

**RISK FACTORS OF CYBERBULLYING AMONG FINNISH ADOLESCENTS AND
ITS EFFECTS ON THEIR HEALTH**

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Master's thesis
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(Global Health)
August 2017

Abstract

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HAMAL MANISHA: RISK FACTORS OF CYBERBULLYING AMONG FINNISH ADOLESCENTS AND ITS EFFECTS ON THEIR HEALTH

Master's Thesis, 64 pages

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Global Health

July 2017

Background: The rapid advancement of technology and social networking has invited a new form of bullying called 'cyberbullying' among adolescents. Very little is known on whether cyberbullying and its risk factors are linked with poor self-reported health (SRH) and increased subjective health complaints (SHC) among adolescents. The purpose of this study was to find the prevalence and risk factors related with cyberbullying and its impact on health and well-being of Finnish adolescents.

Methods: Cross-sectional, self-administered questionnaire survey on nationally representative sample of (12, 14, 16 and 18) years old Finns was conducted in 2015. Altogether 6698 respondents (boys 2870 and girls 3828), response rate 41%, replied the survey questions. Self-reported health, subjective health complaints (tension, feelings of irritation and headaches) and two questions on cyberbullying, were collected during the survey. Binary and multinomial logistic regression was used to determine the risk factors of cyberbullying and for the association of cyberbullying with health outcomes. Odd ratios (OR) and their 95% confidence intervals (CIs) were reported as the measure of associations.

Results: The prevalence of cyberbullying (victims) and (bullies) were 12% and 8.2% respectively. Cyberbullying (victims and bullies) was highest in 14 and lowest in 18 years old adolescents in both gender. Statistically significant association between gender and cyberbullies was found with girls less likely to act as cyberbullies (OR=0.34, 95%, CI=0.16-0.70). Adolescents living in a

family without their biological parents were more likely to become cyber victims (OR=1.82, 95%, CI= 1.16-2.84). Adolescents of 12 years were less likely to report poor health and subjective health complains (tension, irritation and headaches). Girls were 2 folds more likely to report poor health and 5 folds more likely to complain (tension, irritation and headaches) compared to boys. Adolescents not having biological parents and with low and medium educated parents were more likely to report poor health and subjective health complaints. Those adolescents who were bullied once/many times a week had higher odds of reporting poor health (OR=15.22, 95%, CI= 7.07-32.77) and higher odds of complaining to have health symptoms (OR=13.8, 95%, CI= 7.23-26.37) compared to those who were not bullied at all. Likewise, adolescents who bullied other once/many times a week reported higher odds of having poor health (OR=1.88, 95%, CI=0.41-8.53) and higher odds to complain all three symptoms (OR=2.32, 95%, CI=0.75-7.15) than those who never bullied.

Conclusion: Family structure was significantly associated with cyber victims and gender was significantly associated with cyberbullies. Adolescent's age, gender, family structure and parents' education were found to be statistically significantly associated with self-reported health and subjective health complaints. As cyberbullying is clearly associated with poor health of adolescents, policy makers, teachers, parents, and adolescents need to have a proper understanding of the nature of cyberbullying, how to address it and how to prevent it.

Keywords: Adolescents, Cyberbullying, Risk factors, Health, Finland

List of acronyms

CDC	-	Centers for Disease Control and Prevention
AHLS	-	Adolescent Health and Lifestyle Survey
CI	-	Confidence Interval
OR	-	Odds Ratio
SPSS	-	Statistical Package for the Social Sciences
UK	-	United Kingdom
NCPC	-	National Crime Prevention Council
U.S.	-	United States
SRH	-	Self-reported health
SHC	-	Subjective health complaint

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1. INTRODUCTION

The rapid advancement of technology, particularly electronic communication and social networking in recent decades has become a cheapest and easiest way of interaction for most of the people around the world. Similarly, devices like mobile phones and computers have facilitated in instant communication among friends living at a distance via email, internet and various social sites as Twitter, Facebook and many more. Today's generation; particularly, adolescents are totally reliant on these machineries as they are entertaining and have a numerous benefit like providing latest information around the globe, can be used as learning resources and helpful for sustaining social relations (Safaria, 2016). However, this digitalized world has created an opportunity for them to misuse these technologies and harass and bully others, inviting a new form of bullying called 'cyberbullying'. As compared to traditional bullying (physical, verbal and relational) (Bannink et al., 2014); cyberbullying is unique in a way that within a very limited period of time cyberbullies can offend a huge number of audiences who are physically distant (Bottino et al., 2015) moreover, unlike traditional bullying, offenders could hide their identity if they desire.

As reviewed by Tokunaga, the prevalence of adolescents' once in a lifetime experience of 'cyberbullying' ranged between about 20 to 40% and the report also showed that the number of cyber victims is growing (Tokunaga, 2010). Youth Internet Safety Survey (2000, 2005, 2010) has reported that there is a slender growth in cyberbullying behaviors throughout that time from (6%, 9% to 11%) (Patchin, 2010). Among the adolescents of high income countries, the proportion of cyberbullying victims varied between 9 to 34% whereas, (cyberbullies) from 4% to 21% (Lindfors et al., 2012; Tokunaga, 2010). A survey conducted by Save the Children in Finland identified that (11–20%) girls and (9–17%) boys had faced cyberbullying from their friends (Li et al., 2011). Likewise, Online Safety Survey conducted by Microsoft's European in early 2009 revealed that approximately 21% of Finnish adolescents had been bullied sometimes in the Internet, and unfortunately 4% had been targeted recurrently (Salmivalli, 2012). Moreover, a population based study conducted in Finland in 2009, reported that the prevalence of cyberbullying among adolescent's girls and

boys were 17% and 20% respectively whereas, the proportion of adolescents who reported of being both bully-victims was 4% (Lindfors et al., 2012).

The exposure to cyberbullying leads to adverse health and social outcomes, including mental health effects i.e. self-harm, suicidal ideation, headaches, depression and irritation, low educational performances, and other psychosocial problems such as feeling of low self-esteem and low confidence among the adolescents (Bottino et al., 2015; Daine et al., 2013; Pham & Adesman, 2015; Sourander et al., 2010; Wang et al., 2011; Wolke et al., 2013; Ybarra, 2004; Zhou et al., 2013) and basically, 'cyber victims' offended by cyber bullies tend to suffer more from this bullying. A recent study in Finland reported that adolescents' constant involvement in these technologies is more likely to be associated with their subjective health and school-related mental health problems (Salmela et al., 2016). Center for Disease Control and Prevention (CDC) reported that despite its relatively brief history and lower prevalence than traditional bullying, cyberbullying has already been entitled as a serious public health threat among adolescents (Aboujaoude et al., 2015) that demands further study (Bottino et al., 2015; Callaghan et al., 2015) to better understand the burden in different settings.

There are few earlier reports that have measured cyberbullying, and its risk factors and their association with poor self-reported health (SRH) and increased subjective health complaints (SHC). The purpose of this study is to evaluate the prevalence and risk factors associated with cyberbullying and its impact in overall health and well-being of adolescents in Finland.

2. LITERATURE REVIEW

To understand the cyberbullying's impact in the adolescents' health and wellbeing, it is obligatory to examine the different mechanisms of cyberbullying. Numerous research has been performed on bullying, and very few literatures exist regarding cyberbullying as this is a new problem established on modern technology in communication. This chapter evaluates the risk factors of cyberbullying, its prevalence rates, and its impact on the health of adolescents. However, before getting into the objectives of this paper, the process of literature search and short definitions regarding the measured variables is provided.

2.1 Literature search

Literatures were searched through Medline, Google scholar and PubMed databases by using key words “cyberbullying” in combination with different words “adolescents” and “health consequences” and “risk factors” with country specified as Finland and all over the world. Literatures were also reviewed through Google scholar using the above mentioned key words.

2.2 Definition of cyberbullying

In the field of health sciences, several definitions have been proposed for cyberbullying. Besley (2004) was apparently the first to define cyberbullying as "activities that includes the usage of communication and information machineries to support thoughtful, frequent, and aggressive behavior by a person or group that is aimed to harm others" (Besley, n.d. Cyberbullying: An Emerging Threat to “Always On” Generation”). This definition is close to those of Smith and Tokunaga who defined cyberbullying as a persistent action done by groups or an individual, using electronic means of interaction, regularly and over time to impose harm or distress others (Smith et al., 2008; Tokunaga, 2010). So, all the definitions mentioned above draw a conclusion so far that cyberbullying is an upsetting activity carried out by aggressors by means of electronic devices and in a recurring manner to their victims.

However, in this paper, cyberbullying considers the following two dimensions:

- a. being a bully - someone who bullies or harasses others through internet or mobile phones
- b. being a victim – someone who is bullied or harassed using internet or mobile phones

2.3 Definition of health

WHO has defined health as "a state of complete physical, mental and social well-being not merely the absence of disease or infirmity" (Sartorius, 2006). Though, in this study, health is measured or defined from the subjective aspect.

- a. **Self-reported health** - refers to the self-evaluation of individuals own health. People with subjective poor health are those who recognize themselves as unhealthy rather than being physically or mentally ill.
- b. **Subjective health complaints** - complaints that are not linked to any provable disease or can be stronger than one would expect from the clinical findings (Facts on Health and Environment: Subjective health: n.d., para 1).

The following table 1 summarizes the prevalence of cyberbullying, risk factors and effects in adolescents' health.

