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## Childhood violence and mental health among indigenous Sami and non-Sami populations in Norway: a SAMINOR 2 questionnaire study

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### ABSTRACT

The main objectives of this study were to investigate the association between childhood violence and psychological distress and post-traumatic stress symptoms (PTS) among Sami and non-Sami adults, and to explore a possible mediating effect of childhood violence on any ethnic differences in mental health. This study is part of a larger questionnaire survey on health and living conditions in Mid- and Northern Norway (SAMINOR 2) which included 2116 Sami and 8674 non-Sami participants. A positive association between childhood violence and psychological distress and PTS in adulthood was found regardless of ethnicity. For women, childhood violence may have mediated some of the ethnic differences in psychological distress (53.2%) and PTS (31.4%). A similar pattern was found for men as to psychological distress (45.5%) and PTS (55.5%). The prevalence of psychological distress was significantly higher in the Sami than in the non-Sami group: 15.8% vs. 13.0% for women, and 11.4% vs. 8.0% for men. Likewise, PTS showed a higher prevalence in the Sami group, both for women (16.2% vs. 12.4%) and for men (12.2% vs. 9.1%). Conclusion: A positive association between childhood violence and adult mental distress was found for both Sami and Norwegian adults. More mental problems were found among the Sami. Childhood violence may have mediated some of the ethnic differences.

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## Background

The World Health Organization (WHO) has recognised interpersonal violence as an important, worldwide public health issue that adversely affects both mental and physical health [1]. Childhood violence is defined as all forms of physical and/or emotional maltreatment, sexual abuse, neglect, negligence and commercial or other exploitation, which result in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power [2]. Globally, the prevalence of childhood violence varies among countries, regions, genders and ages. Approximately 20% of women and 5–10% of men report childhood sexual abuse. Nearly a quarter of adults (22.6%) suffered physical abuse as a child, and 36.3% suffered emotional abuse [1]. The lifelong consequences of child maltreatment include impaired physical and mental

health, poorer school performance, and job and relationship difficulties [3–6]. The WHO has listed a range of health risks associated with interpersonal violence in childhood [7]. As for mental health, depression and post-traumatic stress disorders (PTSDs) are considered the most prevalent conditions associated with violence and abuse [4,8–11]. Mental health problems may preclude people to realise their potential, cope with the normal stresses of life, work productively and contribute to their communities [5]. People with mental disorders experiences disproportionately higher rates of disability and mortality [2].

Indigenous peoples have been shown to be more prone to various types of mental health problems, such as mental distress, post-traumatic stress, and suicidal ideation and attempts, compared to the majority groups [12–17]. These disparities have often been linked to colonisation, forced assimilation, violence and discrimination [17–19].

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 Supplementary data for this article can be accessed [here](#).

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Indigenous people in the Arctic region is home to different groups that share a common history of social injustice and oppression [12,20–23]. Most of the indigenous Sami live in the Arctic region of the Nordic countries and Russia's Kola Peninsula. They have traditionally been a nomadic people combining reindeer husbandry with small-scale fishing and agriculture. The Sami have their own culture and language [24]. As in the other countries, the Sami in Norway have suffered under a severe assimilation policy. This policy came into effect around 1850 [23] and had wide-reaching implications, including prohibition on teaching in the Sami language in schools, and limited opportunities for developing and preserving Sami culture and identity [23,25,26]. The assimilation process had the greatest impact on Sami people living in the coastal areas. In these areas, the Sami are a minority (Sami minority areas); whereas, in the highland communities, the Sami have been a majority (Sami majority areas), and the assimilation process has not had equally severe consequences [23,24,27].

We hypothesised that exposure to violence in childhood would be a risk factor for mental distress and post-traumatic stress symptom (PTS) in adulthood. International studies from a wide range of cultural settings show that childhood violence is associated with poorer mental health [25–35]. However, to our knowledge, this association has not previously been examined in a Sami population. The above-mentioned differences in living area may have an impact on mental health status, as a protective effect of a strong Sami identity on mental distress has been demonstrated [28]. Further, Laestadianism (a special branch of the Christian Lutheran Church) still plays an important role in many Sami families [29]. An association between sense of coherence and subjective well-being has also been demonstrated [30] as well as between spirituality and health-related symptoms [31]. Affiliation to the Laestadian church and living area was therefore included as a variable that could potentially protect against mental distress following childhood violence. Although, ambiguous results of mental health problems among indigenous compared to the majority groups [12], we hypothesised that mental health problems might be more prevalent among the Sami than among the non-Sami participants. Finally, we hypothesised that childhood violence might mediate some of the ethnic differences in adult mental health problems.

