



Personality and Social Psychology

Cyberbullying status and mental health in Norwegian adolescents

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Kaiser, S., Kyrrestad, H. & Fossum, S. (2020). Cyberbullying status and mental health in Norwegian adolescents. *Scandinavian Journal of Psychology*, 61, 707–713.

The aim of the present study was to examine how the cyberbullying status (not involved, cyber-victim only, cyberbully only, cyber-victim and bully) is related to the mental health of the adolescents when controlled for traditional bullying experience. We also examined the potential moderator sex on the relationship between cyberbullying status and mental health. Univariate analyses of variance were conducted to predict mental health problems using the Strength and Difficulties Questionnaire total difficulties score and its five scales. The model consisted of five predictors in addition to an interaction term between cyberbully status and sex. Of the 2,117 adolescents, 50% were girls. The vast majority did not have any cyberbullying experience (87%), 9% of the adolescents were cyber-victims only, 1% were cyberbullies only and 3% were both cyber-victims and bullies. Overall, girl's mental health seems to be more compromised when exposed to or involved in cyberbullying than boys mental health. In general, adolescents who are not only cyberbullies and cyber-victims, but also cyber-victims only had a worse mental health compared to adolescents without cyberbullying experience. Being exposed to cyberbullying is a unique contributor to mental health problems. Preventing cyberbullying is therefore important. Especially girl's mental health seems to be negatively affected when exposed to cyberbullying.

Key words: Cyberbullying, mental health, SDQ, Strength and Difficulties Questionnaire.

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CYBERBULLYING STATUS AND MENTAL HEALTH IN NORWEGIAN ADOLESCENTS

Smith, Mahdavi, Carvalho, Fisher, Russell and Tippett (2008, p. 376) defines cyberbullying as “An aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself.” Prevalence rates of cyberbullying vary a lot from for example 4.8% to 73.5% with a median of 23.0% as found in a review by Hamm, Newton, Chisholm, Shulhan, Milne, Sundar and Hartling (2015). Arnarsson, Nygren, Nyholm, Torsheim, Augustine, Bjereld and Bendtsen (2019) found even lower prevalence rates, which may partly be explained by the use of different measures to assess cyberbullying. The prevalence of being cyberbullied, bullied in a traditional manner, or both was 1.6%, 2.7%, and 1.6%, respectively, for 15-year-old Norwegian boys and 2.6%, 3.1%, and 1.9% for 15-year-old Norwegian girls (Arnarsson *et al.*, 2019). These rates indicate that the overlap between traditional bullying and cyberbullying is relatively low in Norway (Arnarsson *et al.*, 2019).

Olweus and Limber (2018) problematize in their article the degree to which traditional bullying and cyberbullying overlap and the extent to which cyberbullying victimization adds to negative mental health outcomes. A study indicates that traditional bullying and cyberbullying might affect adolescents differently (Sjursø, Fandrem & Roland, 2016). Sjursø *et al.* (2016) found that associations between cyber victimization and symptoms of anxiety were stronger than for traditional victimization and symptoms of anxiety, while the opposite was the case for associations with depressive symptoms. However, both traditional- and cyber victimization were related to emotional problems. Other studies found that being cyberbullied only or in combination with traditional bullying seems to have an additional

negative effect on the mental health of adolescents (Arnarsson *et al.*, 2019; Campbell, Spears, Slee, Butler & Kift, 2012; Wolke, Lee & Guy, 2017). While Wolke *et al.* (2017, p. 906) concludes that “From a public health perspective, considering the low prevalence of pure cyber-victimization compared to traditional peer victimization, cyber-victimization has only a small unique impact on adolescent mental health; it is an overrated phenomenon,” Fahy, Stansfeld, Smuk, Smith, Cummins and Clark (2016, p. 507) conclude, quite opposite, “that cybervictimization – even at low levels – may be a risk factor for future adolescent mental health problems.” Also Campbell *et al.* (2012) found that cyber-victimization was related to poorer mental health. That cyberbullying is indeed a risk factor for future mental health problems is also indicated by a meta-analysis that found a unique relationship between cyber-victimization and internalizing problems (Gini, Card & Pozzoli, 2018).