Table 1: Summary of studies on cyberbullying among adolescents, its risk factors and association with health

Last name of first author/ year/ country	Title of the study	Study design/ sample size (N)	Main findings	Risk factors associated to cyberbullying	Association with adolescents' health
Olumide et al /2015/ Nigeria	Prevalence and correlates of the perpetration of cyberbullying among in-school adolescents in Oyo State, Nigeria	Cross sectional/ N= 653	39.8% were victims and 23.9% were bullies		

Garaigordobil / Basque country/2015	Cyberbullying in adolescents and youth in the Basque Country: Changes with age	Cross sectional/ N=3026	30.2% victims and 15.5% bullies	Adolescents of age 12-18 years involved in both activities
Michelle /2014/ Tennessee	Cyberbullying, Bullying, and Victimization among Adolescents: Rates of Occurrence, Internet Use and Relationship to Parenting Styles	Cross Sectional/ N=77	One third of students involved in cyberbullying	Females involved more in both types of bullying
Caravaca et al., /2016/Spain	Prevalence and patterns of traditional bullying victimization and cyber-teasing among college population in Spain	Cross sectional/ N=543	52.7% were found to be victims	Girls more likely to become victims than boys. Economic problems and family conflicts were other risk factors
Hemphill/ 2014/Australia	Adolescent predictors of young adult cyberbullying perpetration and victimization among Australian youth	N=927	5% of them victims as well as 5% bullies	
Popović/ 2011/Serbia	The prevalence of cyberbullying among adolescents: A case study of middle schools in Serbia	Case study/ N=387	20% victims and 10% bullies	male students reported both getting bullied and being bullies in high amount compared to females
Mishna et al., /2012	Risk factors for involvement in cyber bullying: Victims, bullies and bully-victims	Cross sectional/ N=2188	30% were victims and 25.7% were bullies	Gender, age and safety found to be associated only for one category of cyber bullying. Girls more likely than boys to be both bully and victims
Zhou/ 2013/China	Cyberbullying and its risk factors among	Cross sectional/ N=1438	56.88% victims	Boys more likely to participate in

	Chinese high school students		34.84% bullies	cyberbullying both as perpetrators and victims. Students with poor academic performances more likely to be perpetrators	
Fahy et al., /2016/East London	Longitudinal Associations Between Cyberbullying Involvement and Adolescent Mental Health	Longitudinal /N=2480	20% victims 8% bullies		Cyberbully/victims more likely to report symptoms as depression, social anxiety and poor health than not involved ones
Sourander et al., /2010/ Finland	Psychosocial risk factors associated with cyberbullying among adolescents: a population-based study	Cross sectional/ N=2215	5.4% victims 7.4% bullies		Cyber victim lived in a family without biological parents, headaches, emotional and peer problems, sleeping problems Cyberbullies associated with hyperactivity, low prosocial behavior, headache
Durkee et al., /2011	Internet pathways in suicidality: a review of the evidence	Review report	5.4% victims 7.4% bullies		Increased the risk for suicidal behaviors, particularly among adolescents
Foody/2015	A review of cyberbullying and suggestions for online psychological therapy	Review report		Age associated with cyberbullying	
Smith et al., /2006	An investigation into cyberbullying, its forms, awareness and impact, and the relationship between age and gender in cyberbullying			No significant association to age. Girls significantly more likely to be cyberbullied than boys	

National Crime Prevention Council/2007	Teens and Cyberbullying	Report		Cyberbullying mostly prevalent among 15 and 16-year-olds specifically in girls	
Kowalski/2013	Psychological, physical, and academic correlates of cyberbullying and traditional bullying	Cross sectional/ N=931		Girls more likely to participate in cyberbullying compared to males	Cyberbullying associated with poor psychological health, physical, health, and academic performance
Bayraktar et al./2014/Czech Republic	Cyberbullying: The Discriminant Factors Among Cyberbullies, Cyber victims, and Cyberbully-Victims in a Czech Adolescent Sample	Cross sectional/ N=2092		No significant difference related to gender	
Huang/2010/Taiwan	An analysis of multiple factors of cyberbullying among junior high school students in Taiwan	Cross sectional/ N=545		Boys more likely to bully others	
Heiman/2015	Cyberbullying experience and gender differences among adolescents in different educational settings	Cross sectional/ N=507		Girls more likely to be cyber victims, and boys as cyber bullies	
Li/2006	Cyberbullying in schools: a research of gender differences	Cross sectional/ N=264	Half of the students were victims whereas One in four were perpetrators	Males found to be more victims and bullies than females	
Fosse/2002/Norway	Childhood environment of adult psychiatric outpatients in Norway having been bullied in school	Cross sectional/ N=160		Boys bullied in their childhood had family with no biological father and girls who were bullied got no father's care and love	

Jablonska/2007/Germany	Risk behaviors, victimization and mental distress among adolescents in different family structures	Cross sectional/ N=15428		Adolescents with single parent at higher risk of risk behaviors, victimization and mental distress
Jansen et al., / 2011/Netherlands	Early risk factors for being a bully, victim, or bully/victim in late elementary and early secondary education. The longitudinal TRAILS study	Longitudinal prospective study T1: N=982 T2: N=977		Children with two parents more likely to be uninvolved in cyberbullying activities
Sara et al., / 2012/Sweden	Cyberbullying and subjective health A large-scale study of students in Stockholm, Sweden	Cross sectional/ N=22544	5% victims 4% bullies	Worse subjective health was associated with both cyberbullying variables
Callaghan et al., /2015/Ireland	Exploring traditional and cyberbullying among Irish adolescents	Cross sectional/ N=318		Cyber victims more likely to report poor health and low life satisfaction
Bannink et al., /2014/Netherlands	Cyber and Traditional Bullying Victimization as a Risk Factor for Mental Health Problems and Suicidal Ideation in Adolescents	Longitudinal N=3181		Girls found to have mental health problems compared to boys
Bottino et al.,/2015/Usa	Cyberbullying and adolescent mental health: systematic review	Review report	Cyberbullying ranged from 6.5% to 35.4%	Cyberbullying was associated with different depressive symptoms, substance use, ideation and suicide attempts
Sampasa/2014/Canada	Associations between Cyberbullying and School Bullying	Cross sectional N=2999		Cyberbullying associated with the risk

	Victimization and Suicidal Ideation, Plans and Attempts among Canadian Schoolchildren				of suicidal ideation, plans and attempts
Wang et al./China /2015	Study on the Relationship Between Traditional Bullying, Cyberbullying and Depression in Adolescents	Cross sectional/ N=5726	8.9% cyberbullying prevalence		Association of cyberbullying with depression
Lindfors et al./ Finland/2012	Cyberbullying among Finnish adolescents – a population-based study	Cross sectional/ N=5516	11% victim 9% bully	Girls reported experiencing at least one dimension of cyberbullying than boys	

2.4 Prevalence of cyberbullying globally:

As youth are more fascinated by the advanced technologies, cyberbullying has become a huge problem all over the world (Belsey, 2005) affecting 10 to 20% of adolescents' emotional health and well-being (Bottino et al., 2015). Even though, a huge proportion of adolescents reported to cyberbully, few studies have been conducted to identify the prevalence of cyberbullying and its association in health. Hemphill & Heerde (2014) investigated 927 children aged 11 to 15, in Victoria analyzing the data from 2006 (Grade 9) to 2010 (young adulthood). Findings illustrated that cyberbullying existed within the respondents with 5% being cyber victims and another 5% as cyberbullies. In Serbia, the similar age group were found to be actively involved in cyberbullying (Popović et al., 2011). A study from China also reported that cyberbullying to be relatively common among students (Zhou et al., 2013). Likewise, a recent study in Indonesia conducted among 102 students studying in 7th grade reported that 12.7% of students experienced cyber victimization daily (Safaria, 2016).

In their study with very large sample size (2186), Mishna, Khoury-Kassabri, Gadalla, and Daciuk (2012) observed the relationship between the cyber bullying (victims, bullies, bully-

victims) and its risk factors as age, gender, technology use, involvement of parents and safety. Findings elucidated that more than 30% of the students participated in cyberbullying activity as either cyber victims or bullies. Risk factors, such as age, gender and safety, were found to be significant for only one dimension of cyber bullying (victims). In addition, female students were more likely to become cyberbullies vs. cyber victims in contrast to males (Mishna et al., 2012).

With regards to find the prevalence of cyberbullying, a study performed in Spain (2014) in 543 students identified that more than 50% of the students participated in the study were cyber victims whereas, female students disclosed to be harassed more through cyber-teasing compared to male students (Caravaca et al., 2016). Similarly, another study from Spain reported that adolescents aged between 12-18 years were involved in cyberbullying. The prevalence rate of cyber victims and cyberbullies in this study was 30.2% and 15.5% respectively (Garaigorodobil, 2015). Another study performed in Southeastern Tennessee City revealed that cyberbullying and cyber victimization was quite high among the adolescents (Black, 2014).

A literature stated that adolescents having personal mobile phones with internet access were more often cyberbullied and the same groups cyberbullied others too (Olumide et al., 2016). Similarly, a recent study from East London reported 14% of the adolescents to be cyber victims and 8% cyberbullies (Fahy et al., 2016).

2.5 Prevalence of cyberbullying in Finland:

A survey conducted by Save the Children Finland (2008) identified that (11–20%) girls and (9–17%) boys were cyberbullied by their friends (Li et al., 2011). Likewise, Online Safety Survey conducted by Microsoft's European in early 2009 revealed that approximately 21% of Finnish adolescents were bullied sometimes in the Internet, and unfortunately 4% had been targeted frequently (Salmivalli, 2012). Moreover, a population based study conducted in Finland in 2009, reported that the prevalence of cyberbullying among adolescent girls and boys were 17% and 20% respectively whereas, the proportion of adolescents who reported

of being both bully-victims was 4% (Lindfors et al., 2012). In this similar study, compared to boys, girls reported to experience at least on aspect of cyberbullying. Findings also revealed that adolescents of 14 years old from both gender were frequently involved in cyberbullying whereas 18 years' boys and girls had less involvement (Lindfors et al., 2012). Similarly, another cross-sectional study conducted in 2010 in Finland reported that out of 2215 adolescents of age group 13-16, the prevalence rate of cyber victims and cyberbullies was 4.8% and 7.4% respectively (Sourander et al., 2010).

2.6 Risk factors associated with cyberbullying

Many studies across the world have revealed that there are number of risk factors associated with cyberbullying and their impact in adolescents' health and well-being. However, in this study, socio-demographic factors like age, gender, family structure and parents' education are considered to have association with cyberbullying.

2.6.1 Socio-demographic factors

Age and cyberbullying

Age is one of the important factor associated to cyberbullying and an article of systematic review of cyberbullying has revealed that victims suffer from cyberbullying from their early adulthood (Foody et al., 2015). In one hand, internet has become a popular and commonplace tool among teenagers, while on the other hand, as cons cyberbullying is uprising dramatically among 15 to 16 years' age groups of adolescents (Patchin, 2010) with girls predominantly becoming cyber victims (NCPC, 2007). Furthermore, teens of that similar age (15-16) have informed a wide range of emotions because of cyberbullying from embarrassment to anger and feeling insecure. Likewise, girls of 13 to 15 years were found to have higher level of these emotions compared to boys (NCPC, 2007). Fauman (2008) in his study reported that children are more likely to get victimized during elementary and middle school likewise they act as bullies as they enter their early and mid-adolescence. A study performed among 210 school students aged 12-15 years in Australia, found that older students bullied younger

students, with boys more likely to bully than girls (Robson et al., 2013). On the contrary, Balakrishnan (2015) in his study explored that younger participants engaged more in cyberbullying activities (i.e. victims and perpetrators) compared to old ones. Also, there are also some studies which reported no significant association between age and cyberbullying (Smith et al., 2006).

