

## Concurrent adversities and deliberate self-harm among indigenous Sami and majority Norwegian adolescents: the Norwegian Arctic Adolescent Health Study

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### Abstract

**Background:** Few studies have investigated proximal relationships between deliberate self-harm (DSH) and concurrent adversities.

**Objective:** We aimed to investigate these relationships in a community population of 4881 indigenous Sami and majority Norwegian adolescents, 15 to 16 years old, and related to ethnicity and gender.

**Methods:** Youth with and without self-reports of DSH last year were compared on 12 concurrent adversities, on scales measuring family and peer functioning, and on sociodemographic conditions.

**Results:** DSH last year was reported by 22.3% of the adolescents, and by more girls (28.8%) than boys (15.9%). All 12 concurrent adversities were related strongly to DSH last year. Deliberate self-harmers reported twice as many concurrent adversities as non-DSHs, and a large effect size (Cohen's  $d = 0.80$ ) indicated a strong multiple additive relationship, but among DSHs no ethnic or gender differences were found. Multivariately, among Sami youth sexual abuse [odds ratio (OR), 8.4] was strongly related to DSH, whereas among majority Norwegians sexual abuse (OR, 3.9) and violence (OR, 4.5) were identified as the strongest predictors. Similarly, among boys violence from adults (OR, 8.8) was associated most strongly with DSH, whereas among girls sexual abuse (OR, 4.3) was the most robust predictor. DSHs reported more conflicts with parents, less family support and involvement, and more peer problems than non-DSHs, and DSH girls had more difficulties in these relationships than DSH boys. Only small ethnic differences were found.

**Conclusion:** Adolescent DSHs reported twice as many concurrent adversities as non-DSHs, sexual abuse and violence were strongly related to DSH. Ethnic and gender differences in risk factors were found. Clinicians should inquire about traumatic experiences such as sexual and physical abuses, and should have a family, peer, and gender perspective in their work.

**Keywords:** ethnicity; family problems; gender; self-harm; sexual abuse; violence

### Introduction

Deliberate self-harm (DSH) is reported to be the strongest risk factor for future suicide (1). According to many studies, worldwide, a significant proportion of adolescents are likely to engage in DSH or non-suicidal self-injury (NSSI) during their lifetime (2-5). Muehlenkamp et al. (6) concluded that NSSI and DSH have a comparable prevalence in studies with adolescents from different countries. No statistically significant differences were found between the NSSI and the DSH studies. NSSI and DSH are measured differently when DSH is assessed by a single item question referring to an act of purposefully harming

oneself physically that may or may not reflect a real suicidal intent, whereas NSSI is measured by differentiated questions that exclude a suicidal intent. Rates of self-injury seem to increase by age during adolescence and with a decline in young adulthood (7-9). In their review study, Jacobson and Gould (2) found a lifetime prevalence of NSSI ranging from 13.0% to 23.2%.

Important contributors to self-harm and suicide include genetic vulnerability and psychiatric, psychological, familial, social, and cultural factors (10). Such relationships are found in clinical as well as in community samples or populations.

Self-injury is found to be related to a range of different mental health problems such as loneliness, low self-esteem, hopelessness, suicidal thoughts, anxiety, body dissatisfaction, sexual orientation concerns, and similarly to a range of different psychiatric diagnoses such as substance use disorders, personality disorders, post-traumatic stress disorder (PTSD), depressive disorders, eating disorders, conduct disorders, and ADHD (8,11-18). Also, the relationship between self-injury and maltreatment, or childhood adversities such as sexual and physical abuse, bullying, the loss of someone important, and the witnessing of family violence, has been confirmed in many studies (15,19-22).

Yates (23) offered a developmental understanding in which self-harm develops as an adaptation to childhood traumas, and where self-harm has a function as a compensatory regulatory strategy in post-traumatic adjustment.

Several studies have verified that poor family functioning is related to self-harm. Family communication and functioning and parental distress are identified to be associated closely with offspring's self-injury (7,22,24,25). Peer factors may be very important when it comes to the contagious effect of self-injurious behavior in adolescence (26-28). Similarly, the effects of media and contagion are ever more important to consider, with the internet playing an increasingly important contemporary role (10,29,30).

The gender ratio in self-harming behavior varies with age. More boys than girls are found to engage in NSSI in the third and sixth grades, whereas far more girls than boys are involved in NSSI in the ninth grade (8). Generally, female gender is a risk factor for self-harming behavior (5,7,9,31). However, boys and girls share many of the hazards related to self-harm. Yet, studies have identified some gender-specific risks. Girls seem to be more at risk of physical and sexual abuse, boy/girlfriend problems, self-harm by friends, and parental mental problems, whereas being bullied, sexual orientation concerns, anxiety, and impulsivity are found to be risk factors for boys (17,26,31-33). Nevertheless, in a review study Jacobson and Gould (2) concluded that the question of gender differences in NSSI and DSH is still unclear and needs to be studied further.