Furthermore, studies indicate that the degree of cyberbullying involvement (not being involved, being a cyber-victim only, being a cyberbully only, and being both a cyber-victim and a cyberbully) may be associated with the well-being of adolescents. For example did a cross-sectional article find that adolescents being both cyberbullies and cyberbullied have a poorer mental health than cyber-victims only or those not being involved in cyberbullying (Spears, Taddeo, Daly, Stretton & Karklins, 2015). A longitudinal study identified that being exposed to or being exposed to and involved in cyberbullying were risk factors for mental health problems, including the development of depressive symptoms and social anxiety symptoms (Fahy *et al.*, 2016). Being a cyberbully only, however, was not associated with a higher risk for future mental health problems. However, none of the studies were adjusted for traditional bullying (Fahy *et al.*, 2016; Spears *et al.*, 2015).

Sourander, Brunstein Klomek, Ikonen, Lindroos, Luntamo, Koskelainen and Helenius (2010) examined risk factors associated with cyberbullying. They found that the most troubled adolescents were those that are both cyberbullies and victims. The Strength and Difficulties Questionnaire (SDQ) was used to predict the different cyberbully categories. Cyber-victims only were predicted by the scales emotional problems and peer problems, cyberbullies only were predicted by the scales hyperactivity, conduct problems, and prosocial problems, and cyberbullies and victims were predicted by all of the scales, except for peer problems and prosocial problems.

In addition to differences between cyberbullying status and how this influences the adolescents' mental health, there may be sex differences that moderate the relationship. Kim, Kimber, Boyle and Georgiades (2019) found that cyber-victimization was associated with poorer mental health among both sexes but the effects were more pronounced among girls. The more exposed girls were to cyber-victimization the higher the odds for suicide ideation, psychological distress, and delinquency. Furthermore, cyber-victimization was related to an increased odds of substance abuse among girls but not boys (Kim *et al.*, 2019). Similarly, Turner, Exum, Brame and Holt (2013) found that girl being cyberbully victims reported higher levels of depression compared to boys, while depression levels for traditional bullying victimization were the same for boys and girls.

The aim of the present study was to examine how cyberbullying status (not involved, cyberbully-victim only, cyberbully only, cyber-victim and bully) is related to adolescents' mental health measured by the SDQ and when controlled for traditional bullying experience. A secondary aim was to examine possible sex differences in the relationship between cyberbullying status and the outcome variables.

METHOD

Participants and procedure

Participants were recruited as part of the PIN-study, which examines the relationship between mental health and cyberbullying, bullying, internet use and -addiction. The PIN-study is part of a larger international collaboration called "Adolescent health in a digital world: Associations of well-being, mental health and help-seeking with risk behaviors." A similar survey to the PIN-study was also conducted in Greece, Japan, China, India, Finland, Singapore, Vietnam, Israel, Iran, Lithuania, Russia, and Indonesia.

In order to recruit schools, an information letter about the PIN-study was sent to all schools in 85 municipalities in the three northernmost counties of Norway (Nordland, Troms, and Finnmark), inviting 220 junior high schools to participate. Of those 220 schools, 72 schools agreed to participate in the study. Of the 5,192 students in these schools, 2,117 students answered the questionnaire (response rate 40%). The participating schools were responsible for distributing the information letters to the students and parents. Parents had to give active consent. The study was approved by the Regional Committee for Medical Research Ethics (REK No: 2016/998).

In spring 2017, all secondary school students, whose schools agreed to participate in the study and whose parents gave consent, were invited to participate in the PIN-study. Study participation was voluntary and anonymous and students replied on an electronic questionnaire during school hours. The questionnaire was available in Norwegian and Sami.

Table 1 presents the sample characteristics for the total sample ($N = 2,117$) and for boys ($n = 1,066$) and girls ($n = 1,051$) separately. There were sex differences in the distribution of the cyberbully status and in the SDQ total difficulties score and on three SDQ scales (i.e. emotional symptoms, conduct problems and prosocial behaviors).

Measures

Demographic characteristics. The questionnaire included questions about demographic characteristics such as sex (girl or boy), school grade (8th, 9th, or 10th grade), and nationality, which was coded as Norwegian vs. non-Norwegian with the categories yes and no.