Gender and cyberbullying

Many studies have find out an association of gender and cyberbullying with girls more likely to experience cyberbullying compared to boys in terms of both victim and bully (Goebertet et al., 2011; Mishna et al., 2012; Smith et al., 2006). Whereas boys are more likely to be cyber-perpetrators (Heiman & Olenik, 2015, Garaigorodobil, 2015). One earlier study conducted in Hong Kong also evaluated that more male adolescents are involved in different form of cyberbullying behavior than females (Wong et al., 2014).

545 Taiwan junior high school students were included in a survey which showed boys more likely bullied others in cyberspace (Huang & Chou, 2010). Likewise, significant differences were found in gender, as boys were more likely to be involved in cyberbullying both as perpetrators and victims (Zhou et al., 2013). Li Qing (2006) also in his study reported that boys were more likely to be involved as cyberbullies than their female counterparts. Another study from Czech Republic indicated that cyberbullies/cyberbully-victims had the same ratio as per gender (Bayraktar, 2015). Similarly, a study with total 276 adolescents ranging from 14-18 years reported that boys were more likely to become both cyberbullies/victims than girls (Baker, 2010).

In contrary, some studies identified that girls highly participate in cyberbullying than boys (Kowalski & Limber, 2013), as it is easy to harass others keeping their identity secret (Kowalski & Limber, 2013). Likewise, Balakrishnan (2015) performed a study among 393 adults of age 17-30, where the author found that no significant association was established between gender and cyberbullying activities, however, female participants were found to be both cyberbullies and victims more often than the male counterparts.

Family structure and cyberbullying

Home environment with several features also have a significant influence on aggression among adolescents, and that is why family structure has gained much attention in the psychological literature ('What is Psychology': n.d., para 1). The type of the family in which a child lives plays a vital role in influencing children's status as a bully or a victim ('What is Psychology': n.d., para 1). A study from Norway stated that adolescents (male) who were raised by single parent especially mothers, were more likely to be victimized. Likewise, boys who were bullied in their childhood lived in a family with no biological father. Similarly, women who were bullied during their childhood lacked father's care (Fosse & Holen, 2002).

Some studies have shown that adolescents in single parent families were at greater risk of becoming victims with mental health problems than those with their biological parents (Jansen et al., 2011). However, after controlling the possible confounders, the associations between the above-mentioned problem and single mother parenting were no longer significant, however, these relations remained constant for adolescents having only fathers (Jansen et al., 2011). Likewise, adolescents from families with low socioeconomic background were more expected to become bully, victim, or both. Moreover, factors like preschool behavioral, socioeconomic status, emotional and motor problems as well as family breakup were the cause to the involvement of adolescents in bullying at a later age (Jansen et al., 2011). Some of the other studies suggested that while comparing to adolescents who were not involved in these cyberbullying and violent activities, violent ones were about six times more likely to have single unmarried parents and eleven times as likely to live with their fathers only ('What is Psychology': n.d., para 1).

Whilst, a study conducted by 'Cernkovich and Giordano' found that family structure might not be the only contributor to adolescent delinquent behavior, the quality of relationships between parents and children also play a greater role in making their children aggressive (Bryce et al., 2006). However, many other studies mentioned above indicate that single parenting has negative consequences for children and adolescents (Bryce et al., 2006).

Similarly, adolescents with their own biological parents had less disciplinary actions than adolescents from other type of family ('What is Psychology': n.d., para 4).

Parental education status and cyberbullying

Parents' education is a significant predictor of children's educational and behavioral outcomes (Dubow et al., 2009). Apparently, literatures revealed that compared to those adolescents who were not engaged in cyberbullying activities, a large number of vigorously involved ones lived in families that were of low income, without their own birth parents, and without parents who had higher education (Shetgiri et al., 2012). Besides if parents, adults and the school systems do not monitor, educate, and bring awareness to the youth, this new era of communication through internet and mobiles we will increase cyber-related fatalities (Clarke, 2013).

2.7 Cyberbullying and health status

The consequences of cyberbullying have been mostly investigated in adolescents' well-being concerns (Tokunaga, 2010). Although, there is no clear evidence on the health impact of cyberbullying, only few studies have recognized that victims of bullying are more likely to report experiencing bad general health (Rigby,1996). A scientific review of various literatures has also suggested that cyberbullying is a threat to adolescents' health and well-being (Bottino et al., 2015).

Earlier study from Sweden reported that adolescents involved in cyberbullying activities and mainly cyber victims had worse subjective health when the socio-economic factors and victims of traditional bullying were adjusted (Låftman et al., 2013). Another study conducted in Ireland explored that although not being statistically significant, cyber victimization was positively associated with increased exposure of poor health and low life satisfaction among the adolescents of 15-18 years (Callaghan et al., 2015). Similarly, cyber victims also reported various behavioral and emotional symptoms, along with school-related problems (Suzuki et al., 2012). One of the studies from Australia found that youths within the age group 10-25

years almost 3% of the study population thought of doing suicide after a cyberbullying incident, followed by 2% who were already engaged in self-harming behavior (Foody et al., 2015). Similarly, a systematic review report in US also found that cyber victims and cyberbullies had more psychosomatic and emotional problems, and did not feel safe in school in contrast to those not involved in cyberbullying (Bottino et al., 2015), whereas, a study from Indonesia reported that there was positive relationship between cyber victimization and level of students' psychological distress (Safari, 2016). Besides, cyberbullying was related with various depressive symptoms, substance abuse and suicide attempts (Bottino et al., 2015; Wang et al., 2015). A Canadian study also identified depression to be associated with suicidal thoughts, plans and even attempts among students. Findings revealed that there was an association between the victims of both forms of bullying (traditional and cyber) and the risk of suicidal plans and attempts and depression act as a mediator for cyberbullying victims and the outcomes of suicidal ideation, plans and attempts (Sampasa et al., 2014). In US, cyber victims reported higher depression compared to cyberbullies or bully-victims (Wang et al., 2011).

A cross sectional study from Finland revealed that cyberbullies were associated with, low prosocial behavior, conduct problems, frequent smoking and drunkenness, headache, hyperactivity, very high level of depression and have feeling of insecurity in school environments whereas, cyber victims were found to live with fear of safety and possibly suffering from trauma (Sourander et al., 2010).

677 high school students of Asian and Pacific Islander origins in Hawaii reported that more than fifty percent had been cyber victimized last year. Samoan and Filipino youth were more likely to report to feel bad about themselves because of cyberbullying (Goebert et al., 2011). In the context of cyberbullying and its association with mental health problems, the findings varied within ethnicity and gender, as cyberbullying was common with serious consequences among Asian and Pacific Islander youth (Goebert et al., 2011).

A prospective study from the Netherlands reported girls to be the victims of mental health problems in comparison to boys in both types of bullying after controlling the baseline for

mental health; however, there was no significant association between gender and (traditional or cyber bullying) victimization on suicidal ideation (Bannink et al., 2014). Another study from Reed et al., (2015) reported that female adolescents who were cyber victims had higher rates of depression and suicidal behaviors compared to males, and as the age increased, depression and substance abuse also increased.

Studies have been conducted to find out the relationship between internet harassment and depressive symptomatology. A study from US with 1501 youths of age 10 and 17 years reported that adolescents with major depressive symptomatology were three times higher in risk (OR: 3.38, CI: 1.78, 6.45) of getting harassed through internet compared to adolescents with mild/absent symptomatology (Ybarra et al., 2012). Likewise, males with symptoms of major depression reported the adjusted odds of being harassed three folds greater than for males who had mild or no symptoms of depression however, there was no significant association found between females (Ybarra et al., 2012).

Studies from Finland have shown cyberbullies to be associated with low prosocial behavior, conduct problems, frequent smoking, hyperactivity and drunkenness, headache, very high level of depression and have feeling of insecurity in school environments whereas, cyber victims found to live with fear of safety and possibly suffering from trauma (Sourander et al., 2010). According to Salmela et al., (2016) disproportionate use of internet can be a cause of school burnout which can later result in depressive symptoms with girls typically suffering from depressive symptoms whereas, boys suffering from excessive internet use.

2.8 Research gaps:

Although the empirical studies conducted previously recognized the risk factors of cyberbullying and its association with the health of adolescents, the research performed on the occurrence of cyber bullying among adolescents in Finland are limited. Moreover, no literatures were discovered studying the association between cyberbullying and health of Finnish adolescents. Only one population-based study has been conducted so far to measure the association between the subjective health complaints (psychosocial symptoms) of adolescents and cyberbullying.

Amongst few studies that measured the status of cyberbullying among school going students and adolescents, only some included the risk factors of cyberbullying. Moreover, no study was carried out on significance of parental educational status on adolescents' involvement in cyberbullying. Therefore, this study is carefully planned to fulfill these gaps on cyberbullying among adolescents.

2.9 Conceptual Framework

Figure 1 describes the conceptual framework of the study. Sociodemographic variables like age, gender, family structure of the adolescents, parents' education i.e. (father's education and mother's education) and cyberbullying related variables such as (cyberbullies and cyber victims) are independent variables. These independent variables directly or indirectly affect the outcome variable i.e. health status of the adolescents.