Cultural and ethnic factors are found to play an important role related to mental health and suicidal behavior among indigenous people (34). Generally, indigenous people in Arctic regions are more exposed to suicidal risk than the majority populations (34,35), but knowledge of self-harm among indigenous adolescents is sparse. Kvernmo and Rosenvinge (36) found no ethnic differences related to self-mutilation and/or suicide attempts between Sami and majority Norwegian youth. Similarly, in an

Australian survey, no statistically significant differences existed between those who did and did not self-injure with regard to sex, socioeconomic status, or indigenous status (37).

Clinicians working with self-harming youth will usually need to evaluate suicidal risk. However, the connection between self-injury and suicide attempt (SA) may seem unclear. In a prospective NSSI study, Wichström (38) found that NSSI did not increase the risk of future SA. However, in a prospective study of DSH, Hawton et al. (1) concluded that a significant and persistent risk of suicide was found at follow up. The difference in conclusions may seem confusing, but not so surprising. DSH is assessed without screening for suicidal intent contrary to the procedure in assessing NSSI. However, some adolescents also tend to report alternating between self-injurious behavior with and without suicidal intent, given that suicidal intent is often a transient experience (6).

Thus, in clinical work with self-harming adolescents, regular suicidal risk assessments are necessary.

Over time, many studies have documented relationships between different adversities or stressors and self-harm. However, few studies have investigated short-term relationships. In a large review study of self-harm, Fliege et al. (39) concluded that evidence of distal, biographical stressors was fairly strong, but that proximal stressors had rarely been investigated.

The aim of this study was to investigate the prevalence of self-reported DSH last year in a large community population of indigenous Sami and majority Norwegian adolescents, from 15 to 16 years old, and to explore the short-term relationships between DSH last year and different kinds of concurrent adversities. Furthermore, we aimed to investigate the associations between DSH and possible multiple additive effects of adversities. Similarly, we sought to explore the relationship between DSH and family and peer relations. We also aimed to examine connections with sociodemographic variables such as family economy and parental divorce. Primarily, we aimed to investigate differences between DSHs and non-DSHs, and ethnic differences between Sami and majority Norwegian youth and similarly to analyze gender differences among these groups.

## Methods

### *Study design and sample*

The Norwegian Arctic Adolescent Health Study (2013) was carried out among 10th graders (from 15 to 16 years old) in all junior high schools in the three northernmost counties in Norway, from 2003 to 2005. All students (5877) in the 10th grade were

invited to participate, and those who agreed were asked to fill in two questionnaires during two school hours. The data collection was performed and funded by a joint collaboration between the Centre for Sami Health Research at the University of Tromsø and the Norwegian Institute of Public Health. The Regional Medical Ethical Committee and the Norwegian Data Inspectorate, and the school authorities approved the investigation. The authors have obeyed the Helsinki Declaration of 1975, as revised in 2000 and 2008 concerning Human and Animal Rights.

A total of 4881 of 5877 students provided their written consent to participate in the survey, of whom 50.1% were girls and 49.9% were boys. The group of adolescents who reported DSH last year ( $n = 950$ ) was compared with non-DSHs ( $n = 3302$ ). Ten percent ( $n = 450$ ) of the sample were indigenous Sami. The reference group ( $n = 4431$ ) was majority Norwegians. The response rate was 83%.

#### Measures

*Deliberate self-harm:* DSH was measured by the question: "Have you during the last 12 months harmed yourself deliberately (DSH)?" ("Yes or No"). Those who answered "Yes" to the question of DSH within the last 12 months were defined as DSHs. Lifetime DSH was registered through the question: "Have you ever harmed yourself deliberately?" ("Yes or No"). Those who answered "No" to the question of DSH ever were compared with those who answered "Yes" to the question of DSH within the last 12 months.

*Concurrent adversities:* Questions about 12 adversities were selected in line with the "Stressful life events" scheme from a UK study of mental health among children and adolescents (40) and the "Registration of trauma experiences in children" scheme (KATE-B) from the Norwegian Centre for Violence and Traumatic Stress Studies (41). In addition, a question about "Parent addiction problems" was included.