Table 1. Sample characteristics for the total sample ($N = 2,117$) and for boys ($n = 1,066$) and girls ($n = 1,051$) separately

Variable	Total sample		Boys		Girls		Difference boys vs. girls
	<i>N</i>	%	<i>n</i>	%	<i>n</i>	%	
Norwegian vs. non-Norwegian							
Yes	1958	87.6	985	92.4	973	92.6	<i>ns</i>
No	277	12.4	81	7.6	78	7.4	<i>ns</i>
Grade							
8 th	828	39.1	423	39.7	405	38.5	<i>ns</i>
9 th	649	30.7	323	30.3	326	31.0	<i>ns</i>
10 th	640	30.2	320	30.0	320	30.4	<i>ns</i>
Cyberbully status							
Not involved	1781	87.0	920	89.7	861	84.3	$p < 0.05$
Cyber-victim only	179	8.7	54	5.3	125	12.2	$p < 0.05$
Cyberbully only	23	1.1	17	1.7	6	0.6	$p < 0.05$
Cyber-victim and -bully	64	3.1	35	3.4	29	2.8	<i>ns</i>
Traditional bullying experience							
Yes	275	12.3	130	12.2	145	13.8	<i>ns</i>
No	1960	87.7	936	87.8	906	86.2	<i>ns</i>
Strength and Difficulties Questionnaire							
Total difficulties score	10.58	5.65	9.67	5.22	11.49	5.92	$p < 0.001$
Emotional symptoms	3.02	2.44	1.99	1.84	4.06	2.53	$p < 0.001$
Conduct problems	1.70	1.60	1.88	1.73	1.52	1.45	$p < 0.001$
Hyperactivity-inattention	3.86	2.24	3.83	2.21	3.89	2.28	<i>ns</i>
Peer relationship problems	2.00	1.79	1.97	1.77	2.03	1.80	<i>ns</i>
Prosocial behavior	7.60	1.83	7.18	1.86	8.02	1.70	$p < 0.001$

Cyberbullying status. First, cyberbullying was defined in accordance to (Hinduja & Patchin, 2009). "Cyberbullying is when someone repeatedly makes fun of another person online or repeatedly picks another person through email or text messages or when someone posts something online about another person that they don't like." Then, two questions were asked ("How often have you been bullied online the last six months?" and "How often have you bullied others online the last six months?") with response categories from "Never" (1), "Less than once a week" (2), "More than once a week" (3), to "Almost daily" (4). These two questions were used to generate the cyberbullying status (not involved, cyberbully-victim only, cyberbully only, cyber-victim and bully). The category "Not involved" was used for adolescents that had neither experienced cyberbullying nor have they cyberbullied others. The category "cyberbully-victim only" was used for adolescents who reported to have been cyberbullied less than once a week or more often but did not report to have cyberbullied others. The category "cyberbully only" was used for adolescents who reported to have cyberbullied others less than once a week or more often but did not report to have been cyberbullied. The category "cyber-victim and bully" was used for adolescents who reported to have both been cyberbullied and cyberbullied others less than once a week or more often.

Traditional bullying experience. First bullying was defined in accordance to Olweus (1993). "A student is being bullied when he or she is exposed repeatedly over time to negative and hurtful actions on the part of one or more students. It is difficult for the student being bullied to defend himself or herself. Bullying may take place frequently or infrequently. Bullying can be verbal (e.g., name-calling, threats), physical (e.g., hitting) or psychological (e.g., rumors, shunning/exclusion). It is bullying when someone is teasing repeatedly in a mean or hurtful way (p. 9)." Then, two questions measuring bullying were asked ("How often have you been bullied in school in the past six months?" and "How often have you been bullied away from school in the past six months?") with response categories from "Never" (1), "Less than once a week" (2), "More than once a week" (3), to "Almost daily" (4). Adolescents that answered to either or both of those two questions to have been bullied less than once a week or more often were grouped as having traditional bullying experience.

