AOR*: 1.59, 95% CI [1.11–2.28]) than the non-involved. Also bully-victims reported poorer health (*AOR*: 2.83, 95% CI [1.33–6.05]) and bodily pain (*AOR*: 2.45, 95% CI [1.17, 5.11]) compared to non-involved. Both bully-victims and aggressive toward others had higher prevalence of any tobacco use during the last six months (*AOR*: 2.66, 95% CI [1.30, 5.44] and *AOR*: 2.06, 95% CI [1.30, 3.29], respectively) compared to non-involved. Both being bullied and aggressive toward others reported higher likelihood for illegal drug use (*AOR*: 2.13, 95% CI [1.14, 3.96] and *AOR*: 3.08, 95% CI [1.60, 5.86], respectively) compared to non-involved.

Among the ASR adaptive functioning scales (see Table 3) there were significant differences on the spouse/partner scale, $F(3, 1{,}033) = 6.76$, $p < .001$), with Bonferroni corrections showing that being bullied had significantly lower scores than non-involved, as well as on the job scale, $F(3, 1{,}184) = 10.99$, $p < .001$, with Bonferroni corrections showing that being bully-victim and the aggressive toward others had significantly lower scores than non-involved group.

Discussion

The aim was to examine prospectively associations between bullying involvement at 14–15 years of age and self-reported general health and psychosocial adjustment in young adulthood, at 26–27 years of age. In general, those involved in bullying in adolescence, either as victim or as perpetrator, fared less well in young adulthood on a range of outcomes, suggesting that adolescent bullying involvement can have a harmful impact on development into young adulthood.

Prevalence for bullying in our study was as follows: 12.5% reported being bullied, 6.9% reported being aggressive toward others, and 3.1% being both a bully-victim at mean ages 14 (T_1) and 15 (T_2). An earlier prevalence study on bullying in Norway reported that among children ages 11–15, 8.3% were bullied, 4.8% were bullies, and 1.6% bully-victims (Solberg & Olweus, 2003). In a recent study, 14.6% reported being bullied *sometimes* in the past 12 months at ages 15 and 16 (Strom, Thoresen, Wentzel-Larsen, & Dyb, 2013). These figures are based on various ages, time range of measurement, and cut-off values for bullying frequency, which may be the main reason for variations in bullying prevalence reported in Norway.

Among specific outcomes were that those involved in bullying of any type had increased likelihood for lower education attainment. This finding is consistent with several earlier reported findings. Olweus (1994) argues that a long-term consequence of being bullied can be developing negative attitudes toward schoolwork and low satisfaction with school environment because much of the bullying occurs in the school setting. Hence, being a victim of bullying may influence adolescents' educational aspirations, which as a consequence may influence educational endpoints in adulthood. In addition this study showed that those who are aggressive toward others also have a higher risk for being unemployed and receiving disability pension or other social assistance. The connection between low education and higher risk for low or no work engagement is known (De Ridder et al., 2013). Also, research has shown that disruptive and aggressive behavior in childhood may have long lasting negative effects, including high school dropout (Asendorpf, Denissen, & van Aken, 2008), which is associated with unemployment and problematic work integration. These problems can affect many young adults for various reasons, but those who are aggressive toward others in adolescence seem to be at a particular risk.

There were differences in educational level but there were no significant differences among those with bullying experience and non-involved in bullying in regard to both income level and having a child. Caution is advisable when interpreting nonsignificant findings (Corty, 2007), but a possible reason for this finding may be that there is strong normative pressure to have a child in Norway, also among low-income groups. Paid maternity leave for up to a year, an established welfare system, and equal and close to free health services may support having children and smooth out socio-economical differences in the society.

Table 2
Odds ratios (95% CI) from univariate logistic regression analyses comparing different bullying involved groups with non-involved group (Total $N = 1266$).

Outcome domains	Being bullied versus non-involved		Bully-victim versus non-involved		Aggressive toward others versus non-involved	
	Unadjusted	Adjusted[d]	Unadjusted	Adjusted[d]	Unadjusted	Adjusted[d]
Cohabitation status						
Have a live-in-partner	**.60 (.43, .85)**[***]	**.54 (.38, .77)**[***]	.57 (.30, 1.08)	.65 (.22, 1.28)	.67 (.43, 1.04)	.71 (.45, 1.11)
Have a child	.80 (.55, 1.17)	.77 (.52, 1.13)	1.14 (.57, 2.25)	1.12 (0.54, 2.33)	.75 (.45, 1.24)	.83 (.49, 1.39)
Education[a]	**1.49 (1.09, 2.05)**[*]	**1.64 (1.18, 2.26)**[**]	**3.58 (1.86, 6.90)**[****]	**3.24 (1.65, 6.35)**[***]	**2.28 (1.49, 3.47)**[****]	**2.33 (1.52,3.58)**[****]
Occupation status[b]						
Disability/social assistance/unemployed	1.72 (.94, 3.14)	1.74 (.94, 3.22)	1.81 (.61, 5.38)	2.5 (.83, 7.72)	**2.22 (1.07, 4.61)**[*]	**2.73 (1.29, 5.75)**[*]
Maternal leave/living at home/sick leave	1.20 (.71, 2.05)	1.11 (.65, 1.92)	1.00 (.34, 2.94)	1.58 (.52, 4.84)	.99 (.46, 2.13)	1.26 (.57, 2.78)
Student	.92 (.53, 1.60)	.87 (.50, 1.53)	.22 (.03, 1.60)	.25 (.03, 1.87)	1.16 (.59, 2.29)	1.21 (.61, 2.39)
Poor general health[c]	**1.51 (.99, 2.30)**[*]	1.49 (.97, 2.23)	**2.44 (1.20, 4.99)**[*]	**2.83 (1.33, 6.05)**[*]	1.47 (.84, 2.55)	1.58 (0.9, 2.77)
Bodily pain	**2.03 (1.40, 2.93)**[****]	**2.05 (1.40, 2.99)**[****]	1.86 (.92, 3.75)	**2.45 (1.17, 5.11)**[*]	.88 (.50, 1.53)	.98 (.56, 1.74)
Legal drug use	**1.76 (1.16, 2.68)**[**]	**1.67 (1.09, 2.58)**[*]	1.32 (.57, 3.08)	1.32 (.53, 3.33)	.90 (.46, 1.74)	.94 (.48, 1.83)
Headache	**1.67 (1.19, 2.36)**[***]	**1.59 (1.11, 2.28)**[*]	.68 (.32, 1.45)	.99 (.44, 2.19)	.68 (.40, 1.14)	.79 (.46, 1.35)
Tobacco use	1.20 (.84, 1.70)	1.38 (.96, 1.99)	**3.35 (1.69,6.68)**[****]	**2.66 (1.30, 5.44)**[**]	**2.16 (1.38, 3.41)**[****]	**2.06 (1.30, 3.29)**[****]
Problematic alcohol use	1.28 (.84, 1.90)	1.44 (.95, 2.19)	1.12 (.51, 2.48)	0.78 (.33, 1.84)	1.56 (.94, 2.58)	1.34 (.80, 2.24)
Illegal drug use	1.80 (.99, 3.27)	**2.13 (1.14, 3.96)**[*]	**3.17 (1.27, 7.9)**[*]	2.42 (0.87, 6.76)	**3.6 (1.97, 6.85)**[****]	**3.08 (1.6, 5.86)**[****]

[a] High *OR* = lower education.
[b] Job and non-involved as reference categories.
[c] High *OR* = poor health.
[d] Adjusted for gender and parental SES.
[*] $p < .05$.
[**] $p < 01$.
[***] $p < .005$.
[****] $p < .001$.

Table 3
Adaptive functioning using standardized means (SD) for different bullying involved groups (Total $N = 1266$)[***]. Numbers of participants analyzed on each scale are inserted.

Adaptive scales	Non-involved (1)	Being bullied (2)	Bully-victim (3)	Aggressive toward others (4)	*F*	Post–hoc comparison[a]
Friends scale ($n = 1242$)	77.50 (19.23)	76.03 (20.75)	73.21 (24.31)	75.41 (16.77)	.99	
Spouse/partner scale ($n = 1036$)	79.98 (17.62)	73.22 (20.01)	73.54 (17.88)	75.88 (18.69)	6.76[***]	1 > 2
Family scale ($n = 1256$)	86.53 (11.07)	85.49 (11.43)	84.71 (12.13)	85.73 (12.13)	.74	
Job scale ($n = 1187$)	87.96 (11.75)	87.09 (11.85)	80.71 (16.35)	81.09 (16.23)	10.99[***]	1 > 3, 4
Education scale ($n = 334$)	75.19 (21.61)	72.56 (20.94)	62.86 (26.90)	67.50 (21.50)	1.55	

[a]Bonferroni pairwise comparisons $p < .00833$.
[***] $p < .005$.

Surprisingly, income levels were not different among the different bullying groups compared to those non-involved. These findings are not consistent with earlier reports that suggest bullying may affect later wealth outcomes among young adults (Brown & Taylor, 2008; Wolke et al., 2013). A possible explanation for these inconsistent findings is that the relationship between educational attainment and salary in Norway is very low compared to other Organization for Economic Cooperation and Development (OECD) countries (OECD, 2013). This may suggest that the relationship between bullying involvement and education level are strong and directly linked while bullying involvement in adolescence and future income in young adulthood may have a more indirect relationship which in turn may be influenced by socioeconomic differences across nations.

This study also showed that self-reported health was poorer among those being bullied and bully-victims compared to non-involved in bullying in adolescence. In the being bullied group there was also a higher risk for bodily pain, headache, and medication use. This suggests that not only have those being bullied a long-lasting risk for poor mental health as indicated by earlier studies (Copeland et al., 2013; Sourander et al., 2007) but also for poor general health. Finding a lower general health is consistent with cross-sectional studies that have reported various physical complaints among those being bullied in school (Hawker & Boulton, 2000). Higher reported bodily pain and headaches could be caused by the overwhelming stress experienced in association the bullying involvement (Allison et al., 2009).

Moreover, findings from this study suggest that both bully-victims and aggressive toward others reported higher tobacco use than those non-involved. In addition, all groups reported (the bully-victims only in unadjusted analyses) higher illegal drug use compared to non-involved. A possible explanation for this association could be the self-medication hypothesis, which proposes that people use substances to alleviate emotional stress (Duncan, 1974). Findings that bullies use tobacco and illegal drugs in adulthood extend earlier reports about adolescent use (Nansel et al., 2001), suggesting a continuation of early problem behavior among those being bullied and those aggressive toward others.

When examining functioning in various life areas, the being bullied group reported to be less inclined to have a live-in partner, and they reported significantly poorer relationship with live-in spouse/partner than non-involved. It has been suggested that social withdrawal is connected with emotional vulnerability in childhood victims of bullying (Boivin, Petitclerc, Feng, & Barker, 2010). This may in turn heighten the risk for poor or no partner/spouse relations in adulthood because of a distrust of others and a difficulty handling difficult emotions. No significant associations were found regarding having a child and being involved in bullying. There is some evidence that women who are bully-victims and bullies giving birth earlier than those not-involved in bullying (Lehti et al., 2011), when measured at age 20 in this previous study in contrast to our study which measured child bearing at age 26–27. This discrepancy could imply that child bearing effects may even out over time.