The aims of the present study were:

- (1) to investigate whether the association between childhood violence and mental health problems (psychological distress and symptoms of PTS) differed between Sami and non-Sami adults.
- (2) to investigate whether there were any ethnic differences in the prevalence of mental health problems (psychological distress and symptoms of PTS) between Sami and non-Sami.
- (3) to investigate whether exposure to childhood violence might have any mediating effect on ethnic differences in mental health.

## Materials and methods

This study is based on data from a population-based study on health and living conditions in areas with both Sami and Norwegian settlements: the SAMINOR 2 Questionnaire survey conducted in 2012. The first SAMINOR study, SAMINOR 1, was conducted in 2003/2004 and is described in detail in a previous paper [32]. The SAMINOR 2 Questionnaire survey was designed as a follow-up study and was expanded to include additional health issues, including further mental health indicators and questions on interpersonal violence. The SAMINOR 2 study is described in more detail in another paper [33].

## Sample

All inhabitants aged 18–69 who were registered in the Central Population Registry in selected multi-ethnic municipalities (mixed Sami and non-Sami populations) received a letter of invitation to participate in the study. Out of 44,669 invitations, 1,424 were returned unopened, leaving 43,245 persons eligible for the study. Among these, 11,600 returned a completed questionnaire, yielding a participation rate of 27%. In the present study, 96 respondents were excluded due to missing information on ethnicity, 567 due to missing information on 3 or more items on the psychological distress measurement (HSCL-10), 26 due to missing information on symptoms of PTS and 121 respondents due to missing information on violence. This provides a total sample of 10,790 participants: 2,116 Sami (19.6%) and 8,674 non-Sami (80.4%).

## Variables

### Ethnicity

When classifying ethnicity in this study, linguistic affiliation and self-identity were used as criteria. Ethnicity was assessed by the following questions: (1) "What language do/did you use at home?" (2) "What language did your parents use at home?" (3) "What language did your grandparents use at home?" and (4) "What do you consider your own ethnicity to be?" The response

options were: “Norwegian”, “Sami”, “Kven” and “Other”. Participants who chose “Sami” in response to any of the first 3 questions, and who also identified themselves as Sami, were classified as belonging to the Sami ethnic group. To use both Sami self-identification and Sami language, competency by either the participants themselves, parents or grandparents are used almost similarly by the Norwegian Sami Parliament to register voters [34]. The linguistic criterion by the Sami Parliament also reaches back to great grandparents, but was not feasible in the SAMINOR 2 questionnaire. Thus, using ethnicity as a variable within research has been much discussed. Various definitions and inclusion criteria of the Sami group have been used in previously studies. The variety of definitions of Sami ethnicity is thoroughly discussed in a recent thesis by Pettersen [34]. Pettersen showed that self-identification seems to be the most complex and challenging measure, but valid criterion for belonging to the Sami group [34,36]. Sami language has in several studies been found to be a strong ethnic identity marker [37]. Norwegians, Kvens (descendants of Finnish immigrants) and “Others” were defined as non-Sami. In the non-Sami group, the vast majority defined themselves as ethnic Norwegians. The variables are described in more detail by Lund et al. [32], Brustad et al. [33] and Hansen et al. [38].

### **Psychological distress (HSCL-10)**

A 10-item version of the Hopkins Symptoms Check List (HSCL-10) was used to measure psychological distress [39]. The HSCL-10 addresses respondents’ experiences during the previous 4 weeks of: (1) sudden anxiety, (2) anxiousness, (3) dizziness, (4) tension/stress, (5) self-blame, (6) sleeplessness, (7) sadness, (8) worthlessness, (9) finding everything burdensome and (10) hopelessness. Each item was rated on a 4-point scale, from 1 “Not at all” to 4 “Very often”. In accordance with earlier validation studies [39], the mean HSCL-10 score was calculated by summing up the scores for each item and dividing the total score by 10. In a recent validation study on respondents of the SAMINOR 2 study, no significant measurement invariance between the included ethnic groups appeared [40]. This indicates that the HSCL-10 response scale predominantly was used in the same way and that significantly different meanings were not ascribed to the same set of questions. The cut-off criteria of 1.85 as indicative of psychological distress based on Norwegian data, equals a score of 1.89, 1.94 and 1.92 in the Sami core, Sami affiliation and Sami background groups, respectively. Thus, the same cut-off criterion 1.85 may be safely used in all groups [40]. Respondents with missing data on 3 or more items were excluded. Those participants who scored