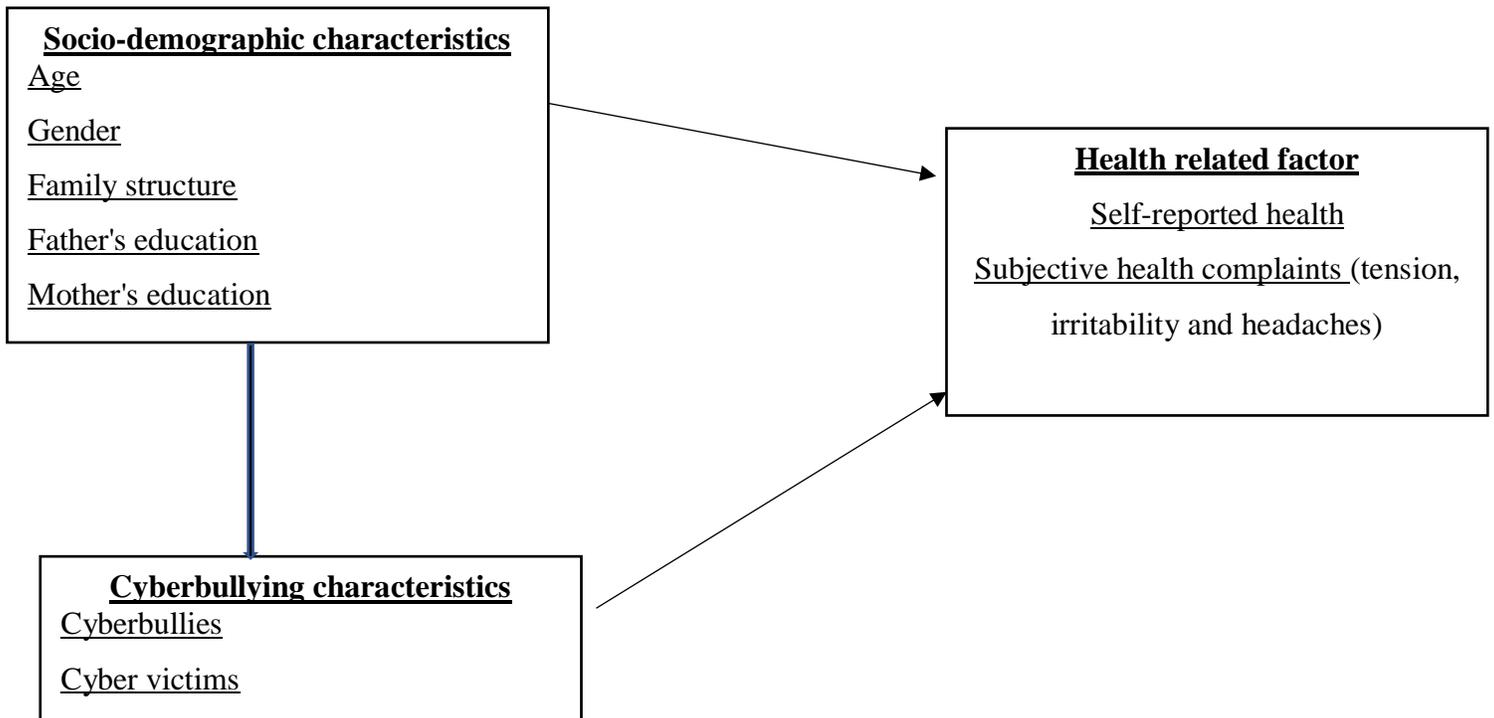


Figure 1: Conceptual framework of socio-demographic factors, cyberbullying and its health outcome

3. STUDY AIM AND OBJECTIVES

The overall aim of the study was to identify the risk factors of cyberbullying and its impact in health among the Finnish adolescents.

The specific objectives are:

- To find out the prevalence of cyberbullying (victims and bullies) among Finnish adolescents.
- To assess the association between socio demographic factors (age, gender, family structure, parent's education) and cyberbullying among Finnish adolescents.
- To assess the association between cyberbullying and self-reported health and subjective health complaints (tension, irritability and headaches) of Finnish adolescents.

4. MATERIALS AND METHODS

4.1 Data Source

A national cross-sectional data of Finnish adolescents was used in this study. Adolescent Health and Lifestyle Survey (AHLS) is conducted biannually in Finland since 1977 covering a wide range of topics which includes socio-demographics, tobacco and alcohol use, health and physical exercise and cyberbullying. In this study, data of cyberbullying from 2015 was used. The AHLS study protocol has been approved by the Ethics Committee of Tampere region.

4.2 Sampling methods

The samples were drawn from the Finnish Population Register based on dates of birth, so that all those aged 12, 14, 16 and 18 born on certain sample days in June, July or August were included with the average birthday on July 22, however, those for Åland Islands were excluded.

4.3 Methods of data collection

Self-administered questionnaires were mailed by AHLS in February followed by three reminders to non-respondents. The respondents had the options to answer either by internet or mailed questionnaire. Questionnaire of this year's survey was 8-pages in total with approximately 100 questions on socio-demographic background, parents' educational attainment, health status, and some symptoms complained by the adolescents which might lead to poor physical, emotional and mental health. In total 16473 questionnaires were sent with a response obtained from 6698 (boys 2870 and girls 3828), response rate 41% (34% among boys vs. 47% among girls). In general, boys in all age groups responded less often than girls. According to the age group, the response rates of the boys and girls for the age group 14 and 16 was little bit higher, (31.5% vs. 24.8% and 28.7% vs. 28.3%) compared to other two groups.

4.4 Study population

Nationally representative samples of adolescents (age group 12, 14, 16 and 18 years)

4.5 Measurement of variables

4.5.1 Outcome variables

Self-reported health

Self-reported health status of the adolescents was measured by asking "what do you think about your health in present situation" with the following options (1= very good, 2= fairly good, 3= average, 4= fairly poor and 5= very poor). In the current analysis, fairly poor and very poor responses were combined as poor.

Subjective health complaints

Adolescents were also asked if they had experienced tension, irritation and headaches in weekly basis that might lead to ill health either physically or mentally the past year and the answers obtained were dummy (no or yes). The responses of all symptoms were combined to make a composite variable and categorized into four options as 0= having no symptoms at all, 1= having one symptoms out of three, 2= having two symptoms out of three, 3= having all three symptoms.

4.5.2 Measurement of independent variable

Cyberbullying status

Adolescents were asked:

"During the last year, have you been bullied by mobile phone or via the internet?" with the responses in four options: a) many times a week, b) approximately once a week, c) more seldom, and d) not at all. And "have you bullied others or participated in bullying others by mobile phone or the internet during the last year?" with the following response options: a) many times a week, b) approximately once a week, c) more seldom, and d) I have not bullied.

In the analysis, the responses 'many times a week' and 'approximately once a week' of both the cyberbullying variables were combined as “once/many times a week while, remaining other responses were not changed.

4.5.3 Socio-demographic variables

Variables related to individual and family characteristics included gender (1= boys vs. 2= girls) and age (12, 14, 16 and 18), mother's and father's education (1=elementary school, 2= primary school and vocational training, 3= middle school, 4= matriculation examination and 5= college or university degree) which were later categorized as elementary, primary school and vocational school as 'low' coded by 1, middle school as 'middle' coded by 2 and matriculation examination and college or university degree as 'high' which was coded by 3 and finally, what kind of family do the respondents have (1= mother and father, 2= mother and stepfather, 3= father and stepmother, 4= only mother, 5= only father, 6= open/ husband-wife and 7= with other guardian which was later categorized as (1= both biological parents, 2=others) in the analysis.

4.6 Statistical analysis

As the data used in this study was from AHLS, data checking, compiling, editing, coding and entry was done by the AHLS survey team.

Regarding data analysis for this study, firstly, all the socio-demographic, cyberbullying and outcome variables were described using frequency distribution and percentages. Secondly, Pearson Chi square test, was used to calculate the statistical significance difference between i) socio-demographic variables and cyberbullying variables, and ii) both socio-demographic and cyberbullying variables and the health-related variables (outcome). *P*-value with <0.05 was considered to have significant association between outcome and independent variables.

Finally, the associations of i) socio-demographic variables with cyberbullying variables and ii) the association of socio-demographic variables and cyberbullying variables with self-

reported health and subjective health complaints variables were studied using logistic regression analysis. For the dependent variable with two categories, binary logistic regression was applied whereas, for the dependent variables with more than two categories, multinomial logistic regression was used. In regression analysis, two models were fitted, firstly, the bivariate associations of each of the independent variables with outcome presented in Model I and the Model II presents the multivariable model, where variables were mutually adjusted. The results of the associations are expressed as odds ratio (ORs) with their 95 % confidence intervals (CIs). Statistical computations were performed with SPSS version 23 statistical software for Windows. All the missing values were excluded.

5. RESULTS

5.1 Socio demographic and cyberbullying characteristics of adolescents

Table 2 presents the socio-demographic characteristics of the adolescents. Out of the total adolescents, 30% and 27% were of the age group 14 and 16 respectively, followed by 18 years (23%). Girls participation was high in the study (57%). More than one-fifth of the total respondents lived in a family without their biological parents. Similarly, nearly 45% of the respondent's father vs. 57% of mothers had high education. According to cyberbullying status, almost 12% of adolescents were found to be victimized and 8.2% act as cyberbullies within one year period, but precisely, 1.6% of the total study population were cyber bullied by others once or many times a week whereas, 0.6% were cyberbullies who bullied other either once or many times a week.

Table 2: Demographic characteristics and cyberbullying status of the adolescents'

Socio demographic and cyberbullying variables	N= 6698	Percentage
Age (years)		
12	1342	20%
14	2002	29.9%
16	1796	26.8%
18	1558	23.3%
Gender		
Male	2870	42.8%
Female	3828	57.2%
Family structure		
Others	1373	20.5%
Mother + father	5275	78.8%
Father's education		
Low	2900	43.3%
Middle	738	11%
High	2734	40.8%
Mother's education		
Low	1959	29.2%
Middle	694	10.4%
High	3850	57.5%

Cyber victims/ has been bullied

Many time/once a week	107	1.6%
More seldom	700	10.5%
Not at all	5845	87.3

Cyberbullies/ has bullied others

Bullied many time/once a week	37	0.6%
Bullied more seldom	506	7.6%
I have not bullied others	6073	90.7%

5.2 Self-reported health and subjective health complaints by adolescents weekly

Table 3 shows the distribution of self-reported health status of the adolescents and the health complaints done by them during past six months of the survey. More than a third (35%) of the participants reported that they had very good health, a little less than half (45.7%) reported fairly good whereas only few (2.6%) reported poor self-perceived health. Similarly, 7% of the adolescents reported that they had all three symptoms (tension, irritability and headaches), whereas, almost half (49.3%) did not have any health complaints/symptoms.