Mental health. The Strength and Difficulties Questionnaire self-report version for 11 to 16 years old is a questionnaire assessing mental health (Goodman, 1997). It consists of 25 items divided into five scales, each consisting of five items (emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior). Furthermore, the four scales emotional symptoms, conduct problems, hyperactivity/inattention, and peer relationship problems can be added up to a total difficulties score. Each item is rated on a 3-point scale from "Not true" (0), "Somewhat true" (1), to "Certainly true" (2), except for five positive worded items where the scaling is reversed ("Not true" (2), "Somewhat true" (1), to "Certainly true" (0)). For each scale, scores can range from 0 to 10, for the total difficulties score, scores can range from 0 to 40. The SDQ has been validated in Norway (Rønning, Handegaard, Sourander & Morch, 2004). Cronbach's alpha in the current sample was 0.75 for the emotional symptoms scale (for boys 0.63 and for girls 0.72), 0.54 for conduct problems (for boys 0.58 and for girls 0.48), 0.70 for hyperactivity/inattention (for boys 0.69 and for girls 0.71), 0.61 for peer relationship problems (for boys 0.59 and for girls 0.62), and 0.66 for prosocial behavior (for boys 0.64 and for girls 0.64). In accordance to the guidelines of the European Federation of Psychologists' Association (2013) Cronbach's alpha of ≥ 0.70 is adequate.

Statistical analyses

The statistical analyses were conducted with SPSS version 25. Univariate analysis of variance were conducted to predict the SDQ total difficulties score and the five SDQ scales (emotional symptoms, conduct problems, hyperactivity-inattention, peer relationship problems, and prosocial behavior). The predictors were cyberbullying status (not involved, cyber-

victim only, cyberbully only, cyber-victim and bully), traditional bullying experience (yes or no), sex (boy or girl), Norwegian vs. non-Norwegian (yes or no), and grade (8th, 9th, 10th), in addition to an interaction term between cyberbully status and sex (Rovai, Baker & Ponton, 2014). Post hoc analyses (Scheffe) were used to test for differences in the scores of the outcome variables between cyberbullying status (not involved, cyberbully-victim only, cyberbully only, cyberbully-victim and bully). Effect sizes were calculated as partial eta squared (η^2) where values of 0.01, 0.06, and 0.14 indicate small, medium, and large effect sizes (Rovai *et al.*, 2014), respectively.

RESULTS

SDQ total difficulties score and cyberbullying status

Univariate analysis of variance with the SDQ total difficulties score as the outcome variable and for the whole model was significant $F(11, 2020) = 37.88, p < 0.01, R^2 = 0.171$. The interaction term between cyberbully status and sex was significant $F(3, 2020) = 9.74, p < 0.01, \eta^2 = 0.014$. Overall, except for cyberbullies only, girls scored significantly ($p < 0.05$) higher on the SDQ total difficulties score compared to boys taking cyberbullying status into account (Table 2). Furthermore, all predictors were significant except for the variable Norwegian or non-Norwegian $F(1, 2020) = 0.06, p = 0.81, \eta^2 = 0.000$. Cyberbullying status contributed significantly to the prediction of the SDQ total problem score $F(3, 2020) = 19.04, p < 0.01, \eta^2 = 0.028$.

Post-hoc analyses of the main effect cyberbullying status revealed significant differences between adolescents with a status of "Not involved" ($n = 1770; M = 9.91; SD = 5.28$) compared to cyber-victims only ($n = 179; M = 15.21; SD = 6.27; p < 0.01$) and cyberbullies and victims ($n = 61; M = 15.36; SD = 5.62; p < 0.01$; see Table 2). The group "cyberbullies and victims" scored significantly higher on SDQ total difficulties score compared to cyberbullies only ($n = 22; M = 11.73; SD = 4.78; p < 0.05$), but did not differ from cyber-victims only ($p = 0.998$). Cyber-victims only scored significantly higher on the SDQ total difficulties score than the adolescents reporting being cyberbullies only ($p < 0.05$).

Emotional symptoms and cyberbullying status

Univariate analysis of variance with emotional symptoms as the outcome variable and for the whole model was significant $F(11, 2025) = 63.63, p < 0.01, R^2 = 0.257$. The interaction term between cyberbully status and sex was significant $F(3, 2025) = 9.01, p < 0.01, \eta^2 = 0.013$. Girls scored significantly higher on the emotional symptoms scale than boys ($p < 0.01$) considering the cyberbullying status, except for the group cyberbullies only (Table 2). All predictors were significant except for the variable Norwegian vs. non-Norwegian $F(1, 2025) = 0.32, p = 0.58, \eta^2 = 0.00$. Cyberbullying status contributed significantly to the prediction of emotional symptoms $F(3, 2025) = 12.34, p < 0.01, \eta^2 = 0.018$.