Bully-victims and those aggressive toward others reported poorer job relations compared to non-involved. This may be related to the aggressive trait shared by the two groups. Although there is some evidence that there may be a link between aggression and being popular during adolescence (Rose, Swenson, & Waller, 2004), direct aggression in the workplace is rare (Neuman & Baron, 1998) and normatively judged as unwanted behavior in most adult life areas including work-life. Hence, aggression could be a useful strategy in some part of life and a problematic strategy later. Wolke et al. (2013) reported poor social relationships in victims of childhood bullying, and yet, when other family and childhood risk factors were taken into account, there was no independent association remaining. However, they did not consider job relations. The relationship between past bullying involvement and adaptive functioning in adulthood should be further explored with better specificity.

Results show that bully-victims and those aggressive toward others overall has a higher risk compared to both those non-involved, but also compared to those being bullied. In regard to risk for low education level there was more than three-fold higher risk for bully-victims and two-fold higher risk for those aggressive toward others compared with those non-involved in bullying. Also in terms of health markers, bully-victims had almost three-fold higher risk reporting poor general health and two-and-a-half-fold risk reporting bodily pain than their non-involved peers. Both bully-victims and those aggressive toward others reported having over two-fold higher risk of using tobacco and those aggressive toward others reported over three-fold higher risk of using illegal drugs compared to those non-involved in bullying. Moreover, the results differed not very much between the unadjusted and the adjusted analyses, underscoring the strengths of the findings across genders and SES classes.

The developmental phase from adolescence to young adulthood is an important transition period, where the dependent adolescent develops into an independent adult. This study investigated a 12-year time span which is a long developmental period marked by substantial maturation and changes for the individual. Although there are significant associations between bullying involvement in adolescence and health and functioning in adulthood, the risk is best considered to be moderately increased based on the size of the odds ratios obtained. There is also a good deal of variation within the groups involved in bullying illustrated by the wide confident intervals. This suggests that there are a multitude of intervening factors that may influence the long-term effects of bullying involvement, both positive and negative. Positive factors may be the effective coping strategies to solve relational conflicts and handle stress. Unfortunately, we know little about positive intervening factors that may help to counter long-term consequences of bullying, an area rife for future research.

Strengths and Limitations

Whereas this is a longitudinal prospective investigation with a representative sample from the region of Mid-Norway, it is not a national representative sample. The age range of the original sample is limited. All data were based upon self-report. Respondents might for various reasons give inaccurate information or be biased. It could be, for instance, that respondents are biased to give social conforming answers. However, when confidentiality and anonymity are granted, as in this study, self-report has high reliability and validity (Brener, Billy, & Grady, 2003).

A limitation with our study is the measure of aggressive toward others. This measure does not specify all forms of bullying. In particular, relational aggression such as spreading rumors or excluding individuals from social groups, which has been found to be more characteristic of female bullies, is not addressed (Archer & Coyne, 2005). Therefore, as expected, more males than females in our study were categorized in the aggressive-toward-others group.

The present study does not take account of some possible confounding factors which may both be a cause and an effect of bullying. For instance, educational achievements or learning disabilities might well increase the probability of being bullied or bullying others. Other issues both possible related to academic achievement and involvement in bullying are reading difficulties, attention deficit disorder/ADHD and more broadly general mental health problems, however it is beyond the scope of this article to assess these issues in depth. Furthermore, these issues may interact and mutually influence each other. More longitudinal and experimental research is needed in order to clarify whether these problems are antecedents or consequences of involvement in bullying.

Although the response rate was excellent at both T_1 and T_2, it was modest at T_4. Moderate response rates can be a problem if the sample is systematic different from the population it is supposed to represent. Attrition analyses showed that even if there were small differences between the responders and non-responders regarding gender, parent SES and ethnicity, there were no differences in attrition associated with different bullying involvement. Moreover, this sample is large and heterogeneous and constitutes variation in gender and geographical and sociocultural markers, indicating that the sample is valid and possibly generalizable to the target population.

Conclusion

Our findings indicate that adolescents involved in bullying have increased risks for a range of adverse outcomes 12 years later. All groups involved in bullying showed a risk for lower educational outcome compared with their non-involved peers. Those being bullied appeared to have a lower likelihood for having a live-in partner and poorer functioning with a spouse/partner, and poorer self-reported health, more bodily pain and headache and higher levels of legal and illegal drug use. Those aggressive toward others reported higher risk of being unemployed, receiving disability or social assistance, tobacco use and illegal drug use, and poorer functioning in job relations. Bully-victims represented some of both from the other groups and reported higher risk for poor health, bodily pain, increased risk of drug and tobacco use, and poor job relations. The present study adds to the growing body of empirical literature that suggest that being involved in bullying might have worrisome adverse health and social effects. In light of the potential long-term effects of bullying engagement, it becomes important to find and implement effective early intervention when it is detected in school and youth recreational settings (Smith, Pepler, & Rigby, 2004). Better yet, investment in preventive efforts, reducing bullying occurring at all, in early school years should be a priority.

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Paper II

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RESEARCH ARTICLE Open Access

The long-term effects of being bullied or a bully in adolescence on externalizing and internalizing mental health problems in adulthood

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Abstract

Background: The aim is to examine associations between bullying involvement in adolescence and mental health problems in adulthood.

Methods: Information on bullying-involvement (being bullied, bully–victim, aggressive toward others) and non-involved was collected from 2464 adolescents in Mid-Norway at mean age 13.7 and again at mean age 14.9. Information about mental health problems and psychosocial functioning was collected about 12 years later at mean age 27.2 (n = 1266).

Results: All groups involved in bullying in young adolescence had adverse mental health outcomes in adulthood compared to non-involved. Those being bullied were affected especially regarding increased total sum of depressive symptoms and high levels of total, internalizing and critical symptoms, increased risk of having received help for mental health problems, and reduced functioning because of a psychiatric problem in adulthood. While those being aggressive toward others showed high levels of total and internalizing symptoms. Both those being bullied and bully–victims showed an increased risk of high levels of critical symptoms. Lastly, all groups involved in bullying on adolescence had increased risk of psychiatric hospitalization because of mental health problems.

Conclusion: Involvement in bullying in adolescence is associated with later mental health problems, possibly hindering development into independent adulthood.

Keywords: Longitudinal, Being bullied, Aggressive toward others, Bully–victim, Epidemiology, Mental health problems

Background

Being involved in bullying is common among adolescents. Prevalence rates of being victims of bullying vary globally from 6 to 35 %, and bullying others from 6 to 32 %, whereas a smaller group, from 1.6 to 13 %, has experience both as a bully and victim ("bully–victim") [1–7]. Prevalence differences are most often attributed to variations in age of participants, time range of measurement and classification of bullying. Olweus and Limber [8] defines bullying or victimization in terms of being bullied, intimidated, or victimized when a person is exposed, repeatedly and over time, to negative actions from more powerful peers. Bullying behavior may be manifested in various ways, for example, as teasing, active exclusion from a social group, or physical assaults [9]. Studies in schools have found an association between involvement in bullying—whether as victim, perpetrator or bully–victim—and elevated mental health problems [10, 11]. Surprisingly, almost no research has addressed the effects from bullying on the transition from adolescent to early adulthood when most people move on from

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the educational system to work-life and are expected to begin making a life apart from their parents. Accordingly, we know little about the long-term association between bullying involvement in adolescence and mental health outcomes and broader effects on development into young adulthood. Recently a few studies have indicated troubling associations between bullying involvement and later problems in adulthood [1, 5, 6]. Nonetheless, further prospective longitudinal research on bullying involvement in adolescence and later mental health outcomes is much needed.

A common way of examining mental health issues separates those reflecting internalizing and externalizing problems. Whereas, the terms internalizing and externalizing problems have traditionally mainly been used to describe symptoms occurring in childhood, they are also applied in adult psychiatric research due to the latent structure of psychiatric disorders [12, 13]. Internalizing symptoms include problems within the individual, such as depression, anxiety, fear and withdrawal from social contacts. Some research suggests that internalizing problems are more prevalent in victims of bullying [8]. However, other research has been inconsistent [14]. A recent longitudinal study has shown that both those who are bullied and bullying others in adolescence have an increased risk of developing panic-disorder or depression in young adulthood; in addition, those being bullied had an increased risk of developing anxiety disorders [1].

Externalizing symptoms reflect behaviours that are directed outwards toward others such as anger, aggression, and conduct problems including a tendency to engage in risky and impulsive behaviour, as well as criminal behaviour. Individuals who are aggressive and bully others not surprisingly concurrently display more externalizing symptoms than those being bullied and peers who have no involvement in bullying [15]. Importantly, research suggests that bullying others in adolescence is associated with elevation in externalizing symptoms as young adults [1, 16]. Sourander et al. [16] found that being a frequent bully at age 8 predicted antisocial personality, substance abuse, and depressive and anxiety disorders in early adulthood. However, the sample consisted only of males during enrollment at the Finish obligatory military service. Copeland and colleagues [1] reported in a prospective study that those bullying others in adolescence have heightened risk of developing antisocial personality-disorder in young adulthood, even when controlling for preexisting psychiatric problems, family hardships, and child maltreatment.

In addition to concerns about psychopathology, there have been several reports of long term impairments in psychosocial functioning among those involved in bullying, including mental and physical health, school functioning, and peer relations. Aggression toward peers is associated with poor school performance and conduct problems among students 7–9 years of age [17], social adjustment problems among students 8–15 years of age [15], and poor social skills, inattention and depression among students 9–12 years of age [18]. Persistent victimization by peers is also associated with poor school performance among 9–10 year olds [19] and impaired social adjustment among 9–14 year old students [20]. There is some evidence that bullying victimization is more prevalent among psychiatric patients. Hansen, Hasselgard, Undheim and Indredavik [21] found that 19 % of young psychiatric outpatients aged 13–18 reported being bullied often or very often. Fosse and Holen [22] reported from a retrospective investigation that almost half (46 %) of the patients from an adult psychiatric outpatient clinic in Norway reported to have been bullied in childhood. Trotta et al. [23] found that adult patients with psychosis had approximately two-fold risk of reporting bullying victimization five or more years previously.

Social ecological theory [24] conceives human development as dynamic interrelations among various personal and environmental factors, such as neighborhood, home, school and society. Bullying could be understood within this framework as not only as the result of individual characteristics, but influenced by multiple relationships with i.e. peers, teachers and families [25]. Diathesis–stress model suggest that cognitive and biological vulnerabilities (i.e., diatheses) in interaction with environmental stressors are important in understanding the development of psychopathology [26]. Understood within these developmental models, involvement in bullying, as either a victim, perpetrator or both, can be seen as a negative life event, when mixed with the right vulnerabilities (i.e. cognitive, biological and social). This could contribute to the development of internalizing and externalizing psychopathology and impaired social relationships [25]. In early adolescence biological development (puberty and bodily changes) coincide with challenges in psychological (identity issues; cognitive development) and social development (increased autonomy from parents; increased social competence) possibly rendering some individuals vulnerable for external stressors, like being bullied.

Longitudinal studies suggest that problems following bullying involvement extend beyond mental health issues. Wolke, Copeland, Angold, and Costello [27] reported that those being exposed to bullying in adolescence, as either a bully or victim, had elevated risks for poverty, poor mental and physical health as well as poor social relationships in young adulthood. These risks were persistent even after controlling for family hardship and childhood psychiatric disorders. Takizawa, Maughan, and Arseneault [28] examined adult consequences of

being bullied as a child in a prospective longitudinal study covering 50 years. They found that being bullied predicted poor psychosocial functioning in later years, psychological distress and poor physical health at ages 23 and 50, depression and poorer cognitive function in the later ages (45–50 years old). These findings suggest that bullying involvement, as a victim, perpetrator, or both, can impair later psychosocial functioning.