Table 3: Distribution of self-reported health and health complaints reported by adolescents weekly

Health variables	N=6698	Percentage
Self-reported health		
Very good	2339	34.9%
Fairly good	3058	45.7%
Average	829	12.4%
Poor	174	2.6%
Missing	295	4.4%
Health complaints (tension, irritability and headaches) weekly		
All three symptoms	469	7.0%
Two out of three	1051	15.7%
One out of three	1624	24.2%
No symptoms at all	3305	49.3%
Missing	249	3.7%

5.3 Cyber victims according to socio-demographic characteristics

The proportion of the adolescents who were bullied (cyber victims) by socio-demographic characteristics is elucidated in the table 4. The percentages of being harassed once or many times in a week through mobiles and internet was statistically different (<0.001) in different age group of adolescents with the highest proportion in the age group of 14 years (2.1%) followed by 12 years i.e. (1.6%). The oldest age group (18 years) were least bullied (1.2%). Cyber victimization percentages differed statistically (<0.001) by gender as girls were bullied more either once/many times a week compared to boys i.e. (1.7% vs. 1.5%). Adolescents living other than their biological parents were bullied more often compared to those living with their own parents (2.4% vs. 1.4%), p -value (<0.001). Likewise, the percentage of cyber victims harassed once or many times a week were statistically higher among those whose father's and mother's educational status was low i.e. (2% and 2.5%) than those with medium and high level of education.

Table 4: Cyber victims' distribution according to socio-demographic characteristics

Socio demographic characteristics	N=6698	Many time/once a week	More seldom	Not at all	P value[†]
Age (years)					<0.001
12	1333	21 (1.6%)	156 (11.7%)	1156 (86.7%)	
14	1989	41 (2.1%)	257 (12.9%)	1691 (85%)	
16	1785	27 (1.5%)	169 (9.5%)	1589 (89%)	
18	1545	18 (1.2%)	118 (7.6%)	1409 (91.2%)	
Gender					<0.001
Girl	3810	63 (1.7%)	452 (11.9%)	3295 (86.5%)	
Boy	2842	44 (1.5%)	248 (8.7%)	2550 (89.7%)	
Family structure					<0.001
Others	1360	33 (2.4%)	186 (13.7%)	1141 (83.9%)	

Father+ mother	5243	73 (1.4%)	510 (9.7%)	4660 (88.9%)	
Father's education					0.020
Low	2883	57 (2%)	328 (11.4%)	2498 (86.6%)	
Medium	734	8 (1.1%)	76 (10.4%)	650 (88.6%)	
High	2722	32 (1.2%)	264 (9.7)	2426 (89.1%)	
Mother's education					0.002
Low	1947	48 (2.5%)	219 (11.2%)	1680 (86.3%)	
Medium	693	7 (1%)	79 (11.4%)	607 (87.6%)	
High	3830	48 (1.3%)	382 (10%)	3400 (88.8%)	

† The difference was tested using Chi-square test.

5.4 Cyber bullies according to socio-demographic characteristics

Cyberbullies percentages according to socio-demographics characteristics is shown in table 5. There was statistical significant difference between cyberbullies and age groups (0.002). Adolescents of the age group 18 were slightly higher in cyberbullying activities (0.7%) followed by 16 and 14, (0.6% both), in contrary, adolescents of age 12 had less involvement in this activity (0.4%). Cyberbullies also differed statistically (<0.001) by gender. Boys were more likely to bully others either once or many times a week rather than girls (0.8% vs. 0.4%). No statistical association was observed between family structure of adolescents and cyberbullies. Likewise, the proportion of cyberbullies and father's education were not statistically associated. However, there were statistically significantly (p=0.026) more adolescents involved in cyber bullying of low educated mothers' (0.8%) compared to medium and high.

Table 5: Cyber bullies' distribution according to socio-demographic characteristics

Socio demographic characteristics	Total (6698)	Many time/once a week	More seldom	Not bullied others	P value[†]
Age (years)					0.002
12	1331	5 (0.4%)	120 (9%)	1206 (90.6%)	
14	1982	11 (0.6%)	181 (9.1%)	1790 (90.3%)	
16	1771	11 (0.6%)	116 (6.5%)	1644 (92.8%)	
18	1532	10 (0.7%)	89 (5.8%)	1433 (93.5%)	
Gender					<0.001
Girl	3799	14 (0.4%)	234 (6.2%)	3551 (93.5%)	
Boy	2817	23 (0.8%)	272 (9.7%)	2522 (89.5%)	
Family structure					0.134
Others	1349	9 (0.7%)	118 (8.7%)	1222 (90.6%)	
Father+ mother	5220	28 (0.5%)	381 (7.3%)	4811 (92.2%)	
Father's education					0.399
Low	2868	18 (0.6%)	229 (8%)	2621 (91.4%)	
Medium	733	3 (0.4%)	59 (8%)	671 (91.5%)	
High	2705	13 (0.5%)	184 (6.8%)	2508 (92.7%)	
Mother's education					0.026
Low	1937	15 (0.8%)	171 (8.8%)	1751 (90.4%)	
Medium	690	4 (0.6%)	57 (8.3%)	629 (91.2%)	
High	3809	16 (0.4%)	260 (6.8%)	3533 (92.8%)	

[†]The difference was tested using Chi-square test.

5.5 Adolescents' self-reported health according to socio-demographic characteristics and cyberbullying status

The proportion of adolescents' self-reported health is presented in the table 6. Age and health were significantly associated (<0.001) with the adolescents of 12 years reporting very good health status (54.9%), followed by 14 years (41.3%), in the contrary, adolescents who were in age group 18 years having poor health (5%). Compared to girls, boys were more likely to report very good health (32.8% vs. 41.6%). With statistically significant difference (<0.001), children living with their own biological parents had more often very good health (38.5%) compared to those without their parents (29.4%) whereas, those living with other guardians had poor health (4.4%) than those living with their own parents (2.3%). Parents' educational status and adolescents' health status were also statistically significantly associated (<0.001).

As per the findings, (39.7% and 38.9%) of adolescents whose father and mother were highly educated respectively had very good health compared to those children with medium and low educated parents. Likewise, there was a statistical significant association between cyber victims, cyberbullies and respondents' health. Compared to cyber victims who were bullied once or many times a week, those who were never bullied reported very good health i.e. (22.8% vs. 38.4%). Similarly, those who were cyber victims had very poor health than those who were not bullied i.e. (15.8% vs. 2.1%). Considering cyberbullies, those who were not involved in bullying others favorably reported to have very good health (37.5%) compared to cyberbullies (18.9%). Also, number of cyberbullies who had poor health was remarkably high (8.1%) compared to those who were not involved in cyber bullying (2.1%).

Table 6: Health status of adolescents according to socio-demographic characteristics and cyberbullying status

Socio-demographic and cyberbullying characteristics	Total (6698)	Poor	Average	Good	Very good	P value[†]
Age (years)						<0.001
12	1295	9 (0.7%)	90 (6.9%)	485 (37.5%)	711 (54.9%)	
14	1919	35 (1.8%)	189 (9.8%)	903 (47.1%)	792 (41.3%)	
16	1700	56 (3.3%)	265 (15.6%)	874 (51.4%)	505 (29.7%)	
18	1486	74 (5%)	285 (19.2%)	796 (53.6%)	331 (22.3%)	
Gender						<0.001
Girl	3677	124 (3.4%)	525 (14.3%)	1821 (49.5%)	1207 (32.8%)	
Boy	2723	50 (1.8%)	304 (11.2%)	1237 (45.4%)	1132 (41.6%)	
Family structure						<0.001
Mother + father	5039	114 (2.3%)	580 (11.5%)	2403 (47.7%)	1942 (38.5%)	
Others	1318	59 (4.5%)	239 (18.1%)	633 (48%)	387 (29.4%)	
Father's education						<0.001
Low	2778	82 (3%)	418 (15%)	1340 (48.2%)	938 (33.8%)	
Middle	707	26 (3.7%)	95 (13.4%)	318 (45%)	268 (37.9%)	
High	2609	50 (1.9%)	259 (9.9%)	1264 (48.4%)	1036 (39.7%)	
Mother's education						<0.001
Low	1870	66 (3.5%)	279 (14.9%)	915 (48.9%)	610 (32.6%)	
Middle	658	30 (4.6%)	85 (12.9%)	313 (47.6%)	230 (35%)	
High	3994	68 (1.8%)	431 (11.7%)	1759 (47.6%)	1436 (38.9%)	

Cyber victims/ has been bullied						<0.001
Many time/once a week	101	16 (15.8%)	26 (25.7%)	36 (35.4%)	23 (22.8%)	
More seldom	659	39 (5.9%)	136 (20.6%)	331 (50.2%)	153 (23.2%)	
Not at all	5603	119 (2.1%)	661 (11.8%)	2669 (47.6%)	2154 (38.4%)	
Cyberbullies/ has bullied others						<0.001
Bullied many time/once a week	37	3 (8.1%)	9 (24.3%)	18 (48.6%)	7 (18.9%)	
Bullied more seldom	479	24 (5%)	89 (18.6%)	233 (48.6%)	133 (27.8%)	
I have not bullied others	5818	147 (2.5%)	721 (12.4%)	2769 (47.6%)	2181 (37.5%)	

†The difference was tested using Chi-square test.

5.6 Adolescents' subjective health complaints (tension, irritability and headaches) according to socio-demographic characteristics and cyberbullying status

Table 7 represents the percentage of adolescents who complained different health related symptoms by socio-demographic and cyberbullying variables. Adolescents of 18 years reported all three health complaints statistically high (9.9%) followed by 16 years and 14 years (8.8% & 6.6%). A statistical significant difference was found between symptoms and gender (<0.001). Compared to boys, girls more likely reported to have all three symptoms (2.9% vs. 10.5%). Number of adolescents living with other than their own parents who complained all symptoms was faintly higher than those living with their own biological parents i.e. (10.6% vs. 6.5%). Fathers' education, mothers' education and complained of adolescents' health related symptoms was found to be statistically significantly associated (<0.001 and 0.009). Percentage of children of low educated father who complained to have all three symptoms was comparatively higher than those with high educated father (8.3% vs. 5.9%). Also, similar kind of response was seen with mothers' education. Adolescents of

medium and low educated mothers were slightly in higher percentage (8.5%) to have all symptoms compared to highly educated mothers. Those who harassed others once or many times a week were high in number to complain all three symptoms than those who were not bullied i.e. (28.4% vs. 5.9%). Similarly, those who bullied others also complained to have all symptoms than those who were not involved in bullying others (19.4% vs. 6.9%).