The 12 adversities were assessed through the following questions: "Have you during the past 12 months experienced: 'Sexual abuse', 'Serious illness or injury yourself', 'Serious illness or injury in someone who is close to you'" ("Yes=1", "No=0"). Parental problems were registered through the following question: "Have you during the past 12 months had any of these problems: 'Mental health problems in parents/caretaker', 'Addiction problems in parents/caretaker'" ("No, never", "Yes, sometimes", "Several times", "Very often"). The variables were dichotomized and those who reported at least "Yes, sometimes" were defined as having a parent with mental health or addiction problems (1) and the rest as no problem (0). Violence was surveyed through the question "Have you been a

victim of violence (hit, kicked or similar) during the last 12 months" ("Yes, just by youth", "Yes, just by adults", "Yes, by both youths and adults"). Suicide was recorded through the question: "Do you know someone who has taken his own life? 'If yes', was it (insert one or more marks): 'Close family', 'Relatives', 'Someone in the neighborhood' (all merged into one variable), 'Pal', 'Boy/girlfriend', 'Fellow student' (all merged into one variable)". Bullying was registered through the question: "Have you during the past 12 months experienced bullying on your way to or from school?" ("Never", "Sometimes", "About once a week", "Several times a week"). Those who reported at least "About once a week" were defined as have been bullied ( $= 1$ ). Hospitalization was registered through the following question: "Have you during the past 12 months ever used (mentioned here several healthcare services)" ("Never", "1-3 times", "4 times or more"). Those who reported at least "1-3 times" were registered as hospitalized ( $= 1$ ).

*Demographics, family, peers, and ethnicity:* Family economy was surveyed through the question: "I think our family compared with others in Norway, has: 'Poor economy', 'Medium economy', 'Good economy', 'Very good economy'". Those who reported "Poor economy" were recorded to have financial problems. Whether parents were divorced or separated were recorded through the question: "My parents are: 'Divorced/separated'".

Sami ethnicity was measured by an assessment of Sami parentage and Sami language competence in grandparents, parents and the participants, and Sami self-labeling. Participants with one or more of these factors were classified as having Sami ethnicity (42).

Parental involvement was measured by a four-item version of the Parental Involvement Scale ( $\alpha = 0.78$ ) (43) on the basis of the following questions: "My parents know where I am and what I do in the weekend", "My parents know where I am and what I do on weekdays", "My parents know who I spend my leisure time with", "My parents like the friends I spend time with". Parental support ( $\alpha = 0.88$ ) was measured by the following five statements: "I feel attached to my family", "My family takes me seriously", "My family values my opinion", "I mean a lot to my family", and "I can count on my family when I need help".

Peer support ( $\alpha = 0.84$ ) was measured by the following four statements: "I feel closely attached to my friends", "My friends value my opinions", "I can help/support my friends", and "I can count on my friends when I need help". Parental involvement and parental and peer support were all measured by a four-point Likert scale from "completely agree" [1] to "completely disagree" [4]. In addition, conflicts with parents and problems in peer relationships were measured by the following two questions: "Have you

during the past 12 months had any of these problems? ‘Quarrels or conflicts with your parents’, ‘Problems in relationships with friends’ (mentioned here several problems)” (“No, never”, “Yes, now and then”, “Several times”, “Very often”).

Close friendships were measured by the following question: “Approximately, how many close friends do you have? (Do not mention siblings)” (“Nobody”, “One”, “Two to three”, “Four or more”).

#### Statistical analysis

The statistics program Statistical Package for the Social Sciences (IBM SPSS Statistics for Windows, version 21.0; Armonk NY, USA) was used for statistical analyses. Differences between the DSH group and the non-DSHs were analyzed using a *t*-test, and the odds ratio (OR) was measured using the chi-squared test. To test for multivariate associations between DSH and the 12 adversity items data were entered into a logistic regression analysis. Adversity

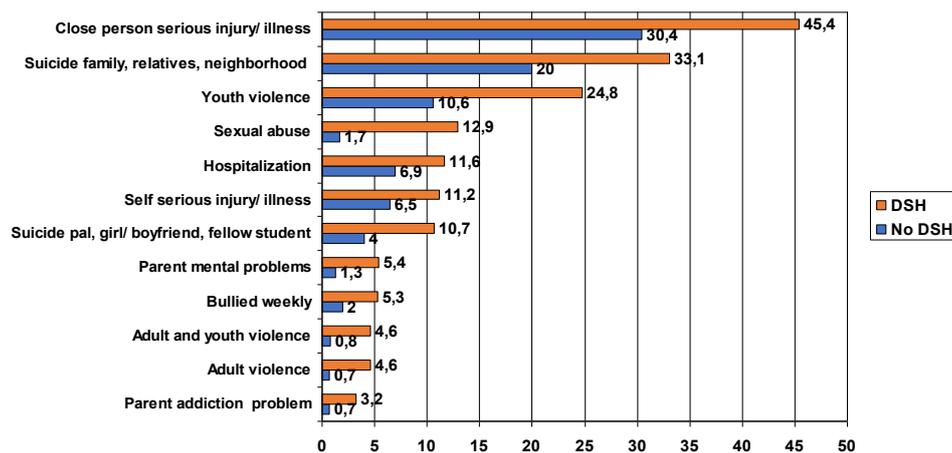
items correlated from  $-0.06$  to  $0.15$  (except for  $0.31$  between the variables “Self serious illness/injury” and “Hospitalization”), indicating that multicollinearity was not a threat. Cohen’s *d* was used as a measure of effect size for all *t* tests.