above the cut-off point of 1.85 were classified as suffering from psychological distress.

### **PTS (NorAQ)**

PTS during the last 12 months were assessed by 3 questions, concerning (1) Intrusive memories, (2) avoidance of certain situations and (3) emotional numbness. Each question had 4 response options: “No”, “Yes, but rarely”, “Sometimes” and “Often”. Respondents who answered “Sometimes” or “Often” on 2 or 3 symptoms were classified as having symptoms of PTS. The responses “Yes, but rarely” or “Not at all” were defined as “No symptoms”. These 3 items measuring symptoms of PTS have previously been used in a study on mental health in Sweden [41].

### **Violence**

Three subsections of the SAMINOR 2 questionnaire addressed emotional, physical and/or sexual violence. Participants who responded positively to the dichotomous question “Have you experienced that someone systematically and over time has tried to repress or humiliate you?” were classified as “Having experienced emotional violence”. Participants who responded positively to the dichotomous question “Have you been exposed to physical assault/abuse?” were classified as “Having experienced physical violence”. Participants who responded positively to the question “Have you been exposed to sexual assault?” were classified as “Having experienced sexual violence”. Those who gave a positive response to any of the above questions were classified as having experienced “Any violence”. Respondents were asked whether the exposure to violence had occurred in childhood and/or in adulthood using the following alternatives: “Yes, as a child”, “Yes, as an adult” and “Yes, in the past 12 months”. Participants who reported emotional, physical and/or sexual violence as children were classified as “Having been exposed to the different types of violence in childhood”.

### **Other variables**

Background information including level of education and household income was collected from the questionnaire. Age and gender were derived from Statistics Norway (SSB), and age was categorised into age groups of 18–34, 35–49 and 50–69 years. The following classification of education was applied: primary school ( $\leq$  0–9 years), high school (10–12 years), higher university or college education  $\leq$  3 years (13–15 years) and university education  $>$  3 years (16 years and more). Family/household income per year was categorised into 3 groups: low ( $<$  150,000–300,000 NOK (1 NOK = 0.12 USD, 19

December 2017)), medium (301,000–600,000 NOK), and high (601,000–900,000 NOK).

Respondents were asked to indicate their affiliation with the Laestadian Church with the following questions: “Are your grandparents affiliated with the Laestadian church?”, “Is your father affiliated with the Laestadian church?”, “Is your mother affiliated with the Laestadian church?” and “Are you affiliated with the Laestadian church?”. Participants who responded positively to 1 or more of these options were classified as “Laestadianist”. Respondents with no positive response on Laestadian church affiliation were classified as “Non-Laestadianist”.

The 25 municipalities included in the SAMINOR 2 study were classified as either “Sami minority area” or “Sami majority area”. The Sami majority areas were characterised by having a Sami majority population and being long-time proponents of Sami language, culture and primary industries (including reindeer husbandry) [20]. Areas in which the Sami people are considered a minority were categorised as “Sami minority areas”. More detailed information about the 25 municipalities included in the SAMINOR 2 study has been published in a previous paper [33].

### Ethics

The data collection and storage of data were approved by the Norwegian Data Protection Authority (Datatilsynet). Written informed consent was obtained from all participants. The study was approved by the Regional Committee for Medical and Health Research Ethics of Northern Norway (REK-Nord) and Statistics Norway (SSB).

### Statistical analysis

IBM SPSS Statistics Version 22.0 and 24.9 and Stata 15 for Windows was used to conduct statistical analyses.

Frequencies and cross tabulations were used to present the distribution of socio-demographic variables,

psychological distress, PTS and childhood violence by ethnicity and gender. The Chi-square test was used for the comparison between Sami and non-Sami respondents. Level of significance was set to  $p \leq 0.05$ .