Table 7: Proportion of health complaints according to socio-demographic characteristics and cyberbullying status

Socio-demographic and cyberbullying characteristics	Total	All three symptoms	Two symptoms	One symptom	No symptoms	P value[†]
Age (years)						<0.001
12	1285	41 (3.2%)	178 (13.9%)	353 (27.5%)	713 (55.5%)	
14	1930	127 (6.6%)	288 (14.9%)	470 (24.4%)	1045 (54.1%)	
16	1720	151 (8.8%)	305 (17.7%)	417 (24.2%)	847 (49.2%)	
18	1514	150 (9.9%)	280 (18.5%)	384 (25.4%)	700 (46.2%)	
Gender						<0.001
Girl	3703	389 (10.5%)	764 (20.6%)	1005 (27.1%)	1545 (41.7%)	
Boy	2746	80 (2.9%)	287 (10.5%)	619 (22.5%)	1760 (64.1%)	
Family structure						<0.001
Others	1316	139 (10.6%)	266 (20.2%)	346 (26.3%)	565 (42.9%)	
Mother + father	5094	329 (6.5%)	780 (15.3%)	1263 (24.8%)	2722 (53.4%)	
Father's education						<0.001
Low	2789	232 (8.3%)	480 (17.2%)	704 (25.2%)	1373 (49.2%)	
Middle	708	55 (7.8%)	103 (14.5%)	193 (27.3%)	357 (50.4%)	
High	2646	156 (5.9%)	411 (15.5%)	648 (24.5%)	1431 (54.1%)	
Mother's education						0.009
Low	1881	159 (8.5%)	326 (17.3%)	459 (24.4%)	937 (49.8%)	
Middle	662	57 (8.6%)	103 (15.6%)	187 (28.2%)	315 (47.6%)	

High	3723	242 (6.5%)	592 (15.9%)	928 (24.9%)	1961 (52.7%)	
Cyber victims/ has been bullied						0.032
Many time/once a week	102	29 (28.4%)	27 (26.5%)	22 (21.6%)	24 (23.5%)	
More seldom	670	107 (16%)	168 (25.1%)	178 (26.6%)	217 (32.4%)	
Not at all	5637	330 (5.9)	853 (15.1%)	1413 (25.1%)	3041 (53.9%)	
Cyberbullies/ has bullied others						<0.001
Bullied many times/once a week	36	7 (19.4%)	7 (19.4%)	11 (30.6%)	11 (30.6%)	
Bullied more seldom	488	51 (10.5%)	118 (24.2%)	120 (24.6%)	199 (40.8%)	
I have not bullied others	5851	404 (6.9%)	920 (15.7%)	1476 (25.2%)	3051 (52.1%)	

†The difference was tested using Chi-square test.

5.7 Cyber victims' association with socio demographic variables

Table 8 presents the crude and adjusted association of the studied demographic variables with the number of cyber victims. According to the crude Model (I), adolescents of the age group 14 years had statistically higher odds of being victimized (OR=1.78, 95% CI=1.02-3.12) compared to the reference group. When all the studied variables were simultaneously added in Model (II), the statistical significant association was lost. There was no statistical significant association found between gender and cyber victims. In bivariate analysis, family structure was significantly associated with victimization with the adolescents living other than their biological parents having highest odds of (OR=1.76, 95%, CI=1.16-2.26) getting harassed. The association remained statistically significant when all the studied variables were adjusted in Model II, (OR=1.82, 95%, CI=1.16-2.84). Children of low educated father were more likely to become victims (OR=1.69, 95%, CI=1.09- 2.62) compared to high. However, in Model II, the statistically significant association was lost. Similarly, adolescents of low educated mother also had the higher odds of getting bullied (OR=1.99, 95%, CI=1.33-2.98) compared to high educated mother, in Model I. However, when variables were simultaneously adjusted in Model II, statistical association was lost.

Table 8: Odds ratio (OR) and their 95% confidence interval (CIs) for adolescents who have been cyberbullied once/more times a week to socio demographic variables

Socio-demographic characteristics	OR, 95% CI for Cyber victims	
	Model I	Model II
Age (years)		
12	1.35 (0.72- 2.55)	1.13 (0.58- 2.22)
14	1.78 (1.02- 3.12)	1.68 (0.95- 2.97)
16	1.30 (0.71- 2.37)	1.19(0.64- 2.21)
18	Reference	Reference
Gender		
Girl	1.06 (0.72- 1.57)	1.05 (0.70- 1.60)
Boy	Reference	Reference
Family structure		
Others	1.76 (1.16-2.66)	1.82 (1.16-2.84)
Father+ mother	Reference	Reference
Father's education		
Low	1.69 (1.09- 2.62)	1.27 (0.78- 2.09)
Middle	0.92 (0.42- 2.01)	0.97 (0.43- 2.17)
High	Reference	Reference
Mother's education		
Low	1.99 (1.33- 2.98)	1.55 (0.97 – 2.49)
Middle	0.80 (0.36- 1.78)	0.69 (0.28- 1.65)
High	Reference	Reference

Model I: Crude Odds ratio

Model II: Simultaneously adjusted for all variables used in the analysis i.e. (age, gender, family structure, father's education, mother's education)

Reference category for the dependent variable: Have been bullied more seldom/not at all

5.8 Cyberbullies and socio-demographic factors

Table 9 displays the crude and adjusted associations between demographic variables with proportion of cyberbullies. No statistical significant association established between age and the cyberbullies. According to the crude Model (I), girls had statistically smaller likelihood (OR=0.44, 95%, CI=0.23-0.87) of becoming bullies compared to the reference group. In multivariate model (II), the association remained significant with girls still having smaller

odds of becoming bullies than boys. There was no statistical significant association found between the parents' educational status, family structure and age with cyberbullies.

Table 9: Odds ratio (OR) and their 95% confidence interval (CIs) for those who have cyberbullied others once/ many times a week to socio demographic variables

Socio demographic characteristics	OR, 95% CI for Cyberbullies	
	Model I	Model II
Age (years)		
12	0.57 (0.19- 1.68)	0.45 (0.14- 1.49)
14	0.84 (0.36- 2.00)	0.80 (0.32- 1.98)
16	0.95 (0.40- 2.24)	0.96 (0.39- 2.39)
18	Reference	Reference
Gender		
Girl	0.44 (0.23- 0.87)	0.34 (0.16- 0.70)
Boy	Reference	Reference
Family structure		
Others	1.24 (0.58-2.64)	1.16 (0.49-2.71)
Father+ mother	Reference	Reference
Father's education		
Low	1.30 (0.64- 2.67)	0.90 (0.39- 2.08)
Medium	0.85 (0.24- 2.99)	0.87 (0.23- 3.19)
High	Reference	Reference
Mother's education		
Low	1.85 (0.91- 3.75)	1.99 (0.88- 4.48)
Middle	1.38 (0.46- 4.14)	0.69 (0.15- 3.17)
High	Reference	Reference

Model I: Crude Odds ratio

Model II: Simultaneously adjusted for all variables used in analysis i.e. (age, gender, family structure, father's education, mother's education)

Reference category for dependent variable: Bullied more seldom/have not bullied

5.9 Association of health status with socio-demographic factors and cyberbullying

The table 10 below demonstrates the crude and adjusted association of the studied variables with the self-reported health status of adolescents. Adolescents of age group 12 were statistically less likely to have poor health compared to all groups in both Models (I) and (II). Gender and self-reported health were statistically associated in Model (I) where, girls were more likely have poor health compared to boys in both crude and adjusted models. Family structure of the study population and self-reported health were also statistically significantly associated. Those children living in a family without their parents were 2 times more likely to have poor health, average health compared to those with their own biological parents. As per the crude Model (I), adolescents of middle educated father had statistically 2 folds' higher odds to have poor health (OR=2.01, 95%, CI=1.22-3.29) however, the significance was lost in adjusted Model II. Correspondingly, adolescents having medium educated mothers had statistically 2 times higher odds to report poor health compared to highly educated mothers in both models. In crude Model (I), cyber victims who were harassed once or more times were statistically 12 times more likely to have poor health (95%, CI=6.48-24.46) compared to the reference group. In model II, the association was still statistically significant with the odds (OR=15.22, 95%, CI=7.07-32.77). According to the crude Model (I), adolescents who bullied others either once or many times a week were statistically 6 times more likely to have poor health (95%, CI=1.62-24.84) than the reference group. However, after the simultaneous adjustment of all the variables in Model (II), the significance was lost.

Table 10: Odds ratio (OR) and their 95% confidence interval (CIs) for health status of the adolescents' due to different socio- demographic and cyberbullying variables

Socio demographic and cyberbullying characteristics	OR, 95% CI					
	Model I			Model II		
	Poor	Average	Fairly good	Poor	Average	Fairly good
Age (years)						
12	0.05 (0.02-0.11)	0.14 (0.11-0.19)	0.28 (0.23-0.33)	0.05 (0.02-0.11)	0.13 (0.10-0.18)	0.27 (0.22-0.32)
14	0.19 (0.13-0.30)	0.27 (0.22-0.34)	0.47 (0.40-0.55)	0.15 (0.09-0.25)	0.25 (0.20-0.32)	0.45 (0.38-0.54)
16	0.49 (0.34-0.72)	0.60 (0.49-0.75)	0.72 (0.60-0.85)	0.52 (0.35-0.78)	0.62 (0.49-0.78)	0.74 (0.62- 0.89)
18	Reference	Reference	Reference	Reference	Reference	Reference
Gender						
Girl	2.32 (1.65-3.26)	1.62 (1.37-1.90)	1.38 (1.23-1.53)	2.02 (1.39-2.93)	1.51 (1.26-1.80)	1.31 (1.17-1.47)
Boy	Reference	Reference	Reference	Reference	Reference	Reference
Family structure						
Others	2.59 (1.86-3.62)	2.06 (1.71-2.49)	1.32 (1.14-1.52)	2.00 (1.36-2.92)	1.79 (1.45-2.22)	1.28 (1.09-1.50)
Mother+ father	Reference	Reference	Reference	Reference	Reference	Reference
Father's education						
Low	1.81 (1.26-2.60)	1.78 (1.49-2.13)	1.17 (1.04-1.31)	1.19 (0.78-1.81)	1.52 (1.24-1.88)	1.08 (0.94-1.24)
Middle	2.01 (1.22-3.29)	1.41 (1.08-1.85)	0.97 (0.81-1.16)	1.48 (0.86-2.55)	1.31 (0.97-1.77)	0.94 (0.77-1.15)
High	Reference	Reference	Reference	Reference	Reference	Reference
Mother's education						
Low	2.28 (1.60-3.24)	1.52 (1.27-1.82)	1.22 (1.08-1.38)	1.72 (1.14-2.60)	1.15 (0.93-1.42)	1.10 (0.95-1.27)