In light of the significant gaps in knowledge about the long-term outcomes following bullying involvement, we aim to examine the associations between bullying experiences at 14–15 years of age and mental health problems and psychosocial adjustment in young adulthood at 27 years of age in a community sample. We hypothesize that being involved in any type of bullying, either as victim, bully–victim or perpetrator, is associated with later internalizing and externalizing mental health problems, being bullied with more internalizing problems and thus being aggressive toward others more externalizing problems. Moreover, we predict that those being involved in bullying report more signs of poor psychosocial functioning, possibly strongly related to severe psychiatric problems than those non-involved. Using a longitudinal prospective follow-up of a representative community sample, we will differentiate among four types of bullying involvement to illuminate links with mental health and psychosocial functioning in young adulthood, including: (1) non-involved, (2) being bullied, (3) bully–victim, (4) aggressive toward others.

The following research aims were investigated in the present study:

1. How do experiences of being involved in bullying in adolescence affect later broad band internalizing and externalizing, and other more specific domains of mental health problems?
2. Do those being involved in bullying show lower levels of psychosocial functioning compared to those non-involved?
3. Do those being involved in bullying in adolescence receive more help for mental health problems and have more hospitalization compared to non-involved?

Methods

Sampling procedure

The Youth and Mental Health Study [29] is a longitudinal study conducted in Mid-Norway, aiming to address risk and protective factors in the development of mental health in adolescents aged 12–15 years. In 1998, a representative sample of 2813 students (98.5 % attending public schools) from 22 schools in two counties of Mid-Norway (South-and North-Trøndelag) was drawn with a probability according to size (proportional allocation) from a total population of 9292 children.

Sample and assessment points

Baseline data (T_1) were collected in 1998 from 2464 adolescents, reflecting an 88.3 % response rate, with a mean age of 13.7 (SD 0.58, range 12.5–15.7) and 50.8 % girls, which were divided within four strata: (1) City of Trondheim (n = 484, 19.5 %), (2) Suburbs of Trondheim (n = 432, 17.5 %), (3) Coastal region (n = 405, 16.4 %), and (4) Inland region (n = 1143, 46.4 %) [29]. The sample was reassessed one year later (T_2) with 2432 respondents at mean age 14.9 years (SD 0.6, range 13.7–17.0) and 50.4 % girls. Whereas 104 (4.3 %) from T_1 did not participate at T_2, 72 new participants who had changed their mind were added from the same schools. Data in these two waves were collected with questionnaires completed during two school hours. Individuals participating at T_1 or T_2 (N = 2532) were identified for a follow-up survey in young adulthood during the spring 2012 (this is referred to as T_4 here because a portion of the T_2 sample participated in an assessment at T_3 unrelated to the objectives of the present study), about 12 years after T_2 at a mean age of 27.2 years (SD 0.59, range 26.0–28.2). At T_4, 92 were not eligible due to death (n = 13) or no identifiable home address (n = 79), resulting in that 2440 were invited to this follow-up investigation, of which 1266 (51.9 %) participated (56.7 % females) (see Fig. 1 for a detailed overview of the data collection). The data was collected electronically. All waves of data collection were approved by the Regional Committee for Medical Research Ethics in Mid-Norway.

Measures in adolescence (T_1 and T_2)

Report of being bullied As part of a larger assessment, participants were asked if during the last 6 months, they had ever been (1) teased, (2) physical assaulted, or (3) frozen out of peer relationships at school or on the way to school. Responses was on a five-point scale ("never," "1–2 times," "about once a week," "2–3 times a week," and "more often") [30]."

Aggressive toward others Four questions from the Youth Self Report (YSR) [31] addressed aggressive behavior: "I treat others badly," "I physically attack people," "I tease others a lot," and "I threaten to hurt people". These are rated on a three-point scale ("not true," "somewhat or sometimes true," "very true or often true") for the previous 6 months were used. Because these items cannot differentiate aggression toward peers from other people (e.g., parent, teacher), this variable was termed aggressive toward others rather than bullying others.

Classification of adolescent bullying involvement From these items, participants' involvement in bullying was classified as one of four types: *Being bullied* (n = 158,

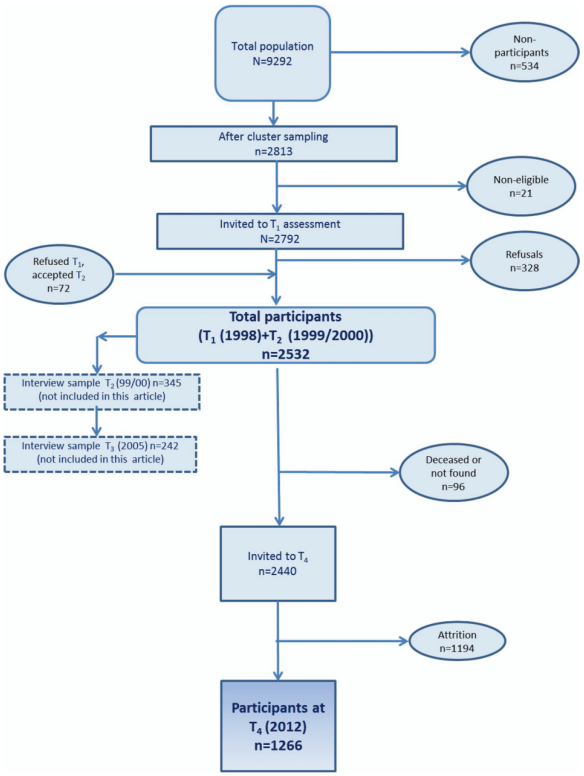

Fig. 1 Schematic illustrating subject recruitment and attrition in the Youth and Mental Health Study wave 4 (T_4)

66.5 % females): Reports of being bullied "about once a week" or more frequently, on one or more of the three items within the last 6 months at either T_1 or T_2. *Aggressive toward others* (n = 87, 42.5 % females): Reports of "very true or often true" within the past 6 months on at least one of the four YRS items indicating aggression toward others at either T_1 or T_2. *Bully–victim* (n = 39, 33.3 % females): Met classification of being bullied *and* being aggressive toward others, by the definitions above, within the last 6 months at either T_1 or T_2. *Non-involved* (n = 982, 57.3 % females): Not classified as being bullied, aggressive toward others or bully–victim at either T_1 or T_2.

The Youth Self Report (YSR) [31], a 105-item self-rating of emotional, behavioral, and social problems in the last 6 months in children adolescents—was used to obtain background knowledge of baseline mental health at T_1 with the global mental health measure YSR total problem scale. To prevent auto correlation, those items on the YSR total problem scale constituting the Aggressive toward others scale were removed in the controlled analyses.

MFQ The Mood and Feelings Questionnaire [32] was administered to measure depressive symptoms in more detail. MFQ is a 33-item questionnaire originally designed for children and adolescents ages 8–18 to report depressive symptoms as specified by the DSM-III Revised criteria [33], including affective, melancholic, vegetative, cognitive and suicidal symptoms. One item from the parent version was added. The individual is asked to report each symptom for the preceding 2 weeks using a three-point scale (0 = "not true", 1 = "sometimes true", and 2 = "true") resulting in the total summed scores range between 0 and 68. High scores represent high depressive symptom levels. In the present sample 3-week and 2-month test–retest reliabilities at T_1 have been reported to be r = 0.84 and r = 0.80, respectively [34].

Socio-economic status (SES) was measured by adolescent report of mother's and father's occupation, in addition to an open question about what their parents did at work, which was classified according to the ISCO-88 [35] into professional leader, upper middle class, lower middle class, primary industry, and manual workers. Father's occupation was used unless the adolescent lived with the mother only, in which case mother's occupation was used.

Outcome measures in young adulthood (T_4)

The instruments administered at T_1 and T_2 were re-administered at T_4 albeit with age appropriate adaptations.

ASR-Mental health problems at mean age 27.2 were assessed with the *ASR*—Adult Self-Report [36], which in the ASEBA system is the adult extension of the YSR addressing behavioral, emotional, and social problems, using the same response options. The ASR was selected because it has empirically based scales and has been shown to correlate with clinical diagnoses [31, 36–38]. The 120 problem items include broadband scales for Internalizing (anxious/depressed, withdrawn, somatic complaints), Externalizing (rule-breaking, aggressive behavior, intrusive), Attention Problems (concentration problems, disorganized behavior), and Critical Items (sum of 19 items). Critical items consist of specific atypical behavior which may be a concern in itself, regardless whether it reflects internalizing or externalizing problems. These types of behavior are termed as critical items, and contain "problems clinicians may be particularly concerned about", for example "breaking things belonging to others", "unhappy, sad or depressed", "can't get mind of certain thoughts" and "self-harming" [36]. A Total Problem score across all items can also be calculated.

MFQ—The Mood and Feelings Questionnaire [32] was re-administered at mean age 27.2 to give an concurrent measure on depressive symptoms.

Psychosocial functioning was measured with four questions related to state of mind [29]: One general question—"When you are worried or sad (having emotional or psychiatric problems) does it happen that you do not function as well as usually?" Responses were "True", "Somewhat true" and "Not true", with a timeframe within the last year. Three additional questions addressed different psychosocial functional areas: "Have you had to reduce/quit leisure activities due to a psychiatric problem for a while in the last year?", "Have you been absent from school/work because of having emotional or psychiatric problems?" and "Have you had interpersonal problems caused by these problems during the last year? Response categories for these three questions were; "No," "Less than 1 week," "between 1 and 4 weeks," or "more than 4 weeks". Each question regarding psychosocial functioning was treated as dichotomous variables in the descriptives and ordinal variables in the logistic analyses.

Received help for mental health problems was measured by one question about receiving any help due to mental health problems during the last year, and one question asking about receiving any help due to mental health problems earlier in life. These questions had eleven response categories differentiating between types of help (i.e. psychologist or school health nurse). The eleven categories were dichotomized to a yes/no response. In addition a yes/no question were used asking about having ever been hospitalized because of mental health problems. This question was recoded based on a follow-up question about timeframe included, to distinguish hospitalization use after young adolescence (T_2)

Statistical analysis

One-way between-groups analyses of covariance were conducted to compare outcomes measured with continuous scales among the four bullying involvement groups. Participants' gender and parent SES level were used as the covariates in this analysis. In additional analyses, the baseline mental health score was added as covariate. For the ordinal outcome variables, logistic regression analyses were used to compare the three bullying involvement groups with the noninvolved group as a reference. Ninety-five percent confidence intervals (CI) were computed. When performing six pairwise comparisons (Tables 1, 2) we used the Hochberg step-up procedure for multiplicity adjustment. The Hochberg procedure is generally recommended before the more conservative Bonferroni correction [39]. For the rest of the analyses, we have not adjusted for multiple hypothesis, as recommended by Rothman [40]. Two-sided p-values <0.05 are taken to indicate statistical significance. Due to multiple analyses, p-values between 0.01 and 0.05 should be interpreted with caution. In addition, cut-off points

Table 1 ANCOVA of ASR (Adult Self-Report) and MFQ (Mood and Feelings Questionnaire) scores for the different bullying involvement groups (Total N = 1266) adjusted for gender and parent SES-level