Logistic regressions were performed to assess the association between childhood violence and psychological distress and PTS. Estimates are presented as Odds Ratios (OR) and 95% confidence intervals (95% CI). We also included living area and affiliation with Laestadianism in the model. Stratified analysis was conducted based on ethnicity and gender. Since both psychological distress and symptoms of PTS were common outcomes, OR are higher than the corresponding prevalence ratio (PR) [42]. Interaction between any childhood violence and ethnicity on psychological distress and PTS was tested.

To explore whether exposure to childhood violence had a mediating effect on the ethnic differences in mental health problems, we did a mediation analysis using ethnicity as exposure, childhood violence as mediator and psychological distress or PTS symptoms as outcomes [43] (Figure 1). We used linear regressions for the total and direct regressions on the binary outcomes. We estimated the total effect (without the mediator in the model). Then we adjusted for the mediator to get the direct effect. The indirect effect was calculated as the total minus the direct effect. The mediated proportion is the indirect divided by the total effect. Since ethnicity does not depend on age, sex and education, we do not have ordinary confounding in the analysis, that is, we have no confounding between exposure and outcome, and no confounding between exposure and mediator. However, we may have confounding between mediator and outcome. Here we think age, education and sex are mediator-outcome confounders. We therefore stratified the mediation analysis on sex and adjusted for age and education in the direct effect model. We used Stata’s “seemingly unrelated regression” command to combine the total and direct models, thereby getting p-values and CI for the indirect effects and the mediated proportions. We did not use robust variance estimation in the linear regressions,

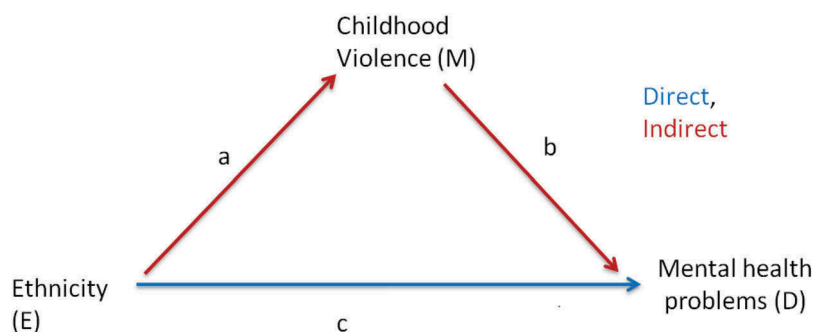


Figure 1. Mediator analysis for ethnic differences in adult mental health problems.

since this is not permitted with seemingly unrelated regressions. Instead we compared standard errors with and without robust variance and found only minor (< 10%) differences.

This mediation approach is valid if there is no E-M interaction in the total model (and we have collapsible measures). The so called controlled and natural direct (and indirect) effects coincide in this situation. Our E-M interaction terms were not significant, and the linear model gives collapsible measures.

The internal consistency between the 3 items measuring PTS was tested by the Cronbach's alpha coefficient, and was found to be acceptable (0.75).

## Results

Background characteristics, mental health and childhood violence are reported in Table 1. A higher proportion of the Sami women were younger and reported a higher educational level than non-Sami women (70% vs. 62%), whereas there were no ethnic differences in age and educational levels among men. The Sami respondents reported a lower household income than the non-Sami, and more than twice as many Sami reported affiliation with Laestadianism compared to the non-Sami.

## Childhood violence

A significantly higher proportion of Sami women than non-Sami women reported exposure to childhood violence (31.3% vs. 21.6%,  $p < 0.001$ ), while corresponding findings for men were 28.3% and 16.6%, respectively ( $p < 0.001$ ). The prevalence of childhood violence is thoroughly described in a previous publication [44].