#### Results

The group of adolescents who reported DSH last year ( $n = 950$ ) was compared with non-DSHs ( $n = 3302$ ). The prevalence was  $22.3\%$  in the total sample, with a rate of  $28.8\%$  among girls ( $n = 611$ ) and  $15.9\%$  among boys ( $n = 339$ ) [OR,  $2.15$ ;  $95\%$  confidence interval (CI),  $1.85$ – $2.49$ ;  $p < .001$ ].

More than one-fourth ( $27\%$ ) of Sami adolescents reported DSH last year, and a moderate difference was registered compared with majority Norwegian peers (OR,  $1.32$ ;  $95\%$  CI,  $1.05$ – $1.67$ ;  $p < .05$ ). Similarly,  $21.1\%$  of Sami boys reported DSH last year versus  $33.2\%$  of Sami girls (OR,  $1.86$ ;  $95\%$  CI,  $1.19$ – $2.91$ ;  $p < .01$ ).

**FIGURE 1.** Concurrent adversities among adolescents with and without deliberate self-harm (DSH) last year - percentage



#### Concurrent adversities

The adolescent DSHs reported on average twice as many adversities as the non-DSHs [mean score,  $1.71$  vs.  $0.85$ ;  $t(4250)$ ,  $21.62$ ;  $p < .001$ ; Cohen’s *d*,  $0.80$ ].

In total, boys reported fewer concurrent adversities than girls [mean score,  $0.96$  vs.  $1.15$ ;  $t(4879)$ ,  $-5.92$ ;  $p < .001$ ; Cohen’s *d*,  $0.17$ ]. However, among DSHs no significant gender differences were found in the number of adversities.

In total, Sami youth reported more concurrent adversities than majority Norwegians [mean score,  $1.38$  vs.  $1.02$ ;  $t(4879)$ ,  $6.32$ ;  $p < .001$ ; Cohen’s *d*,  $0.31$ ]. However, among DSHs no significant ethnic differences were found in the number of adversities.

All 12 adversities occurred significantly more frequent among DSHs compared with non-DSHs. Almost half of the adolescent DSHs reported severe injury or illness in a closely related person, whereas about one-third reported suicide in the family, among relatives, or in the neighborhood (Figure 1).

DSH last year was correlated strongly with all 12 concurrent adversities, and the risk of experiencing such events was from  $1.78$  to  $8.52$  greater for DSHs than for non-DSHs. The greatest risk was related to sexual abuse, adult violence, adult and youth violence, and having parents with addiction or mental health problems. Among DSHs significant gender differences were found for 5 of the 12 adversities (Table 1).

**TABLE 1.** Risk of self-reported deliberate self-harm (DSH) last year related to concurrent adversities and gender

Type of concurrent adversity	Prevalence in the	DSH (n = 950) vs.		DSH boys (n = 339) vs.			
	population	non-DSH (n = 3302)		DSH girls (n = 611)			
	(%)	OR	95% CI		OR	95% CI	
Sexual abuse	4.5	8.52***	6.15	11.80	3.41***	2.05	5.67
Youth violence	14.2	2.78***	2.31	3.34	2.89***	2.13	3.92
Adult violence	1.8	7.06***	4.20	11.86	2.15*	1.02	4.54
Adult and youth violence	1.9	5.74***	3.53	9.34	1.29	0.66	2.51
Bullied weekly	2.9	2.82***	1.93	4.11	1.61	0.91	2.86
Self-serious illness/ injury	7.8	1.82***	1.42	2.33	1.30	0.84	2.02
Hospitalization	8.1	1.78***	1.40	2.27	1.11	0.73	1.68
Close person serious illness/ injury	33.9	1.91***	1.64	2.21	1.86***	1.41	2.45
Parent addiction problem	1.3	4.44***	2.59	7.64	1.54	0.68	3.51
Parent mental health problem	2.2	4.50***	2.97	6.84	1.23	0.67	2.26
Suicide family, relatives, neighborhood	18.8	1.98***	1.68	2.32	1.40*	1.05	1.87
Suicide pal, girl/boyfriend, fellow student	4.6	2.87***	2.19	3.75	1.36	0.90	2.06