Outcomes	Non-involved (1) *M* (*SD*)	Being bullied (2) *M* (*SD*)	Bully–victim (3) *M* (*SD*)	Aggressive toward others (4) *M* (*SD*)	P value	Post-hoc comparison[a]
N	982	158	39	87		
ASR total problems (range 0–240)	30.34 (23.74)	39.61 (25.29)	46.41 (31.23)	39.68 (30.47)	<0.001	1 < 2, 3, 4
ASR externalizing problems (range 0–74)	6.55 (6.37)	8.69 (6.21)	10.33 (7.83)	9.46 (7.84)	<0.001	1 < 2, 3, 4
ASR internalizing problems (range 0–80)	10.82 (10.23)	14.87 (11.78)	16.83 (15.47)	13.75 (13.06)	<0.001	1 < 2, 3, 4
ASR attention problems (range 0–30)	5.40 (4.24)	6.30 (4.18)	8.21 (5.78)	6.63 (5.15)	<0.001	1 < 3
ASR critical items (range 0–38)	2.90 (3.11)	3.90 (3.09)	5.14 (4.19)	4.21 (4.35)	<0.001	1 < 2, 3, 4
MFQ depressive symptoms (0–68)	9.09 (11.25)	13.36 (13.62)	12.69 (13.16)	12.36 (13.86)	<0.001	1 < 2, 4

[a] Hochberg's step-up correction

Table 2 ANCOVA of ASR (Adult Self-Report) and MFQ (Mood and Feelings Questionnaire) scores for the different bullying involvement groups (Total N = 1266) adjusted for gender and parent SES-level and baseline mental health score

Outcomes	Non-involved (1) *M* (*SD*)	Being bullied (2) *M* (*SD*)	Bully–victim (3) *M* (*SD*)	Aggressive toward others (4) *M* (*SD*)	P value	Post-hoc comparison[a]
N	982	158	39	87		
ASR total problems (range 0–240)	30.27 (23.70)	39.70 (25.34)	46.41 (31.23)	39.68 (30.47)	0.057	N.S
ASR externalizing problems (range 0–74)	6.53 (6.37)	8.68 (6.23)	10.38 (7.83)	9.46 (7.84)	0.060	N.S
ASR internalizing problems (range 0–80)	10.79 (10.22)	14.94 (11.79)	16.84 (15.47)	13.75 (13.06)	0.055	N.S
ASR attention problems (range 0–30)	5.39 (4.24)	6.30 (4.19)	8.22 (5.78)	6.63 (5.15)	0.239	N.S
ASR critical items (range 0–38)	2.89 (3.10)	3.91 (3.10)	5.14 (4.19)	4.21 (4.35)	0.008	N.S
MFQ depressive symptoms (0–68)	9.05 (11.13)	13.36 (13.61)	12.68 (13.16)	12.36 (13.86)	<0.001	1 < 2

Baseline mental health score for ASR(T_4); YSR total problem score (T_1), baseline mental health score for MFQ(T_4); baseline MFQ score (T_1)

[a] Hochberg's step-up correction

corresponding to the 90th percentile were used as indicators of possible mental health problems in the clinical range. This cut-off point is widely used in psychiatric epidemiology [41, 42]. Binary logistic regression analyses were used to test for associations between the different bullying groups and being a high-scorer (90th percentile) versus low-to-moderate-scorer on mental health outcomes, as well as receiving help for mental health problems. Analyses were performed in SPSS 21 and the Hochberg procedure was programmed in Excel.

Results

Sample characteristics

The total study sample (N = 1266) comprised 56.7 % females. The prevalence of any bullying involvement in adolescence at T_1 or T_2 was 22.4 % (n = 284). Among these was 12.5 % (n = 158) being bullied, 6.9 % (n = 87) being aggressive toward others, and 3.1 % (n = 39) being a bully–victim, leaving the prevalence of non-involvement in any of the bullying groups at 77.5 % (n = 982).

Attrition analysis

The responders at T_4 were compared with the non-responders on gender, parental SES, ethnicity and bullying classification assessed at T_1/T_2. The responders were characterized by more females than non-responders (56.9 vs. 44.4 %, χ^2 (1) = 39.44, p < 0.001) and fewer with non-Norwegian ethnicity (1.7 vs. 3.6 %, χ^2 (1) = 8.79, p = 0.003.). There were also parental SES differences between responders and non-responders (χ^2 (4) = 27.20, p < 0.001). Subsequent Chi square goodness of fit tests showed that upper middle class was overrepresented among responders (33.6 vs. 25.5 %, χ^2 (1) = 17.19, p < 0.001) whereas workers were underrepresented (34.1 vs. 41.8 %, χ^2 (1) = 5.93, p < 0.015). In the total sample, attrition rate for T_4 was 48.1 %. Specifically among the groups involved in bullying the attrition rate for T_4 was: being bullied (47.3 %), bully–victim (40.0 %), and aggressive toward others (56.7 %). Chi square tests for each sub-group involved in bullying showed no significant difference in proportional rates between those participating at T_4 versus those not.

Young adult outcomes associated with bullying involvement

Table 1 shows the mean scores for the different bullying involvement groups for ASR (Adult Self Report) broadband Total, Externalizing, Internalizing, Attention and Critical Problems scales, as well as MFQ depressive symptoms. As shown in Table 1, after controlling for gender and parents SES level, ANCOVAs indicated there were differences among the bullying involvement groups on ASR total-, externalizing- and internalizing-problems and the critical problems scales (all p < 0.001). Post hoc comparisons showed that being bullied, bully–victim, and aggressive toward others had significantly higher problem levels than non-involved. ASR attention problems were also significantly different, with post hoc comparisons showing that only bully–victims had significantly higher scores than non-involved. Moreover, depression symptom scores as measured on the MFQ (Mood and Feelings Questionnaire) were significantly different, with post hoc comparisons showing that being bullied and those being aggressive toward others had significantly higher scores than non-involved. However, post hoc comparisons showed only differences compared with the non-involved and no differences on any of the measurements between the groups involved in bullying occurred. After adjusting for baseline mental health as seen in Table 2, only depressive symptoms among those being bullied compared to non-involved, remained significant.

Comparing psychosocial functioning outcomes as descriptives (as shown in Table 3) and with ordinal logistic regressions (shown in Table 4), controlling for gender and parent SES, indicated that those being bullied had a higher risk of reporting reduced general functioning (*OR* 1.69, 95 % CI 1.21–2.36, p < 0.002) during the last year compared to the reference group of non-involved. Both those being bullied and aggressive toward others more often reported reduced leisure activities in comparison with non-involved (*OR* 1.76, 95 % CI 1.06–2.94, p = 0.03 and *OR* 2.53, 95 % CI 1.35–2.76, p = 0.004, respectively).

Using the 90th percentile as a cut-off value for being a high scorer on the ASR and MFQ scale, a series of univariate logistic regressions (see Table 5) controlled

Table 3 Dichotomized descriptive psychosocial and mental health characteristics as young adults (T_4) in different bullying involved groups in adolescence (Total N = 1266)

Variables	NNon-involved (*n* = 982) [%(n)]	Being bullied (*n* = 158) [%(n)]	Bully–victim (n = 39) [%(n)]	Aggressive toward others (n = 87) [%(n)]	Total sample (n = 1266) [%(n)]
Reduced functioning (Y/N)	40.6 (371)	55.4 (82)	44.4 (16)	44.7 (34)	39.7 (503)
Reduced leisure activities (Y/N)	6.3 (58)	10.1 (15)	2.8 (1)	13.2 (10)	6.6 (84)
Absence from school/work (Y/N)	7.9 (72)	8.8 (13)	13.9 (5)	10.5 (8)	7.7 (98)
Affected interpersonal relations (Y/N)	8.2 (75)	10.8 (16)	13.9 (5)	7.9 (6)	8.7 (102)
ASR total problem—high scorers (Y/N)[a]	8.1 (79)	17.1 (8)	20.5 (8)	19.5 (17)	8.8 (112)
ASR externalizing—high scorers (Y/N)[a]	9.3 (91)	13.9 (22)	23.1 (9)	20.7 (18)	11.1 (140)
ASR internalizing—high scorers (Y/N)[a]	8.2 (80)	16.5 (26)	23.1 (9)	18.4 (16)	10.3 (131)
ASR attention—high scorers (Y/N)[a]	9.9 (97)	12.7 (17)	23.1 (9)	19.5 (17)	11.1 (140)
ASR critical items—high scorers (Y/N)[a]	9.1 (89)	17.1 (27)	33.3 (13)	18.4 (16)	11.5 (145)
MFQ depressive symptoms—high scorers (Y/N)[a]	8.8 (86)	16.5 (26)	12.8 (5)	16.1 (14)	10.3 (131)
Received mental health help last year (Y/N)	28.2 (277)	39.2 (62)	28.2 (11)	35.6 (31)	30.1 (381)
Received mental health help earlier in life (Y/N)	33.1 (325)	48.7 (77)	38.5 (15)	41.4 (36)	35.8 (453)
Psychiatric hospitalization since T_2 (Y/N)	1.5 (15)	5.1 (8)	7.7 (3)	9.2 (8)	2.7 (34)

[a] Dichotomized being a high-scorer (90th percentile) versus low-to-moderate-scorer on mental health outcomes in young adulthood

Table 4 Adjusted odds ratios from ordinal logistic regression comparing the different bullying involved groups with the non-involved group in adolescence with the outcome of psychosocial functioning in young adulthood (Total N = 1266)

Non-involved vs.	Being bullied (n = 158)			Bully–victim (n = 39)			Aggressive toward others (n = 87)		
	OR	95 CI	P value	OR	95 CI	P value	OR	95 CI	P value
Reduced functioning	1.69	1.21–2.36	0.002	1.30	0.66–2.55	0.447	1.39	0.88–2.18	0.161
Reduced leisure activities	1.76	1.06–2.94	0.029	0.39	0.05–2.86	0.353	2.53	1.35–4.76	0.004
Absence from school/work	1.31	0.85–2.03	0.224	1.91	0.85–4.28	0.117	1.25	0.68–2.29	0.475
Affected interpersonal relations	1.27	0.82–1.95	0.285	0.93	0.36–2.41	0.879	0.93	0.49–1.76	0.819

Adjustments made for gender and parent SES. Range on all variables = 1–4, with higher scores indicating negative outcomes

Table 5 Adjusted odds ratios (95 % CI) from binary logistic regression analyses comparing the different bullying groups in adolescence and being a high-scorer (90th percentile) versus low-to-moderate-scorer on mental health outcomes in young adulthood (Total N = 1266)

Non-involved (n = 982) vs.	Being bullied (n = 158)			Bully–victim (n = 39)			Aggressive toward others (n = 87)		
	OR	95 CI	P value	OR	95 CI	P value	OR	95 CI	P value
ASR total problems	2.42	1.48–3.94	<0.001	3.36	1.41–8.04	0.006	3.28	1.82–5.93	<0.001
ASR externalizing problems	1.68	1.02–2.79	0.044	2.61	1.15–5.92	0.022	2.49	1.41–4.40	0.002
ASR internalizing problems	2.33	1.42–3.80	0.001	4.25	1.83–9.87	0.001	3.17	1.73–5.82	<0.001
ASR attention problems	1.28	0.74–2.19	0.379	3.24	1.47–7.15	0.004	2.37	1.32–4.21	0.004
ASR critical items	2.04	1.27–3.30	0.003	5.06	2.4–10.53	<0.001	2.32	1.29–4.19	0.005
MFQ depressive symptoms	1.92	1.18–3.13	0.009	1.89	0.71–5.05	0.206	2.19	1.17–4.10	0.014

Adjustments made for gender and parent SES

for gender and parent-SES were performed. The results showed that being bullied, bully–victims and aggressive toward others had an increased risk of being above the 90th percentile on the ASR total problem scale (all p values <0.01), on the ASR externalizing scale ($p < 0.05$, $p < 0.05$ and $p < 0.01$, respectively), and having an increased risk of reporting high scores on ASR internalizing problems compared to non-involved (all p-values ≤ 0.01). Further, being a high scorer on the ASR attention problem scale differed between bully–victims and those aggressive toward others compared to non-involved (both tests, $p = 0.004$). Moreover, those involved in bullying compared to non-involved, had increased risk of a being high-scorer on ASR critical problems (all p-values $p < 0.01$). However, when adjusting for baseline mental health in addition to gender and parent-SES (Table 6) results showed that only those being bullied and aggressive toward others had an increased risk of being above the 90th percentile on the ASR total problem scale [both $p < 0.05$) and ASR internalizing scale ($p = 0.017$ and $p = 0.014$, respectively)]. While those being bullied and bully–victims in addition had an increased risk of scoring above the 90th percentile on the ASR critical items ($p = 0.036$ and $p = 0.003$, respectively). Lastly, those being bullied and those aggressive toward others had in the analyses controlling for gender and parents SES level an increased risk of being a high-scorer on the MFQ, the depressive symptom scale, compared to non-involved ($p = 0.009$ and $p = 0.014$, respectively), while when adjusting for MFQ levels at T1 none of the associations remained significant.