Middle	2.75 (1.75-4.32)	1.23 (0.93-1.61)	1.11 (0.92-1.33)	2.39 (1.44-3.96)	1.14 (0.84-1.53)	1.09 (0.89-1.33)
High	Reference	Reference	Reference	Reference	Reference	Reference
Cyber victims/ has been bullied						
Many time/once a week	12.59 (6.48-24.46)	3.68 (2.08-6.49)	1.26 (0.74-2.13)	15.22 (7.07-32.77)	3.76 (1.97-7.15)	1.12 (0.62-2.03)
More seldom	4.61 (3.10-6.86)	2.89 (2.26-3.70)	1.74 (1.43-2.13)	5.19 (3.29-8.18)	3.25 (2.46-4.29)	1.83 (1.47-2.28)
Not at all	Reference	Reference	Reference	Reference	Reference	Reference
Cyberbullies/ has bullied others						
Many time/once a week	6.35 (1.62-24.84)	3.88 (1.44-10.48)	2.02 (0.84-4.85)	1.88 (0.41-8.53)	1.85 (0.62-5.54)	1.44 (0.56-3.69)
More seldom	2.67 (1.68-4.26)	2.02 (1.52-2.68)	1.38 (1.10-1.72)	1.78 (1.02-3.10)	1.63 (1.18-2.26)	1.30 (1.02-1.65)
I have not bullied	Reference	Reference	Reference	Reference	Reference	Reference

Model I: Crude Odds ratio

Model II: Simultaneously adjusted for all variables used in analysis i.e. (age, gender, family structure, father's education, mother's education, cyber victims, cyberbullies)

Reference category for dependent variable: Very good

5.10 Association of subjective health complaints (tension, irritability and headaches) with socio- demographic factors and cyberbullying

Table 11 presents the crude and adjusted association of the socio-demographic and cyberbullying with the symptoms complained by adolescents. Adolescents of 12 years were statistically significantly less likely to complain symptoms compared to reference group in crude Model (I). After simultaneously adjusting all the variables in Model II, the 12 years

age group had significantly lower odds of all symptoms (tension, irritability and headaches). Gender was significantly associated with health complaints with girls were 5 times more likely to have symptoms compared to boys in both crude and adjusted models. With statistically significant association, adolescents living without parents were 2 folds more likely to complain to have all symptoms in crude Model (I) and had odds (OR=1.70, 95%, CI=1.32-2.19) when adjusted in Model (II). Adolescents with low educated father were significantly 55% more likely to complain to have all symptoms compared to the reference group in Model (I) and the association remained significant in Model II after the adjustment of variables. However, adolescents with middle educated mothers were statistically more likely to have all symptoms with odds (OR= 1.46, 95%, CI=1.07-2.00) in Model (I) and (OR=1.41, 95%, CI=1.00-2.00) in Model (II) compared to the reference group. Statistical significant association was found between victims who got bullied either once or many times a week and the health complaints. The odds of complaining to have all three symptoms by those cyber victims compared to the reference group was 11 times higher in Model (I) and 13 times higher in Model (II) than the reference group. Likewise, adolescents who bullied other once or many times a week, were statistically associated to have all symptoms in bivariate Model (I) with odds (OR=4.80, 95%, CI=1.85-12.46) compared to the reference group. Unfortunately, the significance association was lost in Model II.

Table 11: Odds ratio (OR) and their 95% confidence interval (CIs) for health complaints (tension, irritability and headaches) of the adolescents weekly due to different socio- demographic and cyberbullying variables

Socio demographic and cyberbullying characteristics	OR, 95% CI					
	Model I			Model II		
	All symptoms	2 out of 3	1 out of 3	All symptoms	2 out of 3	1 out of 3
Age (years)						
12	0.26 (0.18-0.38)	0.62 (0.50-0.77)	0.90 (0.75-1.07)	0.27 (0.18-0.40)	0.62 (0.49-0.78)	0.90 (0.75-1.09)
14	0.56 (0.43-0.73)	0.68 (0.57-0.83)	0.82 (0.69-0.96)	0.51 (0.38-0.67)	0.63 (0.51-0.78)	0.82 (0.69-0.98)
16	0.83 (0.65-1.06)	0.90 (0.74-1.08)	0.89 (0.75-1.06)	0.85 (0.65-1.12)	0.86 (0.70-1.05)	0.87 (0.73-1.05)
18	Reference	Reference	Reference	Reference	Reference	Reference
Gender						
Girl	5.53 (4.31-7.11)	3.03 (2.60-3.53)	1.85 (1.63-2.08)	5.94 (4.50-7.83)	3.05 (2.59-3.58)	1.83 (1.61-2.08)
Boy	Reference	Reference	Reference	Reference	Reference	Reference
Family structure						
Others	2.03 (1.63-2.53)	1.64 (1.39-1.94)	1.32 (1.13-1.53)	1.70 (1.32-2.19)	1.56 (1.29-1.88)	1.31 (1.11-1.54)
Mother+ father	Reference	Reference	Reference	Reference	Reference	Reference
Father's education						
Low	1.55 (1.24-1.92)	1.21 (1.04-1.41)	1.13 (0.99-1.28)	1.35 (1.04-1.74)	1.08 (0.91-1.29)	1.09 (0.94-1.27)
Middle	1.41 (1.01-1.96)	1.00 (0.78-1.28)	1.19 (0.97-1.45)	1.32 (0.92-1.90)	1.00 (0.77-1.30)	1.13 (0.92-1.40)
High	Reference	Reference	Reference	Reference	Reference	Reference
Mother's education						
Low	1.37 (1.10-1.70)	1.15 (0.98-1.34)	1.03 (0.90-1.18)	0.98 (0.75-1.27)	0.99 (0.82-1.19)	0.95 (0.81-1.11)
Middle	1.46 (1.07-2.00)	1.08 (0.85-1.37)	1.25 (1.03-1.52)	1.41 (1.00-2.00)	1.09 (0.84-1.42)	1.27 (1.03-1.57)
High	Reference	Reference	Reference	Reference	Reference	Reference
Cyber victims/ has been bullied						
Many time/once a week	11.13 (6.40-19.35)	4.01 (2.30-6.98)	1.97 (1.10-3.53)	13.81 (7.23-26.37)	4.27 (2.26-8.06)	1.93 (1.00-3.72)

More seldom	4.54 (3.51-5.88)	2.76 (2.22-3.42)	1.76 (1.43-2.17)	4.44 (3.31-5.95)	2.49 (1.96-3.17)	1.68 (1.34-2.11)
Not at all	Reference	Reference	Reference	Reference	Reference	Reference
Cyberbullies/ has bullied others						
Many time/once a week	4.80 (1.85-12.46)	2.11 (0.81-5.46)	2.06 (0.89-4.77)	2.32 (0.75-7.15)	1.43 (0.49-4.17)	2.04 (0.83-4.99)
More seldom	1.93 (1.39-2.67)	1.96 (1.54-2.49)	1.24 (0.98-1.57)	1.51 (1.03-2.23)	1.76 (1.33-2.32)	1.22 (0.95-1.58)
I have not bullied	Reference	Reference	Reference	Reference	Reference	Reference

Model I: Crude Odds ratio

Model II: Simultaneously adjusted for all variables used in analysis i.e. (age, gender, family structure, father's education, mother's education, cyber victims, cyberbullies)

Reference category for dependent variable: no symptoms

6. DISCUSSIONS

6.1 Summary of main findings

The aim of this study was to explore the prevalence of cyberbullying (cyberbullies and cyber victims), risk factors and its association with health of the adolescents in Finland. The respondents of this study were Finnish adolescents of age group 12, 14, 16 and 18 years.

The prevalence of cyber victims overall was 12% whereas those adolescents who were bullied by others many times/ once a week were 1.6%. Adolescents of 12 and 14 years get bullied in greater percentage i.e. 1.6% and 2.1% compared to other two groups. In univariate analysis, girls, adolescents living in a family without their own parents, adolescents from low educated father and mother were more likely to become cyber victims. However, in multivariate analysis, only family structure was significantly associated where adolescents from family without biological parents were more likely to become cyber victims.

The prevalence of cyberbullies overall was 8.2% however, specifically, bullies i.e. (bullied many times/once a week) was only 0.6%. The highest prevalence of adolescents who bullied others many times/ once a week was in the age group 18 years (0.7%) and the prevalence was higher among boys compared to girls (0.8% vs 0.4%). Likewise, adolescents without biological parents had higher chances of becoming cyberbullies compared to adolescents with their own parents (0.7% vs 0.5%) although there was no significant association established. Children of low educated parents (father and mother) bullied others more often than the other groups. In multivariable logistic regression model, only gender was significantly associated to cyberbullies with girls were less likely bullying others many times/once a week compared to boys.

Likewise, 2.6% of the total adolescents reported to have poor health. Results indicated that age, gender, family structure, father's education and mother's education were significantly associated

to poor health status, where children of 18 years' age group were more likely to report poor health. Girls, adolescents living in a family without their biological parents, having low educated mothers were more likely to report poor health. However, in context of father's education, kids with middle educated father reported poor health. Cyber victims and cyberbullies were more likely to report poor health compared to those not involved in these activities.

As per the health complaints, 7% of the adolescents reported they had all three symptoms (tension, irritability and headaches) whereas, almost half (49.3%) did not have any symptoms. Adolescents of youngest age group had less likelihood of all three symptoms. Girls were more likely to report all three symptoms compared to boys. Adolescents living without parents, having low educated father and middle educated mothers, were significantly more likely to report having all symptoms. Likewise, cyber victims and cyberbullies were more likely to complain to have all three symptoms.

All the changes seen in Model I and Model II is probably due to adjustments and the interaction of variables.