Post-hoc analyses were conducted to examine differences in emotional symptoms for the cyberbullying status. Cyber-victims only ($n = 179; M = 4.97; SD = 2.88$) and both cyber-victims and bullies ($n = 61; M = 3.80; SD = 2.77$) scored higher on

Table 2. Descriptive statistics and group differences for the SDQ considering cyberbullying status for the total sample and for boys and girls separately

SDQ	Group	Cyberbullying status	Total sample <i>M (SD)</i>	Sig. diff. between the groups for total sample	Boys <i>M (SD)</i>	Girls <i>M (SD)</i>
Total difficulties score	A	Not involved	9.91 (5.28)		9.39 (5.20)	10.47 (5.31)
	B	Cyber-victim only	15.21 (6.27)	B> A & C	11.33 (4.58)	16.89 (6.17)
	C	Cyberbully only	11.73 (4.78)		11.24 (4.82)	13.40 (4.77)
	D	Cyber-victim and bully	15.36 (5.62)	D> A & C	13.74 (4.75)	17.41 (6.03)
Emotional symptoms	A	Not involved	2.80 (2.29)		1.93 (1.83)	3.72 (2.37)
	B	Cyber-victim only	4.97 (2.88)	B> A, C & D	2.59 (1.94)	6.00 (2.60)
	C	Cyberbully only	2.32 (1.62)		2.12 (1.41)	3.00 (2.24)
	D	Cyber-victim and bully	3.80 (2.77)	D> A	2.38 (2.03)	5.59 (2.55)
Conduct problems	A	Not involved	1.57 (1.55)		1.82 (1.72)	1.30 (1.28)
	B	Cyber-victim only	2.38 (1.72)		2.04 (1.55)	2.53 (1.77)
	C	Cyberbully only	2.32 (1.76)		2.29 (1.96)	2.40 (0.89)
	D	Cyber-victim and bully	3.07 (1.78)	D> A & B	3.03 (1.66)	3.11 (1.95)
Hyperactivity-inattention	A	Not involved	3.71 (2.21)		3.75 (2.19)	3.66 (2.22)
	B	Cyber-victim only	4.84 (2.20)	B> A	4.20 (2.11)	5.11 (2.19)
	C	Cyberbully only	4.27 (2.47)		3.88 (2.29)	5.60 (2.88)
	D	Cyber-victim and bully	5.23 (2.10)	D> A	5.41 (2.09)	5.00 (2.13)
Peer problems	A	Not involved	1.84 (1.67)		1.88 (1.72)	1.79 (1.62)
	B	Cyber-victim only	3.02 (2.06)	B> A	2.50 (1.73)	3.25 (2.16)
	C	Cyberbully only	2.82 (2.63)		2.94 (2.86)	2.40 (1.82)
	D	Cyber-victim and bully	3.26 (2.17)	D> A	2.91 (1.99)	3.70 (2.33)
Prosocial behavior	A	Not involved	7.63 (1.81)	A> C & D	7.20 (1.83)	8.09 (1.67)
	B	Cyber-victim only	7.84 (1.68)	B> C & D	7.83 (1.60)	7.84 (1.72)
	C	Cyberbully only	6.05 (2.06)		5.71 (2.02)	7.20 (1.92)
	D	Cyber-victim and bully	6.52 (2.10)		6.24 (2.08)	6.89 (2.11)

Notes: SDQ = Strength and Difficulties Questionnaire. Post-hoc analyses were conducted to examine differences in the total difficulties score and the five scales for the cyberbullying status for the total sample. The interaction term between cyberbullying status and sex was significant in all six models. Text marked in bold indicates significant differences between boys and girls ($p < 0.05$).

emotional problems than adolescents who had no cyberbullying experience ($n = 1775$; $M = 2.80$; $SD = 2.29$; $p < 0.01$, respectively; see Table 2). The mean scores on emotional symptoms for cyberbullies only ($n = 22$; $M = 2.32$; $SD = 1.62$) did not differ from adolescents who had no cyberbullying experience ($p = 0.77$). Furthermore, cyber-victims only scored significantly higher on emotional symptoms than the remaining three groups ($p < 0.01$, respectively).