A sensitivity analysis was performed to assess if a 90 % cut-off was reasonable, assessing different threshold levels on the actual outcome (85th, 90th, 95th percentiles). This analysis showed in terms of significance, similar results for the 85th and 90th percentile (as shown in the current Table 5).

As shown in Table 7, all groups involved in bullying in adolescence had four- to eight-fold higher risk of being hospitalized due to mental health problems since T_2 compared to non-involved. Those being bullied in adolescence reported as young adults' 63 % higher risk of receiving any help due to mental health problems during the last year, and 94 % increased risk of having received any help earlier in life, compared to non-involved. However, the other bullying involved groups were no different from non-involved.

Table 6 Adjusted odds ratios (95 % CI) from binary logistic regression analyses comparing the different bullying groups in adolescence and being a high-scorer (90th percentile) versus low-to-moderate-scorer on mental health outcomes in young adulthood (Total N = 1266)

Non-involved (n = 982) vs.	Being bullied (n = 158)			Bully–victim (n = 39)			Aggressive toward others (n = 87)		
	OR	95 CI	P value	OR	95 CI	P value	OR	95 CI	P value
ASR total problems	1.87	1.12–3.11	0.017	1.75	0.69–4.44	0.238	2.17	1.16–4.07	0.016
ASR externalizing problems	1.34	0.79–2.26	0.274	1.55	0.65–3.70	0.323	1.78	0.97–3.24	0.061
ASR internalizing problems	1.87	1.12–3.10	0.017	2.43	0.99–6.00	0.053	2.22	1.17–4.21	0.014
ASR attention problems	1.06	0.61–1.85	0.843	2.07	0.90–4.81	0.089	1.76	0.95–3.24	0.071
ASR critical items	1.70	1.03–2.79	0.036	3.31	1.52–7.20	0.003	1.73	0.93–3.23	0.083
MFQ depressive symptoms	1.61	0.97–2.68	0.064	1.20	0.43–3.39	0.726	1.62	0.84–3.14	0.154

Adjustments made for gender and parent SES and and baseline mental health score

Baseline mental health score for ASR(T4); YSR total problem score (T_1), baseline mental health score for MFQ(T4); baseline MFQ score (T_1)

Table 7 Adjusted odds ratios (95 % CI) from binary logistic regression adjusted with gender and parent—SES comparing the different bullying involved groups with the non-involved group in adolescence on reported received mental health help and inpatient hospitalization since T_2 as young adults due to mental health problems (Total N = 1266)

Non-involved vs.	Being bullied (n = 158)			Bully–victim (n = 39)			Aggressive toward others (n = 87)		
	OR	95 CI	*P* value	OR	95 CI	P-value	OR	95 CI	P-value
Received mental health help last year	1.63	1.15–2.33	0.007	1.18	0.57–2.43	0.656	1.51	0.95–2.40	0.084
Received mental health help earlier in life	1.94	1.38–2.74	<0.001	1.41	0.71–2.79	0.328	1.57	99–2.46	0.051
Psychiatric hospitalization since T2	3.94	1.58–9.82	0.003	8.13	2.14–30.88	0.002	8.63	3.84–22.00	<0.001

Adjustments made for gender and parent SES

Discussion

The aim was to examine associations between bullying experiences at 14–15 years and mental health problems and psychosocial functioning in young adulthood at 27 years. In the results, controlling for gender and parents SES level, all groups involved in bullying in adolescence reported higher levels of mental health problems in adulthood, including broadband total, externalizing and internalizing problems, compared to the group who reported no such experience. Moreover, bully–victims reported significantly higher attention problems in adulthood compared with non-involved. Also those being bullied and those aggressive toward others reported more depressive symptoms as measured by the MFQ. However, when adjusting for baseline mental health problems, only those being bullied retained a significant result on depressive problems. Results controlling for gender and parents SES level and in addition adjusted for baseline mental health showed that being involved in bullying as being bullied, bully–victim or aggressive toward others increased the odds of reporting a higher odds of being a high scorer on problems scales across the range of mental health outcomes compared to non-involved. These findings suggest that not only does involvement in bullying in adolescence act as a risk factor across the mental health spectrum in young adulthood, but also that there is a disproportional shift toward the top end of that range. This suggests that involvement in bullying contribute to vulnerability to mental health problems in young adulthood, and should be seen as a harmful public health risk.

Research has previously established that bullying may be a risk factor for later depression in adolescence [14] and young adulthood [1]. Regarding later depressive problems the results in the present study show, when adjusting for baseline depressive symptom levels, that those being bullied report significantly more depression symptoms than those non-involved in young adulthood. The finding that those being bullied specifically have a depression outcome is a strong argument that victims experience long-term impairment in the long run by their experience. However, when assessing high scorers of mental health problems versus low-to middle scorers, in controlled analyses, both victims and those aggressive toward others show high levels of internalizing problems, however not on depressive symptoms. Internalizing problems are not only composed of depression but also contain components such as anxiety, fear and withdrawal from social contacts. Starr and Davila [43]

found that while there were many features common to both depression and general anxiety, social anxiety has shown to have a greater correlation with peer variables (e.g., social competence, communication in friendships). Bullying has been characterized as a peer relationship problem [44]. Involvement in bullying both as victim and aggressor might be an anxiety provoking experience, which could leave longstanding marks. It is thus particularly important to understand the development of anxiety from adolescence to young adulthood among those who are involved in bullying.

A possible link between an aggressive trait and depression and other internalizing symptoms, may be mediated through relational problems i.e. domestic problems with depression and anxiety as a possible outcome. Surprisingly, bully–victims did not report significantly elevated depressive symptoms, which might be the result of the small size of this group in this study. On the other hand, it could be that bully–victims have another reaction pattern than the other bullying involvement groups. Given that bully–victims display more adjustment problems among all children involved in bullying [45], it could in the long run turn into more externalizing problem tendencies such as rule-breaking behavior or a tendency to reactive aggression or other internalizing problems such as anxiety [46]. This was in part confirmed by our findings, when high-scorers compared to low-to-moderate scores with non-involved as baseline, bully–victims had higher odds than the other involved groups in bullying on internalizing and critical problems in both analyses adjusted and unadjusted for baseline mental health.

Critical problems may indicate a clinical concern and behavior that deviate markedly from more typical problem behavior, such as breaking things belonging to others or self-harm. Those involved in bullying, again regardless of type of experience, reported more critical problems than those non-involved, Also, a higher proportion of high-scorers on critical problems were evident in the groups involved in bullying than those non-involved. However, when adjusting for baseline mental health these finding were retained for those being bullied and bully–victims only. In line with the externalizing and internalizing findings, those involved in bullying in adolescence seems to be at risk for significant psychiatric morbidity in young adulthood and victims being strongest affected. This finding was confirmed in that all those involved in bullying in adolescence had higher risk of having a history of hospitalization due to mental health problems in young adulthood.

We hypothesized that adolescent bullying involvement would predict poorer psychosocial functioning in young adulthood including reduced leisure activities, more absence from school/work, and affected interpersonal relations. Results partly confirmed this in that those being bullied reported reduced general psychosocial functioning as young adults compared to those non-involved and both those being bullied and aggressive toward others reported reduced leisure activities. A general reduced psychosocial functioning in young adulthood could be caused by social vulnerability and trust issues caused by past bullying experiences [47]. Further, the results could be mediated by, the higher levels of depression symptoms reported among those being bullied and being aggressive toward others in adolescence. This could imply that being depressed could negatively impact the level of leisure activities.

The 14 year length of time between the first measurement of bullying-involvement and measurement of mental health and psychosocial functioning adverse outcomes might indicate a long lasting effect on the individual. In regard to using the health system as young adults, only the group being bullied was significantly more likely than non-involved to have been receiving mental health services earlier in life and in the last year. Those being bullied appear to be at higher risk of currently using mental health services even if the bullying exposure happened over a decade in the past. However, all groups involved in bullying had increased risk of mental health hospitalization since T_2: those being bullied reported a four-fold higher risk and both bully–victims and those aggressive toward others reported an eight-fold higher risk than their non-involved peers. This is an important marker of severity of mental health problems in adulthood which adds to previous findings that adverse mental health outcomes associated with involvement in childhood bullying are also exhibited into adulthood [1, 5, 6, 48].

Strengths and limitations

The longitudinal perspective in this study captures an important developmental transition from dependent childhood to early adulthood when considerable, if not complete, independence is expected [49]. It provides stronger evidence how bullying involvement can exhibit effects over a decade later than previous studies have been able to do relying on clinical samples or retrospective reports.

Whereas the sample followed in the present study is representative of the community from the region of Mid-Norway, it is not a national representative sample. All data were based upon self-report. Respondents might for various reasons give inaccurate or biased information, such as social conforming responses. However, when confidentiality and anonymity are granted as in this study, self-report typically has high reliability and validity [50].

Social ecological theory [24] and the diathesis-stress model [26] have been used to explain how stressful life experiences such as bullying interact with biology to influence the development of mental health problems. Although difficult to assess in a non-experimental design, it is probable that these relations are transactional, with preexisting mental health problems also putting individuals at greater risk for stressful life experiences and vice versa stressful life experiences put the individual at risk for mental health problems. Young adolescents who are involved in bullying may have characteristics that make them more vulnerable for mental health problems, i.e. those aggressive toward others could initially have more externalizing problems and those being bullied could have more introvert, non-assertive behavior. Our analyses controlling for baseline mental health does only partly address the suspected bidirectional relationship between mental health problems and bullying involvement as temporal priority is the foremost criterion for testing causal effects.

Bully–victims were a relatively small group in our sample with large variations in outcomes. Many of the findings in the unadjusted analyses disappeared when the analyses were controlled for baseline mental health at T1. This might be caused by a small group size, with differences not reaching significance levels and because long term outcomes in this group was strongly related to mental health problems already apparent already at the age of 14. Future research with larger samples should explore bully–victims in particular with regard to mental health and psychosocial functioning.

Another limitation of our study is the measure of "aggressive toward others" represented by four questions. These do not specify forms of bullying nor exclusively toward peers. Importantly, relational aggression, such as spreading rumors or excluding individuals from social groups, which has been found to be more characteristic of female bullies, is not addressed in this measure [51]. Therefore, the group "aggressive toward others" may be over-represented in our sample by male bullies, who more often engage in this type of bullying.

A limitation to the assessment of bullying involvement was that it was measured only in the two last years of middle school. Ideally one would have liked to follow the adolescents up after each school year within middle school and possibly over to the first years of high-school, to get an even better understanding of the developmental trajectories of involvement in bullying. This was not done, due to economic constraints. However, several studies has shown that involvement in bullying peaks in the end of middle school, followed by a decline as high school precedes [52,53].