Note. OR, odds ratio; CI, confidence interval

\* $p < .05$ ; \*\*\* $p < .001$

**TABLE 2.** Multivariate associations with deliberate self-harm (DSH) last year and gender (Logistic regression analysis)

	DSH boys				DSH girls			
	<i>b</i>	SE	AOR	95% CI	<i>b</i>	SE	AOR	95% CI
Sexual abuse	1.34	0.42	3.83**	1.67 8.77	1.47	0.21	4.33***	2.90 6.48
Youth violence	1.06	0.14	2.89***	2.19 3.82	1.23	0.18	3.41***	2.42 4.80
Adult violence	2.17	0.60	8.77***	2.67 28.57	1.29	0.33	3.64***	1.92 6.91
Adult and youth violence	1.20	0.40	3.32**	1.51 7.30	1.75	0.43	5.74***	2.47 13.33
Bullied weekly	0.80	0.31	2.22*	1.21 4.08	-	-	-	-
Hospitalization	0.47	0.22	1.60*	1.04 2.46	-	-	-	-
Close person serious illness/ injury	-	-	-	-	0.44	0.11	1.55***	1.25 1.91
Parent addiction problem	-	-	-	-	1.36	0.42	3.89**	1.71 8.86
Parent mental health problem	0.98	0.43	2.65*	1.13 6.21	-	-	-	-
Suicide family, relatives, neighborhood	0.33	0.15	1.40*	1.04 1.88	0.46	0.12	1.59***	1.27 2.00
Suicide pal, girl/boyfriend, fellow student	0.85	0.23	2.34***	1.49 3.66	-	-	-	-

Note. *b*, regression coefficient; SE, standard error; AOR, adjusted odds ratio; CI, confidence interval

Divorce/separation, and poverty are entered as covariates in analysis

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

**TABLE 3.** Multivariate associations with deliberate self-harm (DSH) last year and ethnicity (Logistic regression analysis)

	DSH majority Norwegian youth				DSH Sami youth			
	<i>b</i>	SE	AOR	95% CI	<i>b</i>	SE	AOR	95% CI
Sexual abuse	-1.35	0.20	3.86***	2.63 5.68	-2.13	0.54	8.40***	2.92 24.39
Youth violence	-1.17	0.12	3.24***	2.58 4.07	-0.93	0.32	2.54**	1.34 4.81
Adult violence	-1.50	0.31	4.46***	2.41 8.26	-	-	-	- -
Adult and youth violence	-1.43	0.32	4.17***	2.22 7.81	-1.68	0.61	5.38**	1.63 17.54
Close person serious illness/ injury	-0.35	0.09	1.42***	1.20 1.70	-	-	-	- -
Parent addiction problem	-0.80	0.36	2.22*	1.10 4.48	-	-	-	- -
Parent mental health problem	-0.72	0.26	2.05**	1.23 3.42	-	-	-	- -
Suicide family, relatives, neighborhood	-0.39	0.10	1.47***	1.22 1.79	-0.59	0.27	1.80*	1.06 3.06
Suicide pal, girl/boyfriend, fellow student	-0.52	0.18	1.68**	1.17 2.39	-1.16	0.39	3.19**	1.49 6.85

Note. *b*, regression coefficient; SE, standard error; AOR, adjusted odds ratio; CI, confidence interval

Gender, divorce/separation, and poverty are entered as covariates in analysis

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001

**TABLE 4.** Self-reported deliberate self-harm (DSH) last year related to family support and involvement, conflicts with parents, peer support and problems, and related to gender

	Non-DSH (n = 3302)		DSH (n = 950)		<i>t</i> -value	Cohen's <i>d</i>	DSH boys (n = 339)		DSH girls (n = 611)		<i>t</i> -value	Cohen's <i>d</i>
	Mean	SD	Mean	SD			Mean	SD	Mean	SD		
Family support	18.25	2.67	15.89	4.14	20.86***	0.77	16.46	3.59	15.58	4.39	3.14**	0.21
Family involvement	13.85	2.24	12.29	2.96	17.48***	0.64	11.99	3.33	12.46	2.72	-2.37*	0.16
Conflicts with parents	1.02	0.76	1.57	0.90	-18.90***	0.70	1.27	0.84	1.74	0.88	-8.10***	0.55
Peer support	4.64	2.95	4.91	3.13	-2.49*	0.09	5.65	3.21	4.50	3.01	5.47***	0.37
Peer problems	0.41	0.56	0.75	0.72	-15.31***	0.57	0.53	0.67	0.87	0.72	-7.05***	0.48

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001

Among DSHs significant differences in four concurrent adversities were found between Sami youth and majority Norwegian peers. Sami youth more often reported sexual abuse (OR, 1.72; 95% CI, 1.01–2.92;  $p < .05$ ), adult and youth violence (OR, 2.59; 95% CI, 1.24–5.41;  $p < .01$ ), suicide in the family, among relatives or in the neighborhood (OR, 1.73; 95% CI, 1.15–2.60;  $p < .01$ ), and almost thrice as often (24.1% vs. 9%) suicide among pals, girl/boyfriend, or fellow student (OR, 3.20; 95% CI, 1.94–5.27;  $p < .001$ ).