## The association between childhood violence and mental health problems

When investigating the association between violence in childhood and adult mental health problems, stratified analysis by gender and ethnicity were conducted. Results are presented in Tables 2 and 3. Regardless of ethnicity, respondents who reported childhood violence were more than 3 times as likely to suffer from psychological distress (adjusted OR for women = 3.7, CI: 3.1–4.3, adjusted OR for men = 3.7, CI: 2.9–4.6) and over twice as likely to exhibit symptoms of PTS (adjusted OR for women = 3.0, CI: 2.5–3.5, adjusted OR for men = 3.5, CI: 2.8–4.3) than respondents who reported no experience of violence in childhood (Tables 2 and 3). In stratified analyses by gender, there were no interactions between childhood violence and ethnicity on psychological distress ( $p = .256$  among women and  $.571$  among men) or PTS ( $p = .403$  among women and  $p = .165$  among

**Table 1.** Background characteristics, reported childhood violence and mental health in the Sami and non-Sami population.

	Women (n=6003)		Men (n=4787)		p-value <sup>a</sup>	Women (n=6003)		Men (n=4787)		p-value <sup>a</sup>
	Sami (n=1195)	%	Non-Sami (n=4808)	%		Sami (n=921)	%	Non-Sami (n=3866)	%	
<b>Age</b>					< 0.001					.965
18–34	306	25.6	993	20.7		150	16.3	616	15.9	
35–49	366	30.6	1690	35.1		274	29.8	1158	30.0	
50–69	523	43.8	2125	44.2		497	54.0	2092	54.1	
<b>Education</b>					< 0.001					.141
Primary school	124	10.4	557	11.7		176	19.3	650	17.0	
High school	216	18.0	1215	25.2		280	30.7	1180	30.8	
College/university	308	25.7	1284	26.7		214	23.5	1022	26.7	
University	534	44.6	1723	35.8		242	26.5	982	25.6	
<b>Income</b>					< 0.001					< 0.001
Low	187	15.6	612	12.7		157	17.0	482	12.5	
Medium	504	42.2	1766	36.7		341	37.0	1366	35.3	
High	460	38.5	2306	48.0		403	43.8	1945	50.3	
<b>Laestadianism</b>					< 0.001					< 0.001
Yes	498	41.7	791	16.5		386	41.9	625	16.2	
No	697	58.3	4017	83.5		535	58.1	3241	83.8	
<b>Living area</b>					< 0.001					< 0.001
Sami minority	454	38.0	4268	88.8		370	40.2	3447	89.8	
Sami majority	740	62.0	539	11.2		551	59.8	417	10.8	
<b>Childhood Violence</b>										
Emotional	250	20.9	606	12.6	< 0.001	193	21.0	472	12.2	< 0.001
Physical	141	11.8	460	9.6	.021	126	13.7	278	7.2	< 0.001
Sexual	204	17.1	566	11.8	< 0.001	46	5.0	140	3.6	.053
Total	374	31.3	1038	21.6	< 0.001	261	28.3	624	16.6	< 0.001
<b>Mental health</b>										
Psychological distress <sup>b</sup>	189	15.8	623	13.0	.010	105	11.4	308	8.0	.001
Symptoms of PTS <sup>c</sup>	194	16.2	598	12.4	.001	112	12.2	353	9.1	.005

<sup>a</sup> Comparing Sami and non-Sami by Pearson chi-squared, level of significance  $p < 0.05$ . <sup>b</sup> Psychological distress last 4 weeks: 10-item version of the Hopkins Symptoms Check list (HSCL-10). <sup>c</sup> Post-traumatic stress symptoms (PTS) last 12 months: the NorVold abuse questionnaire (NORAQ).

**Table 2.** The association between childhood violence and psychological distress in Sami and non-Sami and total sample.

Women	Sami Crude OR	aOR*	Non-Sami Crude OR	aOR*	Total Crude OR	aOR*
Any childhood violence						
Yes	3.2 (2.3–4.3)	3.3 (2.4–4.6)	3.9 (3.3–4.7)	3.8 (3.1–4.5)	3.7 (3.2–4.4)	3.7 (3.1–4.3)
No	1	1	1	1	1	1
<b>Men</b>						
Any childhood violence						
Yes	3.3 (2.2–4.9)	3.7 (2.4–5.7)	3.7 (2.9–4.8)	3.6 (2.8–4.6)	3.7 (3.0–4.6)	3.7 (2.9–4.6)
No	1	1	1	1	1	1

\*Adjusted for age and education.