Conduct problems and cyberbullying status

Univariate analysis of variance with conduct problems as the outcome variable and for the whole model was significant $F(11, 2024) = 16.64$, $p < 0.01$, $R^2 = 0.083$. The interaction term between cyberbullying status and sex $F(3, 2024) = 5.58$, $p = 0.01$, $\eta^2 = 0.008$ was significant. There were significant differences between boys and girls in the two groups "Not involved" and "cyber-victims only" (Table 2). Furthermore, there was a significant main effect for cyberbullying status $F(3, 2024) = 14.85$, $p < 0.01$, $\eta^2 = 0.022$, and traditional bullying experience $F(1, 2024) = 29.96$, $p < 0.01$, $\eta^2 = 0.015$.

Post-hoc analyses were conducted to examine differences in conduct problems and cyberbullying status. Cyberbully victims and bullies ($n = 61$; $M = 3.07$; $SD = 1.78$) scored significantly higher than cyber victims only ($n = 179$; $M = 2.38$; $SD = 1.72$; $p < 0.05$) and those with no cyberbully experience ($n = 1774$; $M = 1.57$; $SD = 1.55$; $p < 0.01$; see Table 2). Cyberbully victims and bullies did not score significantly higher than cyberbullies only ($n = 22$; $M = 2.32$; $SD = 1.76$; $p = 0.285$).

Hyperactivity-inattention and cyberbullying status

Univariate analysis of variance with hyperactivity-inattention as the outcome variable and for the whole model was significant $F(11, 2023) = 9.13$, $p < 0.01$, $R^2 = 0.047$. The interaction term between cyberbullying status and sex was significant $F(3, 2023) = 3.76$, $p = 0.01$, $\eta^2 = 0.006$. Boys cyber-victims only score significantly lower on the scale than girls do ($p < 0.01$) while the remaining differences were not significant (Table 2). There were three significant main effects (Cyberbullying status $F(3, 2023) = 9.65$, $p < 0.01$, $\eta^2 = 0.014$, traditional bullying experience $F(1, 2023) = 3.16$, $p < 0.01$, $\eta^2 = 0.006$, and Norwegian vs. non-Norwegian $F(1, 2023) = 5.13$, $p < 0.05$, $\eta^2 = 0.003$).

Post-hoc analyses were conducted to examine differences in hyperactivity-inattention for the cyberbullying status. Cyberbully victims and bullies ($n = 61$; $M = 5.23$; $SD = 2.10$) scored significantly higher than those with no cyberbully experience ($n = 1773$; $M = 3.71$; $SD = 2.21$; $p < 0.01$; see Table 2). Cyberbully victims and bullies did not score significantly higher than cyberbullies only ($n = 22$; $M = 4.27$; $SD = 2.47$; $p = 0.380$) or cyber victims only ($n = 179$; $M = 4.84$; $SD = 2.20$; $p = 0.694$). Adolescents with no cyberbully experience scored significantly lower on the scale than cyber-victims only ($p < 0.01$) but not significantly lower than cyberbullies only ($p = 0.696$).

Peer problems and cyberbullying status

Univariate analysis of variance with peer problems as the outcome variable and for the whole model was significant $F(11,$

2024) = 32.07, $p < 0.01$, $R^2 = 0.148$. The interaction term between cyberbullying status and sex was significant $F(3, 2024) = 3.84$, $p < 0.01$, $\eta^2 = 0.006$. Girls, categorized as cyber-victim only, scored significantly higher than boys on the peer problems scale ($p < 0.01$) (Table 2). There were three significant main effects (cyberbullying status $F(3, 2024) = 5.17$, $p = 0.01$, $\eta^2 = 0.008$, traditional bullying experience $F(1, 2024) = 200.25$, $p < 0.01$, $\eta^2 = 0.090$, and Norwegian vs. non-Norwegian $F(1, 2024) = 8.53$, $p < 0.05$, $\eta^2 = 0.004$).

Post-hoc analyses revealed significant difference on the peer problems scale for the cyberbullying status between the group "cyberbullies and victims" ($n = 61$; $M = 3.26$; $SD = 2.17$) compared to the group "not involved" ($n = 1774$; $M = 1.84$; $SD = 1.67$; $p < 0.01$; see Table 2). In addition, cyber-victims only ($n = 179$; $M = 3.02$; $SD = 2.06$) scored significantly higher compared to adolescents without cyberbullying experience ($p < 0.01$).