Using post hoc thresholds of item scales has its limitations. The very best option to delineate those in the normal range versus clinical range would have been to observe people with different levels for a sustained period, and identify a threshold beyond which people start feeling the burden in some sense. However, this is an extremely complex procedure involving consultation from experts, and is beyond the scope of our research material. A sensitivity analysis using different thresholds levels showed that the 90th percentile was robust as a cut-off point.

Although the response rate was excellent at both T_1 and T_2, it was modest at T_4, although this was 14 years after the first wave and a drop in response rate certainly would be expected. In our study, we obtained follow-up data from 1266 individuals. We regard the follow up rate (51.9 %) as neither particularly low nor high, compared to what is often seen in observational studies over this duration. Moderate response rates can be a problem if the sample is systematically different from the population it is supposed to represent. Attrition analyses showed that even if there were small differences between the responders and non-responders regarding gender, parent SES and ethnicity, there were no differences in attrition associated with bullying involvement. Moreover, this sample is large and heterogeneous and constitutes variation in gender and geographical and sociocultural markers, indicating that the sample is valid and likely generalizable to the target population.

Conclusion

The present study has some main findings. Firstly, all groups involved in bullying in young adolescence had adverse mental health outcomes at 27 years compared to non-involved. Specifically, those being bullied and those being aggressive toward others showed reduced mental health in adulthood compared with non-involved and both groups showed reduced leisure activities than their non-involved peers. Those being bullied were strongly affected, especially regarding increased total sum of depressive symptoms and high levels of total, internalizing and critical symptoms, increased risk of having received help for mental health problems and reduced functioning because of a psychiatric problem. While those being aggressive toward others showed high levels of total and internalizing symptoms. Both those being bullied and bully–victims showed an increased risk of high levels of critical symptoms. Lastly, those involved in bullying as being bullied, bully–victim and aggressive toward others, had increased risk of psychiatric hospitalization because of mental health problems since T_2, compared to those who had no bullying experience. These findings reinforce implementing zero-tolerance

policies toward bullying in schools and provide a strong argument that prevention of bullying should start as early as possible. In the clinical practice questions about past bullying experiences should not be missed as it seems to be highly relevant to mental health outcomes in young adulthood.

Authors' contributions
JFS, AMU and AMS participated in the design the study, performed the analysis and drafted the article. JW participated in description and design of the study, as well as drafting of the article. SL was essential in the design, statistical analysis and presentation of results. All authors read and approved the final manuscript.

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Compliance with ethical guidelines

Competing interests
The authors declare that they have no competing interests.

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Paper III

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The Longitudinal Association of Being Bullied and Gender with Suicide Ideations, Self-Harm, and Suicide Attempts from Adolescence to Young Adulthood: A Cohort Study

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Longitudinal associations between being bullied during adolescence and suicide ideations, self-harm, and suicide attempts into young adulthood were examined. A large representative sample was examined in 1998 (N = 2,464, MA 13.7), 1999/2000, and 2012 to reassess the outcome measures. At all ages, bullied participants showed more suicide ideation, self-harm, and suicide attempts, regardless of gender. Bullied females showed a decrease in suicide ideation from adolescence to adulthood, while bullied males showed an increase in suicide attempts in the same time period. Being bullied in adolescence strongly predicts suicidal behavior and self-harm. Preventive efforts might reduce the risk of later suicidality.

Extensive research has examined bullying's link with suicide ideation, self-harm, and suicide attempts (e.g., Klomek et al., 2008; Olweus, 1991; Roland, 2002; Undheim & Sund, 2010). Bullying, intimidation, and victimization involve more powerful peers repeatedly targeting an individual with negative actions (Olweus & Limber, 2010). Bullying may manifest as teasing, active exclusion from a social group, or physical assault (Roland, 2002).

Bullying is common among adolescents. Globally, rates of being bullied are reported to be 6%–35% among adolescents (Craig et al., 2009; Undheim & Sund, 2010). The rate differs significantly between the genders: In 29 of 40 countries, girls aged 11–15 years had higher occurrence of

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bullying than boys in the same age group (Craig et al., 2009). Being bullied becomes less prevalent starting in middle school, independent of gender (Baly, Cornell, & Lovegrove, 2014; Smith, Madsen, & Moody, 1999). In adolescence, males are more likely to be physically bullied (Undheim & Sund, 2010), whereas females are more likely to be exposed to more covert forms of bullying, such as gossip and social exclusion (Craig & Pepler, 2003).

A spectrum of suicidal behavior exists among humans; thinking about death and suicide and committing suicide constitute this spectrum's extremes (Bridge, Goldstein, & Brent, 2006). Self-harm and suicidal acts are forms of self-injurious behavior and often diverge regarding frequency, intention, and lethality (Hamza, Stewart, & Willoughby, 2012). In an international meta-analysis study, the last-year prevalence of suicide attempts and nonsuicidal self-harm among adolescents aged 14–19 years was 3%–15% and 7%–16.2%, respectively (Madge et al., 2008); in another study examining seven European countries, the average lifetime and 1-year prevalence of deliberate self-harm among adolescents aged 15–16 years were 17.8% and 11.5%, respectively (Madge et al., 2008). In Norway, 1-year incidence rates for self-harm and suicide attempts are 3.6% and 1.7% for 14- to 15-year-olds and 13.8% and 4.5% among somewhat older adolescents (Larsson & Sund, 2008; Tørmoen, Rossow, Larsson, & Mehlum, 2013). People who self-harm are more likely to attempt suicide (Lipschitz et al., 1999; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006) and complete suicide (Angst, Stassen, Clayton, & Angst, 2002). Self-harm and suicide attempts tend to emerge during early adolescence and are most common in the early twenties (Klonsky, Victor, & Saffer, 2014). In Norway, the rate of suicide increased 2.5 times from the 1970s to the 1990s and then stabilized (Mehlum, Gjertsen, & Hytten, 2000) and is most common among adults aged 20–29 years (16.6 per 100,000 individuals; Mehlum et al., 2000). In that age group, the rate of suicide is two to three times higher among males than among females (SSB, 2015).

Factors causing self-harm and suicidal behavior are complex; however, mental health problems appear to explain 50%–90% of suicides (Cavanagh, Carson, Sharpe, & Lawrie, 2003; Harris & Barraclough, 1997). Contextual and relational factors may also predict suicidal behavior (Hjelmeland & Knizek, 2013). During adolescence, males and females undergo rapid physical, cognitive, and interpersonal development. Insecure attachment, independence issues, and problematic social peer relations (i.e., bullying) are common during adolescence and the transition from adolescence to adulthood (i.e., emerging adulthood; Arnett, 2000). Bullying's characteristic psychological maltreatment (Hart & Glaser, 2011) may attack the individual's need for fulfillment and lead to degradation, humiliation, and loss of personal and social value, thereby promoting suicide ideation, self-harm, and suicide attempts. Individuals bullied during adolescence have shorter education, poorer spouse/partner relationships (Sigurdson, Wallander, & Sund, 2014), less work participation (Strøm et al., 2013), and higher unemployment (Varhama & Björkqvist, 2005); these effects may impede establishment of a career path. Failure to complete stage-salient tasks appears to promote behavioral disorders, impede completion of subsequent tasks (Cicchetti & Rogosch, 1999), and increase suicide risk, especially among males (Conner & Goldston, 2007). In this context, examining bullying's relationship with suicidal behavior —particularly regarding gender differences in bullying's effects—may help to differentiate interventions aiming to protect or assist bullying victims.

Gender may moderate bullying's relationship with suicide ideation and self-harm. Females more commonly have suicide ideation (Reinherz et al., 1993) and suicidal behavior (Borges et al., 2010; Hjelmeland & Bjerke, 1996); however, completed suicide is more common among males (Canetto & Sakinofsky, 1998). Specifically,

females more commonly attempt suicide in adolescence, but this rate decreases in young adulthood (Thompson & Light, 2011); in contrast, males' rate of attempting suicide remains fairly constant over time (Canetto & Sakinofsky, 1998).

Peer victimization predicts subsequent suicide ideation and suicidal behavior; however, longitudinal research of this topic is required (Klomek, Sourander, & Gould, 2010). Additionally, few studies have examined bullying's association with suicide attempts. Some studies have longitudinally examined bullying's effect on suicidal behavior. Peer victimization predicts suicide ideation, self-harm, and suicide attempts up to age 25, controlling for child abuse, maladaptive parenting, domestic violence, and mental health problems (Winsper, Lereya, Zanarini, & Wolke, 2012). In a prospective longitudinal study covering 50 years, bullied individuals more commonly experienced depression, anxiety disorders, and suicidality (Takizawa, Maughan, & Arseneault, 2014). No research has longitudinally tested whether gender moderates the relationship between being bullied and suicide ideation, self-harm, or suicide attempts. Therefore, in this study we examined concurrent and longitudinal associations between being bullied and suicide ideation, self-harm, and suicide attempts in a representative community sample over 14 years, starting when participants were 13.7 years old. We expected that bullied participants would more commonly report suicide ideation, self-harm, and suicidal attempts at all assessment points and that gender would moderate the observed associations. The study's explicit aims were as follows:

1. To examine the association between being bullied (at T_1) and suicide ideation in adolescence and young adulthood.
2. To examine the association between being bullied (at T_1) and self-harm and suicide attempts in adolescence and young adulthood.

METHOD

Sampling Procedure

The Youth and Mental Health Study is a longitudinal study conducted in mid-Norway to examine risk and protective factors in the development of mental health in adolescents aged 12–15 years (Sund, 2004). In autumn 1998, from the total population of 9,292 adolescents aged 13–14 years and attending eighth and ninth grade in Trøndelag, a representative sample of 2,813 students (98.5% attending public schools) was drawn from 22 schools with probability according to school size (cluster sampling). Twenty-one students (0.7%) were ineligible (e.g., due to hospital admission, temporary vacation, or insufficient knowledge of Norwegian). Thus, 2,792 adolescents were eligible and 2,464 participated (88.3%; further sampling details are presented in Sund, Larsson, & Wichstrom, 2001).

Sample and Assessment Points in Adolescence

In 1998 (T_1), baseline data were collected: Participants were aged 13.7 ± 0.58 years (N = 2,464, range: 12.5–15.7; 50.8% female; response rate: 88.3%). Participants were divided among four strata: (1) City of Trondheim (n = 484, 19.5%), (2) Suburbs of Trondheim (n = 432, 17.5%), (3) Coastal region (n = 405, 16.4%), and (4) Inland region (n = 1,143, 46.4%; Sund, 2004). In 1999 (T_2), the participants were aged 14.9 ± 0.6 years (range: 13.7–17.0; 50.4% girls; N = 2,432). One hundred four participants from T_1 dropped out at T_2; 72 new participants (who had changed their mind about participating) were added from the same schools. Data were collected using questionnaires completed during school time.

Sample in Young Adulthood (T_4)

Individuals participating at T_1 or T_2 (N = 2,532) completed a follow-up survey

in young adulthood during the spring of 2012 (completed either online or on paper, $n = 1{,}260$ and $n = 6$, respectively; referred to as T_4 because a portion of the T_2 sample participated in an unrelated assessment at 20 years, T_3). T_4 occurred approximately 13.5 years after T_1; participants' mean age was 27.2 ± 0.59 years (range: 26.0–28.2). At T_4, 92 participants were ineligible due to death or unknown home address ($n = 13$ and $n = 79$, respectively); accordingly, 2,440 participants were invited to participate and 1,266 participated (51.9%; 56.7% female). All waves of data collection were approved by the Regional Committee for Medical Research Ethics in Central Norway.