**Table 3.** The association between childhood violence and symptoms of PTS in Sami and non-Sami and total sample.

Women	Sami Crude OR	aOR*	Non-Sami Crude OR	aOR*	Total Crude OR	aOR*
Any childhood violence						
Yes	2.4 (1.7–3.2)	2.4 (1.8–3.)	3.2 (2.7–3.8)	3.1 (2.6–3.7)	3.0 (2.6–3.5)	3.0 (2.5–3.5)
No	1	1	1	1	1	1
<b>Men</b>						
Any childhood violence						
Yes	3.6 (2.4–5.5)	3.9 (2.6–5.9)	3.4 (2.7–4.3)	3.3 (2.6–4.2)	3.5 (2.9–4.3)	3.5 (2.8–4.3)
No	1	1	1	1	1	1

\*Adjusted for age and education.

men). When adjusting for age, education, living area and religion, none of these factors had any significant impact on the estimates.

### Mental health problems

Ethnic differences in mental health were found, with a significantly higher prevalence of psychological distress among Sami than among non-Sami women (15.8% vs. 13.0%,  $p=.010$ ) and among Sami compared to non-Sami men (11.4% vs. 8.0%,  $p=.001$ , Table 1). Differences were also identified in the prevalence of PTS symptoms: 16.2% among Sami women vs. 12.4% among non-Sami women ( $p=.001$ ), and 12.2% among the Sami men vs. 9.1% among non-Sami men ( $p=.005$ , Table 1).

#### The impact of childhood violence on ethnic differences in mental health

The results from the mediator analysis showed that about half of the effect of ethnicity on psychological distress for men was mediated through childhood violence (mediated proportion was 45.5%), and the figure for women was 53.2%. The mediated proportion for PTS and men was 55.5 and 31.4% for women (age and education level adjusted analysis).

### Discussion

This is the first study to present findings on the association between childhood violence and adult mental health in a Sami population. Moreover, we compared

the prevalence in mental health problems between the 2 ethnic groups and investigated the potential mediating effect of childhood violence on ethnic differences in mental health problems between Sami and non-Sami.

#### Associations between childhood violence and adult mental health problems

The findings of significant associations between childhood violence and psychological distress and symptoms of post-traumatic stress in both Sami and non-Sami respondents strengthen the hypothesis that violent victimisation generally affects mental health, regardless of ethnic background [45–48]. As concluded in a previous systematic review and meta-analyses of child abuse [45], all forms of child maltreatment should be considered important risk to health, including to a range of mental disorders. According to our study, this applies to the Sami as well. Our hypothesis that living in a Sami majority area and affiliation with Laestadianism would be protective against mental health problems was not supported by our findings. This could be because ethnic identity affiliation might not be affected by whether or not 1 is living in a minority or majority area. A possible explanation of why religious affiliation did not have any impact might be that the Laestadian church tends to advise against seeking help from the majority society [49]. Such attitudes might have cancelled out the positive effect between spirituality and mental health. However, other factors that are also related to mental health was not included, such as physical activity, drug use/misuse, other life stressors (e.g. job loss, loss of

partners/children), general adversity (e.g. social isolation, economic hardships), somatic illnesses, or psychological vulnerability (e.g. neuroticism or negative thinking). This must be regarded as a major limitation. Further, similar to our study, a study of violence, sexual abuse and health among the Inuit in Greenland [47] found that having been victim of violence or sexual abuse was significantly associated with several health problems, including mental health problems. For the indigenous of the North, these findings highlight the importance of culturally informed preventive programmes focusing on the influence of childhood violence on mental health in these populations. Moreover, our findings support the findings of a recent study in the Norwegian population which found that different forms of childhood violence were a risk factor for victimisation in adulthood among Norwegians [46]. However, our study did not examine the influence of the different forms of childhood violence on adult mental health, and a more detailed examination of the different forms of violence on mental health in a Sami population is warranted.