A multivariate regression analysis of the 12 concurrent adversities related to gender identified some differences. Among boys, adult violence and youth violence led to the highest risks of DSH, whereas among girls sexual abuse and adult and youth violence were most strongly related to DSH (Table 2).

Similarly, a multivariate regression analysis of the 12 concurrent adversities related to ethnicity showed differences in the number of predictors. Sami youth had fewer significant predictors of DSH than majority Norwegians. However, sexual abuse was strongly related to DSH in both ethnic groups. Among majority Norwegians the three adversities of violence were identified as strong predictors of DSH, whereas among Sami youth two adversities of violence were related to DSH. Similarly, among Sami youth suicide among peers was associated with DSH (Table 3).

#### *Demographics, family, and peers*

Somewhat less than one-third (29.7%) of adolescents with DSH last year reported that their parents were divorced or separated (OR, 1.71; 95% CI, 1.46–2.00;  $p < .001$ ), and 5.5% stated that their family was poor (OR, 2.24; 95% CI, 1.57–3.19;  $p < .001$ ). DSHs reported more conflict with parents, less parental support and involvement, more problems with peers, but moderately more peer support than non-DSHs. Among DSHs girls experienced less family support, but more monitoring through family involvement than boys and also less peer support and more peer problems (Table 4). Among DSHs no gender difference was found in the number of close friends.

Similarly, among DSHs no difference was found between Sami youth and their majority Norwegian peers related to parental divorce/separation, poverty, family support and involvement, or peer support. However, majority Norwegian DSHs reported more conflicts with parents compared with their Sami peers [mean score, 1.60 vs. 1.35;  $t(947)$ , 2.73;  $p < .01$ ; Cohen's  $d$ , 0.28].

## **Discussion**

In the present adolescent community population, DSHs reported twice as many concurrent adversities

as non-DSHs. However, among DSHs no gender or ethnic differences related to the number of adversities were found. All the 12 concurrent adversities were strongly related to DSH, and in the multivariate analysis, strong risk factors of sexual abuse and violence were identified.

Almost a quarter (22.3%) of the adolescents in the present study had deliberately harmed themselves in the last year. This rate is within the range of prevalences found in other studies of adolescent self-injury (44–48). However, in a study from Arctic Norway, Kvernmo and Rosenvinge (36) found that 12.5% of adolescents, from 13 to 16 years old, reported self-mutilation and/or suicide attempts the last six months, but a comparison of the two studies is problematic. The referred study included two younger age classes. This should yield a lower prevalence because the rates of DSH increase during the teens. However, the prevalence in the referred study encompassed both self-injury and SA, but this should yield a higher rate than self-injury alone. Besides, there is a considerable difference in time between the two studies. An increase in the rates of self-injury in recent years has been postulated, but it appears that the global lifetime prevalence may have stabilized (6). Beyond this, it is difficult to explain the difference in prevalences between the two studies.

Almost twice as many girls as boys reported DSH, a proportion that is somewhat lower than the gender ratio reported from many other surveys (44,49–51). However, the DSH gender ratio will vary depending on the age groups studied (8).

In the present study, Sami adolescents reported moderately more often DSH than majority Norwegians, and the gender difference among Sami youth was comparable. In the study by Kvernmo and Rosenvinge (36), no significant differences in prevalence occurred between Sami and majority Norwegian adolescents, and Sami gender differences disappeared in the multivariate analysis.

#### *Concurrent adversities*

In this survey, in the chi-squared analysis, all 12 concurrent adversities were strongly correlated with DSH. Sexual abuse and adversities of violence were identified as the strongest predictors. The relationship between sexual and physical abuse and self-harm has been confirmed in many studies (52–56).