Prosocial behavior and cyberbullying status

Univariate analysis of variance with prosocial behavior as the outcome variable and for the whole model was significant $F(11, 2027) = 15.21$, $p < 0.01$, $R^2 = 0.076$. The interaction term between cyberbullying status and sex was significant $F(3, 2027) = 3.29$, $p < 0.05$, $\eta^2 = 0.005$. Girls without cyberbullying experience scored significantly higher on the prosocial behavior scale than boys ($p < 0.01$) (Table 2). There were two significant main effects (Cyberbullying status $F(3, 2027) = 9.34$, $p = 0.01$, $\eta^2 = 0.014$ and sex $F(1, 2027) = 8.69$, $p < 0.01$, $\eta^2 = 0.004$).

Post-hoc analyses for prosocial behavior and cyberbullying status reveals significant differences between cyber-victim and bully ($n = 61$; $M = 6.52$; $SD = 2.10$) and cyber-victims only ($n = 179$; $M = 7.84$; $SD = 1.68$; $p < 0.01$) and adolescents with no experience with cyberbullying ($n = 1777$; $M = 7.63$; $SD = 1.81$; $p < 0.01$; see Table 2). Cyberbullies only ($n = 22$; $M = 6.05$; $SD = 2.06$) scored significantly lower than cyber-victims only ($p < 0.01$) and adolescents in the group "Not involved" ($p < 0.01$).

DISCUSSION

The aim of the present study was to examine how the cyberbullying status (not involved, cyber-victim only, cyberbully only, cyber-victim and bully) would be related to the mental health of the adolescents when controlled for traditional bullying experience and further to examine possible sex differences. Overall, the model explained most of the variance in the emotional symptoms scale ($R^2 = 0.257$) followed by the total difficulties score ($R^2 = 0.171$), the peer problems scale ($R^2 = 0.148$), the conduct problems scale ($R^2 = 0.083$), the prosocial behavior scale ($R^2 = 0.076$), and the hyperactivity-inattention scale ($R^2 = 0.047$).

When looking at the moderator sex, girls with no cyberbullying experiences scored higher on the total difficulties score, on the emotional symptoms scale, and on the prosocial behavior scale than boys, while boys without any cyberbullying experience scored higher on the conduct problems scale. These trends are

common. Typically, girls experience internalizing problems more often than boys do, whereas boys struggle with externalizing problems (see Martel, 2013 for a review). The sex differences evident in this sample are in line with a previous Norwegian finding, too. A recently published report from the Norwegian Institute of Public Health presents prevalence rates of mental health problems among Norwegian adolescents (Reneflot, Aarø, Aase, Reichborn-Kjennerud, Tambs & Øverland, 2018). There is a higher risk for girls for the development of depression and anxiety disorders in adolescents, and a higher risk for boys for the development of among others ADHD and behavioral problems. Furthermore, the report reports that among students in 10th grade, more girls scored over the clinical threshold for the SDQ total difficulties score and on the scale emotional problems compared to boys (Reneflot *et al.*, 2018). Furthermore, in the current sample boys and girls without cyberbullying experience scored in the normal range considering the Norwegian cut-off points for the SDQ total difficulties score and the five scales (Rønning *et al.*, 2004).

Even though girls in the cyberbullying status of none, scored higher on the total difficulties score and on the emotional symptoms scale than boys, girls that have been cyberbullied or both cyberbullies and cyber-victims scored even higher. This could indicate that girls are more vulnerable to mental health problems when exposed to cyberbullying as compared to boys. This too is in line with findings from a recently published article where cyber-victimization was associated with poorer mental health among both sexes but with more pronounced effects among girls (Kim *et al.*, 2019). Especially girls that are cyber-victims only, but also cyberbullies and cyber-victims scored higher than boys on the total difficulties score and on the emotional symptoms scale in the present study. They scored in the borderline range on the total difficulties score, which is 15 to 17 for northern Norway, whereas boys in the comparable groups scored in the normal range (Kornør & Heyerdahl, 2013). A study indicated that higher scores on the total difficulties score correspond to increasing mental health problems in adolescents at baseline and after 3 years (Goodman & Goodman, 2009). Girls who are cyber-victims only, but also cyberbullies and cyber-victims score in the clinical range on the emotional symptoms scale (cut-off = 6) (Rønning *et al.*, 2004). That girl's health is more compromised when exposed to cyberbullying is also underlined by the other findings. While boys without cyberbullying involvement score higher on conduct problems compared to girls, the relationship is reversed in the cyber-victim only group. Furthermore, girls who are cyber-victims only score higher on the hyperactivity-inattention and on the peer problem scales as compared to boys.