#### ***Mental health – cross-cultural comparisons***

We found a higher prevalence of psychological distress among both Sami men and Sami women compared to the non-Sami population. Very few population-based studies are available on the prevalence and types of mental health problems among the adult Sami population [50]. Moreover, the results of these studies are ambiguous [12], probably due to differences in problem formulation and study design [12,17]. Further, the lack of differences in mental health problems between Sami and Norwegians, as presented in certain earlier papers [13,17], may be due to overlooked within-group differences in the Sami population. For instance, some Sami subgroups may be less vulnerable to mental health problems due to protective factors at an individual, family and/or community level [28,51]. Our results of a higher prevalence of psychological distress among Sami compared to the non-Sami is different from the results of the SAMINOR 1 study from 2003/2004 [17], in which ethnic differences were found for men only. Both studies are population-based, but the latter study had a higher response rate (60.6%), and hence may represent a more reliable result concerning mental health prevalence estimate. Consequently, our prevalence estimate must be interpreted with caution. However, our findings are in line with other Sami studies [52,53]. The Swedish study by Kaiser et al. [52] found that the Sami disclosed higher mean values for both depression and anxiety than the majority population, with Sami men reporting the highest rates. In a study comparing Sami adolescents to majority Norwegian adolescents, it was found that Sami adolescents, particularly

those living in assimilated ethnic communities, reported more behavioural problems [53].

Moreover, international studies comparing mental health among indigenous and non-indigenous people in Australia, the US and Canada, have found a higher prevalence of mental health problems among the indigenous populations [54,55]. It is commonly believed that inferior mental health conditions among indigenous people may be due to historical injustice and oppression [50]. Our finding of a higher prevalence of PTS symptoms among the Sami than among the non-Sami may reflect more trauma exposure among the Sami compared to the majority population [11,56]. To our knowledge, no studies on PTSD diagnosis or PTS among indigenous Sami have previously been performed. Future studies are warranted to confirm our findings.

#### ***Mediating effect of childhood violence on ethnic differences in mental health***

The results of the mediator analysis showed that a substantial part of the ethnic differences was mediated thought childhood violence. Our findings suggest that childhood violence may be an important risk factor mediating the higher level of mental health problems in the Sami population.

#### ***Strengths and limitations***

The cross-sectional design limits the potential for assessing possible causal links between childhood violence and current mental distress and symptoms of PTS [57]. However, since our study measures violence in childhood and its association with adult mental health, the exposures of reported violence are likely to have taken place prior to the reported mental distress condition. Hence, childhood violence probably plays a role in the development of later mental health problems.

Validation of the HSCL-10 has been performed by other researchers and has proven to be a valid and reliable instrument [39,40]. The 3 items measuring PTS are not sufficient to meet all the DSM-V criteria for a PTSD diagnosis. This represents a major limitation, and our findings concerning PTS symptoms should be regarded with caution. In the future, more comprehensive studies are needed in order to verify the results.

The questions that were used to assess childhood violence were taken from the NorVold Abuse Questionnaire (NorAQ), and abbreviated and modified. The validation study showed that the abuse variables in the NorAQ had good reliability and validity [58]. However, the questions have not been validated in a Sami population. Thus, we cannot rule out the



possibility of misinterpretation of questions and of different interpretations due to cultural and linguistic differences.

Recollection bias may relate to a general tendency among adult people to underreport childhood violence [5], thus reducing the association to adult mental health problems. Another possibility is that current anxiety and depression may increase the tendency to recollect and report life events in a more negative and traumatic way [59,60], thus strengthening the negative association with mental health problems. However, those experiencing good times may also be inclined to report fewer adverse childhood events, thus weakening the negative association with mental health [61].

Data were collected in Sami-Norwegian municipalities, which made it possible to assess ethnic differences within the same geographical area. This must be regarded as strength of the study.

When classifying ethnicity, linguistic affiliation and self-identity were used as criteria. The Sami Parliament in their registration of voters uses both criteria almost similar. Hence, misclassification of responders with respect to Sami ethnicity is not very likely. A fundamental question is whether the results change with different definitions of the Sami group [62]. To answer some of the questions regarding varying definitions and potentially divergent outcomes, additional analysis have been conducted. To investigate whether the prevalence estimate of mental health problems changed with different definitions of the Sami, we conducted additional analyses. Definition II was a broader definition than we have used. In addition to our definition, it includes an affirmative response to the question "my ethnic background is Sami". This definition is used in several papers utilising data from the SAMINOR 1 questionnaire study [63]. Definition III, which is also used in other studies, Sami ethnicity was defined by Sami being the home language of grandparents, parents and respondents. Varying the definition II do not change the ethnic differences in the prevalence of mental health problems among men (psychological distress: Sami 11.5% vs. 7.7% non-Sami,  $p < .000$ , PTS: Sami 12.5% vs. 8.8% non-Sami,  $p < .000$ ) or women (psychological distress: Sami 16.5% vs. 12.6% non-Sami,  $p < .000$ , PTS: Sami 16.2% vs. 12.2% non-Sami,  $p < .000$ ). Varying the definition III some differences were found: Among men, the ethnic difference remained but was only significant in psychological distress (Sami 11.2% vs. 8.4% non-Sami,  $p = .044$ ; PTS: Sami men 11.7% vs. 9.5% non-Sami,  $p = .145$ ). For women, there were no significant ethnic difference in psychological distress (Sami 14.2% vs. 13.5% non-Sami,  $p = .637$ ), but the significant differences for PTS remained (Sami 17.6% vs. 12.7%