Independent Variable at T_1

Being Bullied. Participants reported if they have ever been (1) teased, (2) physically assaulted, or (3) excluded from peer relationships at school or while traveling to or from school during the last 6 months; responses used a 5-point scale (0 = *never*, 1 = *1–2 times*, 3 = *about once a week*, 4 = *2–3 times a week*, and 5 = *more often*; Alsaker, 2003). Following Roland (2002), responses were dichotomized (1 = *once a week or more*, 0 = *twice or less in the past 6 months*). Participants were classified as being bullied if they had a dichotomized score of 1 on one or more items; otherwise, they were classified as nonbullied. In addition, as an alternate approach, those being bullied were ordinal-scored using a sum score of the three variables indicating bullying, with scoring similar as the 5-point scale.

Outcome Measures at T_1, T_2, and T_4

Suicide ideation was assessed using an original scale that included five items. Four were from the Mood and Feelings Questionnaire (Angold et al., 1987) containing 33 items examining depressive symptoms experienced in the last 2 weeks among children aged 8–18 years: *I thought that life was not worth living; I thought about death or dying; I thought my family would be better off without me;* and *I thought about killing myself*. One item from the Center for Epidemiologic Studies Depression Scale (Andrews, Lewinsohn, Hops, & Roberts, 1993) was added: *I would have killed myself if I had known a way of doing it*. Responses to these items used a 3-point scale (0 = *not true*, *1 = sometimes true*, 2 = *true*). The sum score ranged from 0 to 10 and was skewed. Therefore, responses were truncated to a 4-point ordinal scale (0 = 0, *none*; 1–1.5 = 1, *low*; 1.5–6 = 2, *moderate*; 6–10 = 3, *severe*). The scale's internal consistency was satisfactory at each time point using Cronbach's α and average-corrected item-total correlations (AITCs). Internal consistency was T_1: $\alpha = 0.821$, AITC = .63; T_2: $\alpha = 0.866$, AITC = .70; and T_4: $\alpha = .861$, AITC = .71.

Self-harm was measured by the question *Have you ever deliberately taken an overdose of pills or in any other way tried to hurt yourself?* Possible responses were *No, never*; *Yes, once*; and *Yes, several times* (Wichstrøm, 2000). Responses were dichotomized (1 = *Yes, once* or *Yes, several times;* 0 = *No, never*).

Suicide attempts were measured using the question *Have you ever tried to commit suicide?* Possible responses were *No, not really*; *Yes, once*; and *Yes, several times* (Wichstrøm, 2000). Responses were dichotomized as 1 = *Yes, once* or *Yes, several times*, and 0 = *No, never*.

Socioeconomic status (SES) was measured at T_1 by participants' report of their mother and father's occupation and with an open question asking what their parents did at work; responses were classified following the ISCO-88 (ILO, 1990) into *professional leader, upper middle class, lower middle class, primary industry,* and *manual worker*. The father's occupation was used unless the participant lived with their mother only, in which case mother's occupation was used.

Ethnicity was measured at T_1 by the participants' report of their parents' origin: 2.6% of participants had two non-Norwegian parents ($n = 65$); the majority

of these participants had parents from outside Europe (n = 39, 1.6%). Twenty-two (0.9%) were also foreign adopted, but age of adoption was not registered. These figures are equivalent with national data for the same age groups at the time (SSB, 2001).

Statistical Analysis

At each time point, frequency of suicide ideation, self-harm, and suicide attempts was stratified by bullying status (i.e., bullied vs. nonbullied) and gender. Regarding bullying status, frequency of suicide ideation, self-harm, and suicide attempts was compared between time points using chi-square tests for binary data and linear-by-linear tests for ordinal data. We compared the risk of suicide ideation, self-harm, and suicide attempts between bullied versus nonbullied and between the genders. The main analysis used generalized linear mixed models (GLMMs; Demidenko, 2004). We carried out analyses with suicide ideation, self-harm, and suicide attempts as respective dependent variables and conducted intra-group analysis of changes over time among the groups. We used an ordinal logistic GLMM with suicide ideation categorized into four categories, and binary logistic models for self-harm and suicide attempt. A time index with each time point and parents' SES were included as categorical covariates. Gender and bullied status were included as binary covariates (an alternate analysis was also carried out using bullied status as an ordinal covariate). We included all two-way and three-way interactions among these covariates to obtain a realistic model with all possible interaction effects. Few participants had non-Norwegian ethnicity; therefore, ethnicity's effect was not analyzed. The model included a random effect of each individual. Results are reported separately by gender; 95% confidence intervals are reported where relevant. Values of $p < .05$ were considered significant. Analysis was performed using SPSS version 22 (Armonk, NY: IBM Corp., 2013).

RESULTS

Demographic Characteristics

Nearly one tenth (9.9%) of participants were bullied at T_1 (233 of 2,532), and were divided into the following groups: *females, nonbullied; females, bullied; males, nonbullied;* and *males, bullied*. Gender did not significantly affect bullying prevalence (females, bullied: n = 12, 10.0%; males, bullied: n = 112, 9.7%; p = .784). The different forms of being bullied were distributed as follows: for girls and boys, respectively: teasing, 8.7% and 7.7%; physical assault, 1.4% and 2.8%; and exclusion, 3.9% and 3.3%.

Attrition Analysis

Gender, parental SES, ethnicity, and bullying at T_1 were compared between responders and nonresponders at T_4. Responders were more commonly female [56.9% vs. 44.4%, $\chi^2(1) = 39.44$, $p < .001$], and fewer were with non-Norwegian background [1.7% vs. 3.6%, $\chi^2(1) = 8.79$, $p = .003$]. Parental SES differed significantly between responders and nonresponders [$\chi^2(4) = 27.20$, $p < .001$]. More responders were upper middle class [33.6% vs. 25.5%, $\chi^2(1) = 17.19$, $p < .001$], and fewer were workers [34.1 vs. 41.8, $\chi^2(1) = 5.93$, $p < .015$]. The rate of bullying (assessed at T_1) did not differ significantly between responders and nonresponders.

Outcome Characteristics

Bullied participants of either gender were significantly more likely to report suicide ideation, self-harm, and suicide attempts at all time points ($p > .001$–$.027$; Table 1). The risk differences between bullied and nonbullied were larger among females (Table 2), except regarding suicide attempts

TABLE 1
Distribution of Outcome Variables of Suicide Ideation, Self-Harm, and Suicide Attempts by Gender and Time Point (N = 2,532)[a]

		T_1		T_2		T_4	
Outcome	Range	Nonbullied (%) *n*	Being bullied (%) *n*	Nonbullied (%) *n*	Being bullied (%) *n*	Nonbullied (%) *n*	Being bullied (%) *n*
Suicide ideation							
Female	None	69.6 (753)	44.6 (54)	69.1 (717)	52.2 (60)	86.1 (516)	67.7 (44)
	Low	17.5 (189)	20.7 (25)	14.4 (149)	14.8 (17)	4.8 (29)	18.5 (12)
	Moderate	11.4 (123)	23.1 (28)	13.4 (139)	23.5 (27)	7.7 (46)	7.7 (5)
	Severe	1.6 (17)	11.6 (14)	3.1 (32)	9.6 (11)	1.3 (8)	6.2 (4)
Male	None	85 (883)	61.3 (68)	85.3 (856)	63.6 (68)	81.1 (348)	71.1 (32)
	Low	7.7 (80)	12.6 (14)	7.9 (79)	12.1 (13)	8.2 (35)	11.1 (5)
	Moderate	6.5 (68)	22.5 (25)	5.7 (57)	20.6 (22)	8.9 (38)	15.6 (7)
	Severe	0.8 (8)	3.6 (4)	1.2 (12)	3.7 (4)	1.9 (8)	2.2 (1)
Self-harm							
Female	No	93.9 (1,010)	79.5 (93)	89.3 (913)	72.8 (83)	86.7 (517)	76.6 (49)
	Yes	6.1 (66)	20.5 (24)	10.8 (111)	27.2 (31)	13.3 (79)	23.4 (15)
Male	No	97.9 (1,009)	92.8 (103)	95.7 (950)	84.8 (89)	96.5 (408)	88.6 (39)
	Yes	2.1 (22)	7.2 (8)	4.3 (43)	15.2 (16)	3.5 (15)	11.4 (5)
Suicide attempts							
Female	No	96.7 (1,039)	87.9 (102)	93.8 (955)	80.5 (91)	93.8 (558)	90.8 (59)
	Yes	3.3 (35)	12.1 (14)	6.2 (63)	19.5 (22)	6.2 (37)	9.2 (6)
Male	No	98.7 (1,016)	94.5 (103)	97.9 (970)	88.7 (94)	96.9 (408)	84.1 (37)
	Yes	1.3 (13)	5.5 (6)	2.1 (21)	11.3 (12)	3.1 (13)	15.9 (7)

[a]Adolescents assessed at three time points: mean age 13.7 (T_1), mean age 14.9 (T_2), and mean age 27.2 (T_4) (*N* = 2,532).

TABLE 2
Risk Differences Over Time in Suicide Ideation, Self-Harm, and Suicide Attempts for Those Nonbullied (N = 2,361) Versus Being Bullied (N = 233) in Adolescence[a]

Outcome	Groups	Range	%Risk diff. at T_1	%Risk diff. at T_2	%Risk diff. at T_4
Suicide ideation	Female	Low	3.2	0.4	15.8
		Moderate	11.7	10.1	3.5
		Severe	10.0	6.5	5.5
	Male	Low	4.9	4.2	2.9
		Moderate	16.0	14.9	6.7
		Severe	2.8	2.5	0.3
Self-harm	Female	Yes	14.5	14.8	10.1
	Male	Yes	5.1	11.0	7.9
Suicide attempts	Female	Yes	10.8	13.3	3.0
	Male	Yes	4.2	9.2	12.8

[a]Adolescents assessed at three time points: mean age 13.7 (T_1), mean age 14.9 (T_2), and mean age 27.2 (T_4) (*N* = 2,532).

TABLE 3
Effect of Being Bullied Separated by Gender with Suicide Ideation, Self-Harm, and Suicide Attempts Using Ordinal or Binary Logistic GLMM Regression (N = 2,532)[a,b]

Outcome	Gender	Time point	OR[c]	CI lower	CI upper	*p* Value
Suicide ideation[d]	Female	T_1	3.10	2.15	4.47	.000
		T_2	2.37	1.61	3.47	.000
		T_4	2.68	1.52	4.73	.001
	Male	T_1	3.97	2.62	6.03	.000
		T_2	3.63	2.37	5.57	.000
		T_4	1.76	0.89	3.49	.103
Self-harm[e]	Female	T_1	4.01	2.37	6.78	.000
		T_2	3.30	2.07	5.26	.000
		T_4	1.91	1.01	3.63	.047
	Male	T_1	3.15	1.31	7.59	.011
		T_2	4.62	2.47	8.67	.000
		T_4	3.86	1.31	11.41	.014
Suicide attempts[e]	Female	T_1	4.07	2.07	7.82	.000
		T_2	3.90	2.26	6.73	.000
		T_4	1.30	0.49	3.45	.600
	Male	T_1	5.12	1.85	14.14	.002
		T_2	6.26	2.94	13.30	.000
		T_4	6.06	2.25	16.36	.000

CI, confidence interval.
[a]Being bullied status, gender, and time points and their interactions as covariates. Parent socioeconomic status (T_1) as covariate only.
[b]Adolescents assessed at three time points: mean age 13.7 (T_1), mean age 14.9 (T_2), and mean age 27.2 (T_4).
[c]Ordinal logistic regression with four-category outcome.
[d]Binary logistic regression.

among males in young adulthood (males: 12.8; females: 3.0).