6.2 Prevalence of cyberbullying

In our study, the prevalence of cyber victims and cyberbullies in total was (12% vs. 8.2%) respectively, however, those the prevalence of those involved as cyber victims and cyberbullies weekly (once or many times a week) was 1.6% and 0.6%. This prevalence is faintly higher compared to the findings reported by Lindfors et al., (2012) Finland, where cyberbullies involvement weekly was 1%; and cyber victims' prevalence weekly was 0.5%. Since both studies were conducted in the same country using the data from the same source, this result is comparable (Lindfors et al., 2012). This shows that the trend of cyberbullying is increasing steadily. Similar findings were reported from another cross-sectional study from Finland, where the prevalence rate of cyberbullies and cyber victims was 7.4% & 4.8% respectively (Sourander et al., 2010). Likewise, another study from Indonesia also reported that 12.7% of the adolescents were

victimized almost daily or more frequently (Safaria, 2016) however, the sample size of this study was quite smaller (495) which may not generalize the entire population. A large cross-sectional study from Canada conducted by Mishna, et al., (2012) reported 30% of their studied population engaged in cyberbullying either as bully or victims. A recent study from East London also stated that 14% of the adolescents were cyber victims and 8% cyberbullies (Fahy et al., 2016) and this prevalence is somehow similar to our study. Studies from China, Nigeria & Serbia (Olumide et al., 2016; Popović et al., 2011; Zhou et al., 2013) reported 57%, 40% and 20% prevalence of victims respectively whereas, 35%, 24% and 10% bullies' prevalence respectively which are very high compared to our study however, the sample sizes in these studies were also small and didn't represent the whole nation.

6.3 Risk factors associated with cyberbullying

Findings from our study revealed that younger age of the adolescents (12 and 14 years) were highly associated with cyberbullying both as a cyberbullies and cyber victims either in weekly basis or more seldom. These outcomes are coherent with some of the previous studies which reported younger children's frequent involvement in bullying compared to old ones (Bannink et al., 2014; Foody et al, 2015; Lindfors et al., 2009) and the reason might be because of curiosity, ignorance and not knowing its consequences, or they take these activities as a fun (Koovakkai & Said, 2010).

These findings of our study contradict with the findings from earlier studies which reported that adolescents of higher age groups were involved more often in both dimension of cyberbullying compared to younger ones (Robson & Witenerg, 2013; Hinduja & Patchin, 2008). Moreover, some studies have also reported that there was no significant association found between age and cyberbullying (Smith et al., 2006).

In our study, gender played an important role in recognizing victims and bullies which was significantly associated with cyberbullies. Similar findings were reported in earlier studies; girls

were more likely to become cyber victims (Heiman & Shemesh, 2015; Li, 2006; Garaigorodobil, 2015; Wong et al., 2014). These results however, contradict with the findings that females highly participate in cyberbullying than boys (Kowalski & Limber, 2013). In coherent with other studies (Goebert et al., 2011; Mishna et al., 2012; Smith et al., 2006) findings of this study showed that girls were more likely to become cyber victims.

Those adolescents who lived in family with their biological parents were less involved in both activities whereas those living without their own parents had higher likelihood to report both cyber victims and cyberbullies, which is not surprising. The finding of our study coincides with one of the longitudinal studies from Netherland where 13.3% of adolescents of age 13.5 were from intact family structure were highly involved in cyberbullying activities, however, in this study only adolescent of age group 11 and 13.5 were included (Jansen et al., 2011). Some other studies from Sweden and Norway also found that those adolescents who live in a family without their biological parents are highly aggressive with high involvement in cyberbullying (Åsa et al., 2012; Fosse & Holen, 2002). Due to lack of parent-child attachment, not getting love and care from other people which usually a child gets from his/her own parents, and finally, those adolescents without parents or single parent families are deprived of opportunities to enhance their social skills and capability, leading them to victimization (Arora, 1987; Bowers et al., 1994) or encouraging them in bullying activities (Jansen et al., 2011).

Adolescents from low educated parents were more likely to become cyberbullies and cyber victims in this study which is supported by the theories given by previous literatures that a higher proportion adolescents engaged in cyberbullying activities have parents without higher education. According to Dubow (2009) parents' education is a significant predictor of children's educational and behavioral outcomes (Dubow et al., 2009). The reason behind this might be if parents don't have enough education, they fail to monitor, educate, and bring awareness to the youth, as a result, internet and mobiles we will arouse cyber-related fatalities however, further studies are

recommended to explore the association between parent's educational status and cyberbullying among adolescents.

6.4 Cyberbullying and health

Our study clarifies that both cyberbullying dimensions (cyber victims and cyberbullies) are associated to poor perceived health and the health complaints. In addition, those involved in cyberbullying activities once or more times in a week are more likely to have poor health compared to those who are not engaged in such activities. Few earlier studies have also reported similar findings (Rigby, 1996; Låftman et al., 2013; Callaghan et al., 2015; Sourander et al., 2010). The adverse consequences of cyberbullying on health are particularly strong because of the unique feature of cyberbullying i.e. cyberbullies hide their identity and are totally anonymous to the victims, and the audiences can be infinite in numbers. Furthermore, the harassment can occur any place and at any time and unfortunately, the victim may not even notice beforehand that they are being bullied (e.g. someone spreading rumors or publishing photos on the Internet). These activities could be important stressors which can lead to poor subjective health.

The interpretation that cyberbullying is distinct from other types of bullying, is also because its effects in health varies, as mental health effects i.e. self-harm, suicidal thoughts, headaches, irritation and depression among the adolescents, low educational performances, and other psychosocial problems such as feeling of low self-esteem and low confidence (Bottino et al., 2015; Daine et al., 2013; Pham & Adesman, 2015; Sourander et al., 2010; Wang et al., 2011; Wolke et al., 2013; Ybarra, 2004).

Adolescents of age group 12 and 14 years were less likely to report poor health compared to older groups, as well as the same groups less likely complained about the symptoms i.e. (tension, irritability and headaches) which is consistent with the results shown by other previous studies (Patchin, 2010; NCPC, 2007; Jansen et al., 2011; Åsa et al., 2012).

Significant association was found between gender and health status and health complaints where girls were more likely to report poorer health and all those psychosomatic symptoms compared to boys which is alike to the results shown by other findings (Bannink et al., 2014; Reed et al., 2015; Salmela et al., 2016). However, this study contradicts with the study of a cross sectional study from USA of sample size (1501) which identified no association between girls and health symptoms (Ybarra et al., 2012). The explanation can be because our study had larger dataset compared to that study.

Adolescents who reported poor health were more likely to be from families without biological parents, and they also more likely reported to have all these psychosomatic symptoms (tension, irritability and headaches). The results are in line with the findings from Finland (Sourander et al., 2010).

Similarly, both the cyberbullies and cyber victims who reported to have poor health and all three symptoms (tension, irritability and headaches) were more likely to have low educated fathers which is consistent to other studies (Fosse & Holen, 2002; Shetgiri et al., 2012). However, our study found that those children who had mothers of medium education were more likely to report poor health and health symptoms which contradicts with these studies (Fosse & Holen, 2002; Shetgiri et al., 2012). The only explanation might be because of the differences in sample size.

6.5 Strengths and limitations of study

This study was focused on the adolescents of age group 12, 14, 16 and 18 years who were exposed to cyberbullying either way. Data for this study was extracted from AHLS 2015. This is the first population based cross-sectional study with large sample size to examine the cyberbullying impact in health status of adolescents in Finland and as the sample size represents the entire nation, findings are generalizable to the whole population of Finland.

However, this study has several limitations which needs to be taken into account while interpreting the findings. Firstly, all the findings gathered were based on self-reports, because of which the information given by the respondents may not be very reliable, however, in this study this was the only reliable method to collect data. Secondly, as the study design was cross-sectional interpretation of the direction of causality between cyberbullying and its risk factors is hard to predict. In the survey, no clear definition of cyberbullying was provided because of which it was not possible to differentiate cyberbullying between internet and mobile phone. In addition, as the questionnaire was bound to the time of 1 year; the reliability of findings needs to be calculated carefully due to recall bias. Because of the low response rates, the final sample may not include those adolescents who are involved in cyberbullying activities, therefore, the overall estimates for cyberbullying may be underestimated or under reported.

7. FURTHER RESEARCH

Further studies on the consequences of cyberbullying need to include more comprehensive research approaches and along with quantitative dimension of the problems it should include qualitative aspects too. It is also important to study cyberbullying at other age groups. More researches with longitudinal designs is needed to assess the association between cyberbullying and its impact in adolescents' health. Likewise, studies should include more detailed measures adjusting for more possible confounders to make it possible to investigate the independent effect of cyberbullying in greater depth, as well as to repeat the measures over time. Future research is also required on whether anti-bullying policies, preventive interventions, and guidelines for mobile, telephone and Internet users are effective for reducing cyberbullying.

8. CONCLUSIONS AND RECOMMENDATIONS

This study focused on the prevalence of cyberbullying (victims and bullies), the risks factors associated with cyberbullying and its impact on the health of adolescents in Finland. The prevalence of cyberbullying (victims and bullies) was 8.2% and 12% respectively, whereas 7% of them reported to have tension, irritation and headaches which is a very serious issue. Family structure was significantly associated with adolescents without biological parents more likely to become cyber victims and gender was significantly associated with girls less likely to become cyberbullies. Age of adolescents, gender, family structure and parents' education were found to be statistically significant associated with self-reported health and subjective health complaints.

Overall, as cyberbullying is a relatively new form of bullying it demands more attention in Finland. Rapid technological modifications, the anonymity of the culprits, and the possibly large audiences make cyberbullying more complex to prevent its consequences compared to other types of bullying. The findings explored in this study about the self-reported health and subjective health complaints reported by both victims and bullies of cyberbullying, should be seriously taken into account. Basically, adolescents, their parents and schools need to have a proper understanding of the nature of cyberbullying, how to address it and how to prevent it. Moreover, there is a need to generate cyber environments and supervision which would provide clear and consistent standards for healthy cyber performance in schools. Health workers working in child and adolescent health services department should be aware that about cyberbullying traumatizing nature. Finally, as the negative effects of cyberbullying is growing with the increasing obsession of children and adolescents towards the digitalized world; policy makers, teachers, parents, and adolescents should give proper attention to the harmful effects of cyberbullying.

Acknowledgement

This study was carried out at the School of Health Sciences, University of Tampere. I would like to express my gratitude to the University of Tampere for offering me with the opportunity and support to conduct this study.

I gratefully acknowledge my supervisors Professor Arja Rimpelä and Adj. Professor Subas Neupane for their constant input, direction and clarity they provided throughout the entire study period. This research would not have taken this shape without their vital encourage and support.

I cannot behold myself without thanking Professor Anneli Milén and Anna-Maija Koivisto for their valuable feedbacks and suggestions during my study.

I sincerely thank all my senior brothers and sisters, and all my classmates at the University who encouraged and motivated me all the time.

And finally; I would like to express my sincere gratitude to my parents for their love, support and encouragement throughout the process.

Manisha Hamal

August 2017

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