Although girl's mental health seems to be more affected than boy's mental health because of cyberbullying, it is vital to note that boys that are exposed to and involved in cyberbullying are negatively affected too. Boys that are both cyber-victims and bullies have higher scores on the total difficulties score and on the four different problems scales, in addition to lower scores on the prosocial behavior scale, than those not involved. These findings are in line with findings from Kim *et al.* (2019).

Furthermore, cyberbullying status predicted the different outcome variables even though it was controlled for traditional

bullying experience. This is another indicator for the harmful effects cyberbullying can have on the mental health of adolescents. Especially adolescents that are both cyberbullies and cyber-victims, but also cyber-victims only seem to be vulnerable. These two groups scored highest on the total difficulties score, on the emotional symptoms scale, on the hyperactivity-inattention scale, and on the peer problem scale when looking at the total sample. Also, Fahy *et al.* (2016) found in a longitudinal study that cyber-victims and both cyber-victims and bullies were more likely to report poorer mental health than adolescents who were not involved in cyberbullying. Furthermore, in the present study, adolescents in the group cyberbullies only did not score significantly higher on the scales compared to adolescents with no cyberbullying experience. While a cross-sectional study found that cyberbullies scored higher on stress, anxiety, and depression than adolescents who are not involved in cyberbullying (Campbell, Slee, Spears, Butler & Kift, 2013), the present findings are in line with results from the longitudinal study Fahy *et al.* (2016) conducted.

LIMITATION

There are several limitations that need to be taken into account when interpreting the study. First of all, the study is based on cross-sectional data and it is therefore not possible to make causal conclusions. Second, the study sample comprises northern Norwegian students, not randomly selected, which might hamper the representativeness of our findings. Third, this study relies on self-report measures, which may have caused common method or self-reporting bias (Donaldson & Grant-Vallone, 2002). Common method bias refers to inflated estimates because of shared method variance when using one source of data. Self-reporting bias refers to an individual's tendency to under-report inappropriate and over-report appropriate behavior. However, the survey was conducted anonymously, which may reduce the risk of self-reporting bias. Examining differences between participating and non-participating students was not possible because of a lack of information about the characteristics of the students who did not participate. Cronbach's alpha for boys and girls for the five SDQ scales was low, especially for the scale conduct problems. However, the values were comparable to those found by Rønning *et al.* (2004). A possible reason for the low Cronbach's alpha values are that the scales only comprise five items and that the phenomena that is to be measured is complex. The consequences of a low Cronbach's alpha are an underestimation of the effect. Another limitation may be the small sample size in the variable cyberbully status and here especially in the subgroup "cyberbully only." This may have led to low power and diminished the possibilities in detecting significant differences between for example boys and girls. Another concern was the use of two or one variable to measure traditional and cyberbullying, respectively. However, the use of one global item to measure bullying is common in bullying research (see for example Olweus & Alsaker, 1991; Olweus, Solberg & Breivik, 2020). More importantly, Solberg and Olweus (Solberg & Olweus, 2003) concluded in their study that one global variable to assess bullying is sufficient in terms of psychometric aspects. Another important point that has to be taken into account, is that the

identified effect sizes were generally small. However, Gini *et al.* (2018) found in their meta-analysis that cyberbullying is a risk factor for future mental health problems even when controlled for traditional bullying.

CONCLUSION

This study adds to the existing literature by examining the association between cyberbullying status and mental health as measured by the SDQ and controlled for by traditional bullying. In addition, it examines sex differences to this relationship. Cyber-victims only and cyber-victims and bullies, especially girls, reported more mental health problems than cyberbullies only and adolescents that are not involved in any form of cyberbullying. Girl's mental health seems to be more compromised when exposed to or involved in cyberbullying than boys mental health. These findings strongly argue for the need of effective prevention of cyberbullying and treatment, help, and support for those exposed and involved in cyberbullying. Further, such efforts might need to take sex-differences into account to be effective. More longitudinal studies that examine cyberbullying victimization and its consequences for adolescents mental health and that control for traditional bullying are needed.

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Received 21 August 2019, accepted 4 May 2020