Mixed Models: Main Results

A comparison of odds ratios (ORs) of suicide ideation, self-harm, and suicide attempts between bullied and nonbullied participants in separate GLMM analyses at each time point are shown in Table 3; these examined the main effects of being bullied and time on all outcome variables, with gender and parents' SES as covariates and considering all two- and three-way interactions. Overall, bullied participants were more likely to report suicide ideation, self-harm, and suicide attempts at all time points; except at T_4, bullied females do not have significantly higher suicide attempts than their nonbullied peers and bullied males have not significantly higher suicide ideation than their nonbullied peers. The results measuring being bullied at an ordinal level were consistent with being bullying measured at a dichotomized level (the results of the latter shown here).

Mixed Models: Intragroup Change Over Time Among Gender and Bullying Status

We used the GLMMs to examine intragroup change over time. Figures 1–3 illustrate differences in the groups' trajectories regarding suicide ideation, self-harm, and suicide attempts (T_1 vs. T_2, T_2 vs. T_4, and T_1 vs. T_4, all findings shown). Regarding suicide ideation (Figure 1), bullied and

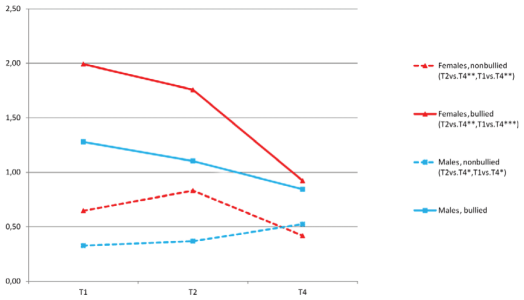

Figure 1. Mean values of suicide ideation for the groups females, nonbullied; females, bullied; males, nonbullied; and males, bullied, assessed at mean age 13.7 (T_1), mean age 14.9 (T_2), and mean age 27.2 (T_4) (N = 2,532).[1,2] *Note.* [1]Intragroup GLMM comparisons between time points: ***p < .001, **p < .005, *p < .05. [2]Females, nonbullied (n = 1,085), females, bullied (n = 121), males, nonbullied (n = 1,043), and males, bullied (n = 112). [Color figure can be viewed at wileyonlinelibrary.com]

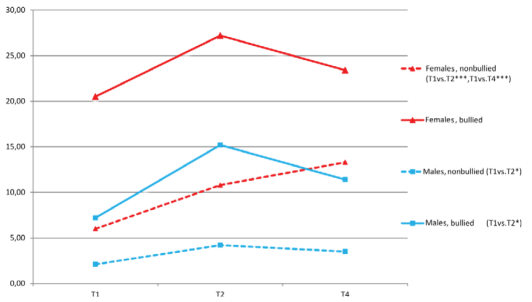

Figure 2. Percentages of self-harm for the groups females, nonbullied; females, bullied; males, nonbullied; and males, bullied, at mean age 13.7 (T_1), mean age 14.9 (T_2), and mean age 27.2 (T_4) (N = 2,532).[1,2] *Note.* [1]Intragroup GLMM comparisons between time points: ***p < .001, **p < .005, *p < .05. [2]Females, nonbullied (n = 1,085), females, bullied (n = 121), males, nonbullied (n = 1,043), and males, bullied (n = 112). [Color figure can be viewed at wileyonlinelibrary.com]

nonbullied participants' trajectories were similar but began at different levels. Among females, suicide ideation decreased from T_1 and T_2 to T_4, independent of bullying (p < .05–.001); however, for males, it increases slightly (T_1 vs. T_4, T_2 vs. T_4, both p values < .05) among nonbullied. Self-harm (Figure 2) shows a pattern with an increase in prevalence of self-harm from T_1 versus T_2 and T_1 versus T_4 among nonbullied females (both p < .001) and from T_1 to T_2 among both nonbullied and bullied males (both p < .05). Regarding suicide attempts (Figure 3), bullied females decreased their levels of suicide attempts from T_2 to T_4 (p < 0.05), while nonbullied females had an increase from T_1 to T_2 and from T_1 to T_4 (p < .005). Both bullied and

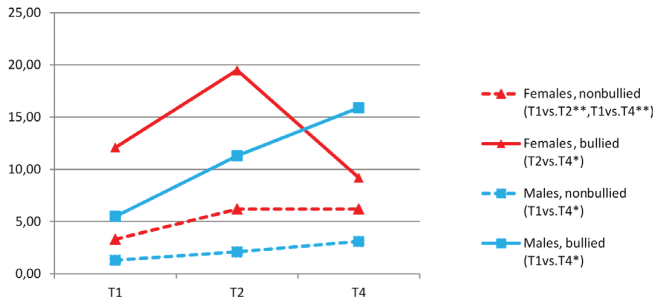

Figure 3. Percentages of suicide attempts for the groups females, nonbullied; females, bullied; males, nonbullied; and males, bullied, at mean age 13.7 (T_1), mean age 14.9 (T_2), and mean age 27.2 (T_4) (N = 2,532).[1,2] *Note.* [1]Intra-group GLMM comparisons between time points: ***$p < .001$, **$p < .005$, *$p < .05$. [2]Females, nonbullied (n = 1,085), females, bullied (n = 121), males, nonbullied (n = 1,043), and males, bullied (n = 112). [Color figure can be viewed at wileyonlinelibrary.com]

nonbullied males have a heightened level of suicide attempts at T_4 compared to T_1 (both $p < .05$).

DISCUSSION

In this study we examined bullying's association with the development of suicide ideation, self-harm, and suicide attempts from adolescence to young adulthood and the possible moderating effect of gender on these associations. Overall, the following patterns were evident: Bullied females most commonly reported suicide ideation, self-harm, and suicide attempts (ORs: 2.00–4.07). The only result deviating from this trend was that bullied males most commonly reported attempting suicide in young adulthood. The observed risk differences were larger among females than among males on all outcome measures except suicide attempts in young adulthood. Bullied females' more frequent reporting of suicide ideation and self-harm in adolescence and young adulthood suggests that bullying affects young females particularly strongly, while the detrimental effect of bullying shows possibly a delayed effect among young adult males.

Gender moderated bullying's effect on suicide ideation, self-harm, and suicide attempts in different directions support the "gender paradox" (Canetto & Sakinofsky, 1998). The following explanations of this observation have been proposed. Females may generally report their health history more accurately and therefore more commonly recall lifetime events such as self-harm (Mościcki, 1994). Females more commonly experience depression in adolescence years (Brent, Baugher, Bridge, Chen, & Chiappetta, 1999; Roland, 2002); this may lead to self-harm as an expression of distress and signal for help. Heightened stress may be associated with traditional gender roles (Webster Rudmin, Ferrada-Noli, & Skolbekken, 2003) and cultural context (Canetto & Sakinofsky, 1998). Suicide risk factors particularly affecting males include more commonly alcohol and other substance use and both the prevalence and the lethality of suicide attempts (Gould, Greenberg, Velting, & Shaffer, 2003; Shaffer et al., 1996).

Characteristic forms of bullying differ between the genders in adolescence: Girls

tend to bully using indirect and interpersonal aggression (e.g., gossiping; Nansel et al., 2001), whereas boys tend to use direct physical aggression (Undheim & Sund, 2010). Gender-based differences in bullying may underlie differing rates of self-harm and suicide attempts. Future research should compare different bullying types' long-term effects on self-harm.

Among bullied participants, suicide ideation and attempts decreased among females from adolescence to young adulthood, while self-harm remained stable. In young adulthood, suicide attempts were considerably less common among bullied females than among bullied males. Accordingly, our results only partly support the general notion that females at all ages more commonly report suicide ideation and suicidal behavior (Canetto & Sakinofsky, 1998; Mościcki, 1994), although completed suicides are more common among men. This may reflect a stable gender-based difference in vulnerability to negative life events. In a longitudinal twin study, women reported more global social support than men (Kendler, Myers, & Prescott, 2005); this may protect women against completed suicides.

In this study, bullied males more commonly reported suicide attempts than both bullied and nonbullied females; however, in the general population suicide attempts are more commonly reported by women (Hjelmeland & Bjerke, 1996). This finding was unexpected and should be independently replicated.

The transition from adolescence to young adulthood may be more difficult for bullied males than for bullied females due to poorer coping skills (e.g., substance use, social avoidance, lack of social support); this may increase the risk of negative outcomes among bullied males in young adulthood.

Bullying creates great distress during adolescence (Kumpulainen et al., 1998). Mental health problems may explain 50%–90% of suicides (Cavanagh et al., 2003; Harris & Barraclough, 1997). In this study, bullied adolescent participants more commonly experienced externalizing and internalizing mental health problems and psychiatric hospitalization in young adulthood; controlling for baseline mental health problems, depressive symptoms was the only significant remaining factor (Sigurdson, Undheim, Wallander, Lydersen, & Sund, 2015). It is important to note that depression explains much of self-harm and suicide attempts (Conner & Goldston, 2007) and may partly mediate the maladaptive developmental trajectory from bullying to self-harm and suicidal behavior in adolescence.

Few studies have examined whether gender moderates adolescent bullying's longitudinal association with self-harm, suicide ideation, and suicide attempts. Almost none have examined the transitional period from adolescence to early adulthood, when most people leave education for work. Most studies have used cross-sectional designs to examine bullying's association with suicidality, preventing them from testing causal inferences. In contrast, the present findings indicate that exposure to bullying increases adolescents' present and future risk of suicide ideation and suicidal behavior.

Strengths and Limitations

This study used a longitudinal design and possible effects of bullying were observed for over a decade longer than previous studies often using clinical samples or retrospective reports.

The present sample represents the adolescent population in mid-Norway, but is not nationally representative. The sample's homogeneity impedes generalization of the present findings to other countries; similar future research should therefore sample more diverse populations.

The data for this study were collected using self-report. Motivations such as social desirability might therefore have biased participants' responses; however, participants' confidentiality and anonymity were protected and this typically leads to valid and reliable self-report data (Brener, Billy, & Grady, 2003). There has also been some concern regarding the registration of suicide

attempts using hospital data (Wichstrøm & Rossow, 2002). These data could be biased because it is believed that suicide attempts by men are underreported in these types of data. The main reason for this is social stigma (Bertolote et al., 2005). Community samples could be a more reliable and valid approach in this matter as it is suspected that most report the truth when anonymity is granted. However, self-reported data also have their limitations; we do not have a good external indicator on the severity of the suicidal behavior. Most likely are the cases reported in a spectrum from acts with little injury to serious attempts that required hospitalization.

The response rate was excellent at both T_1 and T_2; however, it was modest at T_4 (51.9%). The response rate decrease likely reflected the 14-year interim between T_2 and T_4 and is comparable with those observed in Internet-based surveys (Cook, Heath, & Thompson, 2000). The moderate follow-up response rate increases the likelihood of attrition bias; however, our attrition analysis identified no systematic bias regarding bullying or suicide ideation.

CONCLUSION

Among both genders, exposure to bullying during adolescence increases the risk of suicide ideation, self-harm, and suicide attempts; this effect persists into young adulthood. In adulthood, bullied adolescent males were most likely to report suicide attempts. Bullied adolescent females were most likely to report suicide ideation in adolescence and persistent self-harm from adolescence into adulthood. This result should inform relevant public health policy. Specifically, suicide prevention strategies in the school years should particularly target bullied individuals. Multidimensional school-based antibullying campaigns using preventive strategies may change attitudes and behavior within peer groups and thereby decrease bullying and the risk of current and later self-harm and suicide attempts. Clinicians should inquire about experience of bullying, particularly regarding patients with known suicidality.

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