non-Sami,  $p = .001$ ). Hence, other ethnic definitions do not primarily change the results of our study.

However, due to the former Norwegian assimilation policy, some who are Sami according to these criteria might have denied their Sami background [23], and may have reported their ethnic background as Norwegian. This may have resulted in misclassification of exposure, and our estimated association between ethnicity and mental distress may hence be conservative.

The low participation rate in the SAMINOR 2 questionnaire study (27%) indicates that the results must be interpreted with caution. We have limited information about the non-respondents. Accordingly, selection bias is likely. Since ethnicity is not recorded in any official register in Norway, we were not able to assess whether the proportion of the non-respondents differed in the 2 ethnic groups. However, a comparison between participants in the SAMINOR 2 study and those participating in the SAMINOR 1 study has been made [33]. The participation rate in SAMINOR 1 was considerably higher (60.9%) than in the present study, but the proportion of participants classified as Sami did not differ between SAMINOR 1 and SAMINOR 2. We therefore assume that the proportion of the non-respondents in SAMINOR 2 is equally distributed among the Sami and the non-Sami.

The large number of participants is the strength of our study. The same applies to the inclusion of many background variables, which enabled us to control for potential confounding factors. However, unknown potential confounders unequally distributed between Sami and non-Sami respondents may have had an impact on our results. Known risk factors associated with poor mental health, such as childhood loss (e.g. death of a parent or parental divorce) and parental mental illness, were not taken into account in our study [64].

Non-respondents in our study differed from respondents with respect to gender, age and education. Participants were older and more likely to have a high education, and more women than men participated [33]. This conforms well with other studies, which have found that participation rates generally increase with age, female gender and higher education level [65]. The difference between respondents and non-respondents presents a socio-economic gradient that may have influenced the prevalence estimates of interpersonal violence and adult mental health problems. The prevalence may be different among the non-respondents. Since both childhood violence and mental health problems were associated with young age and low educational level in our study, the estimated prevalence between childhood

abuse and mental problems may have been higher if these groups had been included. However, the prevalence estimate might also be inflated. For association measures, the risk of bias is much smaller, even when the response rate is low [66]. Hence, our association measures are more reliable than our prevalence estimates.

## Conclusion

In both ethnic groups, childhood violence was associated with psychological distress and symptoms of PTSD in adulthood. Psychological distress and symptoms of post-traumatic stress were more prevalent in the Sami than in the non-Sami group. Childhood violence mediated some of the ethnic differences in mental health problems, both among women and men. More research on interpersonal violence and mental health among the Sami is needed.

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## Declarations

### *Ethics and consent to participate*

The study was approved by the Regional Committee for Medical and Health Research Ethics of Northern Norway (REK-Nord) and based on written consent. The SAMINOR study has concession for storage of individual information and for later linkages (under the Norwegian Health Registry Law). An information letter was attached to the questionnaire. All possible linkages and further use of the data material is carefully described in the invitation letter. Persons were asked to participate in a study on health, illness and living conditions in areas with both Sami and Norwegian populations. The questionnaire was posted in both a Norwegian and a Sami version. Participants consented by returning the completed questionnaire. The project owner of the SAMINOR-project is the Arctic University of Norway, UiT, by the University Director.

### *Availability of data and materials*

Data is stored at the Centre for Sami Health Research, UiT, The Arctic University of Norway. Website: [https://uit.no/om/enhet/forsiden?p\\_dimension\\_id=88115](https://uit.no/om/enhet/forsiden?p_dimension_id=88115).

## Disclosure statement

No potential conflict of interest was reported by the authors.

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