Similarly, in the multivariate analysis, when controlling for all adversities, the abuse predictors emerged strongly for both genders, showing that female DSHs as more at risk of sexual abuse than boys. Similarly, among Sami youth, sexual abuse was a somewhat stronger predictor of DSH than it was among majority Norwegians. In another Norwegian study of emotional, physical, and sexual violence

among adults, Sami women were more likely to report sexual violence than non-Sami women (57). Similarly, the researchers found Sami men to be more at risk of being subjected to violence than non-Sami men, and that Sami participants were more likely to report having experienced violence in the past 12 months. However, in the present study the adversities of violence were strongly related to DSH among majority Norwegians, whereas this relationship was weaker among Sami youth. It is difficult to explain this ethnic difference in outcome in terms of violence, but the present study is assessing violence related to DSH, whereas the adult study was assessing violence more directly. We have, however, no knowledge of whether adult violence was domestic or whether violent youths were siblings or peers.

Generally, violence is reported to occur more frequently in indigenous populations. In a Canadian report, Brzozowski et al. (58) concluded that indigenous people were three times more likely than non-indigenous people to experience a violent victimization. Indigenous people have historically experienced many psychosocial traumas related to assimilation policies and abuse (35).

In a worldwide study, the adversities of sexual and physical abuse have been identified as strong risk factors of suicidal behavior in the short run in adolescence as well as in the long run throughout life (59).

Consistent with the results of the present study, parental mental health and addiction problems have been identified as risk factors of adolescent DSH (60-61). In the multivariate analysis, ethnic differences were found for these adversities. They were related to DSH among majority Norwegians, but not among Sami peers. Maternal as well as paternal depression has prospectively been identified to predict NSSI, but with differences in short-term and long-term effects (62-63). Wilcox et al. (63) found that maternal depression was an independent predictor of last year's NSSI, whereas paternal depression predicted life-time NSSI. In addition, Gromatsky et al. (33), in a study of self-harm among girls, found that parental substance use was related to NSSI. Similarly, in the present study, parent addiction problems were multivariately related to DSH among girls, but not among boys.

Suicide last year in the family or in the neighborhood or among peers was reported by 44% of DSHs. Multivariately, the burden of exposure to a peer's suicide was related to DSH among boys only, whereas among girls suicide in the family or neighborhood was a hazard. Other studies have confirmed the relationship between the exposure to peer suicide and suicidal behavior (64,65), whereas

offspring of parents with suicide attempts themselves also tend to manifest such behavior (66,67).

In the present study, almost half of Sami youth reported suicide in the family or in the neighborhood. In addition, they reported more than twice as often suicide among peers as majority Norwegians. Yet, multivariately, suicide in the family or in the neighborhood and peer suicide were identified as significant predictors of DSH in both ethnic groups. Generally, indigenous peoples in Arctic regions are more exposed to suicidal risk than the majority populations (34). We know, however, little about the possible impact of these problems on self-harm among indigenous adolescents when research on these relationships, to our knowledge, is sparse.

In this study, adolescent DSHs reported twice as many concurrent adversities as non-DSHs, and the effect size was large (0.80). This indicates a strong cumulative effect of proximal adversities. However, no gender or ethnic differences in the number of adversities were found. In clinical work, the additive burden of adversities related to DSH also needs to be taken into account. Our findings are consistent with many reports on suicidal behavior in general (68-70). Similarly, Bruffaerts et al. (59) concluded that the risk of attempted suicide and ideation increased with the number of adversities experienced, but at a decreasing rate. Nevertheless, the question of the cumulative adversity effect has been discussed. Turner et al. (71) held that focus on particular kinds of victimization was likely to underestimate the full burden of victimization that children and youth experience. Similarly, Mersky and Reynolds (72) found cumulative adversity also to be associated with the cumulative effects of poor health-related outcomes. However, Schilling et al. (73) reported higher cumulative adversity to be related to unduly poorer mental health because of the severity of the adversities that they were exposed to, not the cumulative number of different kinds of adversities experienced. Accordingly, a critical issue may be the traumatic impact of adversities. Many studies have documented a connection between PTSD and suicidal behavior (71-72, 74, 75). In a review study, Panagioti et al. (76) found a strong relationship between PTSD and suicidality. Yet, in this survey we lack information on the possible traumatic impact of adversities that could qualify for a PTSD diagnosis.

#### *Family relations*

Consistent with results from other studies of self-harm (31,48,77), parents of DSHs were significantly more often divorced or separated than parents of non-DSHs. Similarly, in the chi-squared analysis, the parental risk of mental health problems or addiction problems were four and a half times as high

compared with parents of non-DSHs. In the analysis of family relations, DSHs reported more conflicts with parents and less family support and less monitoring through family involvement than non-DSHs. Previous research has identified family factors such as serious communication problems, poor family support, absence of positive feelings toward parents, conflicts with parents, and a harsh parenting style to be related to adolescent self-harm (12,44,61,78-80). However, family studies have also recognized adolescent problem behavior to affect the perceived family atmosphere, rather than vice versa. Thus, causality between perceived parenting and self-harm may go in both directions. In a longitudinal study, Hafen and Laursen (81) found evidence of child-problem effects on changes in parental support, but there was no evidence of parent support effects on adolescent externalizing symptoms. Similarly, Huh et al. (82) found that girls' problem behavior had more impact on parenting than vice versa. In the present study, girls with DSH reported significantly more often conflicts with parents, somewhat more monitoring through family involvement, and less family support than boys with DSH. Perceived conflicts with parents have been identified as one of the strongest predictors of suicide risk behavior (83), and gender differences in perception of family conflicts have been found. In a 23-year Norwegian surveillance study of adolescent suicide attempters, relational conflicts and dysfunctional family issues were reported significantly more often by girls than by boys as underlying reasons for suicidal behavior (84). In this survey, only a minor ethnic difference in parental and family relationships was registered. Sami DSHs reported fewer conflicts with parents than their majority Norwegian peers did. This finding may be associated with results from the multivariate analysis where parent addiction problems and parent mental health problems were related significantly to DSH among majority Norwegians, whereas no such relationships were found among Sami youth. Among majority Norwegians it is reasonable to assume that such problems will increase the risk of conflict between parents and their adolescents.

#### *Peer relations*

Adolescence is a period in life when teenagers seek to gain authority over domains that were once subordinated to parents and when relationships with peers become increasingly more important, psychologically as well as socially. In a 1-year prospective UK study, Stallard et al. (32) concluded that insecure peer relations increased the risk of self-harming behaviors. In the present study, DSHs reported more peer problems than non-DSHs. This could suggest insecure peer relations, but moderately

more peer support was also reported. Furthermore, among DSHs, clear gender differences emerged. Girls reported more peer problems and less peer support than boys do. This could indicate more insecure peer relationships among girls. Yet, among DSHs no gender difference was found in the number of close friends. Similarly, no ethnic differences were identified related to the number of close friends or problems in peer relationships.

Gender differences were also found in relation to peer suicide. Multivariately, among boys suicide among peers was a predictor of DSH, but not among girls. This may suggest that boys could be more vulnerable to peer suicides than girls because of possible stronger peer relations. Knowing a friend who self-injure appears to be a risk factor of contagion of self-injury among youth since self-injurers are found to get the idea to self-injure from peers more often than any other source (85,86). The media may also play an important role in self-harm contagion when self-harm videos on YouTube may foster normalization of this behavior (87).

#### *Strengths and limitations of the study*

The present study is a cross-sectional study from which one can infer nothing about causality or predictability. In this study of a large youth population from Arctic Norway, there is no information of DSH from external sources such as parents or health services. Information of DSH last year is only based on self-reports of young people themselves. Similarly, the 12 selected concurrent adversities are only partially comparable with Green et al. (40) and Myhre et al. (41).

The strength of the study is that it includes a representative sample of an entire youth population ( $n = 5877$ ) with a significant number of adolescents with DSH last year ( $n = 950$ ), and with a response rate of 83%. Equally, the self-reports were anonymous. This is important when disclosure of DSH and adversities may be very sensitive. Research shows that sensitive information more easily is reported anonymously than in a clinical interview (88,89). In collecting such sensitive information, the informants themselves are the most reliable source. The information that we seek is mostly not available in any official registry. Besides, parents have often limited knowledge of such information (7). Similarly, the concurrent adversities asked for covered a limited period of the last 12 months. Thus, the memory of last year's adversities and DSH was likely to be fresh and less at risk of memory distortion or errors than a backward memory span of several years (90).

#### **Conclusion**

Almost one-quarter of youth in a community population reported DSH last year, and almost twice

as many girls as boys. Concurrent adversities were strongly related to DSH, and a large multiple additive effect was found. Multivariately, sexual abuse was a strong predictor of DSH among Sami and among majority Norwegian youth, whereas violence was more strongly related to DSH among majority Norwegians. Multivariately, among boys violence was most strongly related to DSH, whereas, among girls sexual abuse and violence were the strongest predictors. Several family and peer factors such as divorce, poverty, suicide, conflicts with parents, lack of family support and involvement, and problems with peers were strongly related to DSH. Only small ethnic differences were found for these hardships. Clinicians should ask about traumatic experiences such as abuse, suicide, or SA among peers and related people, and need to have a family, peer, and gender perspective in their work. Policy makers should make a priority of sexual abuse and violence prevention measures when these problems underpin mental health problems in the youth population.

#### Conflicts of interest

On behalf of both authors, the corresponding author states that there are no conflicts of interest.

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