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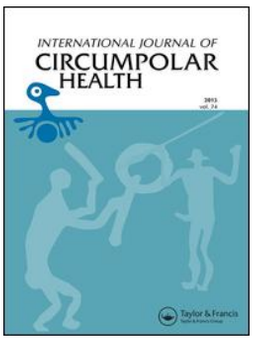

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The effect of structural and functional social relations on smoking among adolescents – data from HBSC Greenland 2018

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ABSTRACT

The prevalence of adolescent smoking in Greenland is relatively high and remains an important topic to study. The present study reports the prevalence of smoking among Greenlandic adolescents in 2018 and the association between smoking and social relations. The study was based on HBSC Greenland 2018, using a theoretical framework proposed by Due and colleagues, which divides social relations into *structural* and *functional* relations. The study showed a statistically significant gender difference in smoking, as 11.4% of the girls reported to smoke compared to 7.9% of the boys. The smoking prevalence increased significantly with age, and differences were also found for a place of residence, as the smoking prevalence was higher in towns and settlements compared to Nuuk. The adolescent smoking prevalence was higher when living in a home with one adult or in a foster family, school home or orphanage, versus living in home with at least two adults. No significant associations were found between adolescent smoking and functional relations. The results are beneficial to consider when applying new interventions to prevent adolescent smoking initiation in Greenland.

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Smoking; social relations; adolescents; HBSC Greenland

Introduction

Cigarette smoking among adolescents is a major public health concern because smoking poses many health risks, such as various forms of cancer, cardiovascular diseases and respiratory diseases [1]. Smoking is still one of the leading causes of preventable premature death in the world [2]. In addition, it has been shown to be a precursor for alcohol and drug use, as well as risk-taking and deviant behaviour [3]. Cigarette smoking is usually initiated before the age of 18, and if so, the risk of becoming a regular smoker is 87% [3,4]. Young people require fewer cigarettes and less time to establish a nicotine addiction, compared with adults [2] and preventing smoking initiation among young people is therefore very important.

The Health Behaviour in School-aged Children (HBSC) study is a WHO collaborative cross-national study, which has provided information about the health, well-being, social environment and health behaviour of school-aged children in 48 countries over the past 30 years. The descriptive full report from the 2013/2014 survey shows that Greenland has the highest prevalence of 15-year olds who smoked at least once a week (51%), which is more than four times the average of all the countries involved [5]. In a study from 2008, HBSC data showed that smoking was more prevalent among girls compared to boys, especially among the older age-groups (15- to 17-year olds) [6]. A study from 2011 showed that an average of 43% of adolescents reported to smoke every day, with a significant gender difference (49% for girls and 38% for boys) [7]. Looking at the results from the national HBSC report from Greenland 2018, more adolescents were smoking if living in settlements and smaller towns, compared to the capital, Nuuk, and smoking increases with age [8]. Public health interventions preventing adolescent's smoking initiation are a significant part of public health policy in Greenland [9].

Previous studies have shown that social relations have a great impact on adolescent smoking initiation and behaviour. Some common risk factors associated with adolescent smoking behaviour are family members who smoke as well as low academic performance, parental divorce/separation, lack of parental supervision and support, and close friends who smoke [10]. Some of the common protective factors are peer support, peer attachment and high quality of life [10], but there are

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inconsistencies in previous studies; social relations have both shown to be a protective and a risk factor to adolescent smoking depending on the context [11–15]. Some studies show that adolescents tend to have friendships consistent with their smoking status; non-smokers tend to have more non-smoking friends and smokers tend to have more smoking friends [10,16]. Other studies show that adolescents with no close friends, are more likely to smoke compared with adolescent in cliques [12,17], and multiple studies show that adolescents having close friends are more likely to smoke [10,11,18].

Because of the inconsistency in definitions of social relations, it is important to clarify the concept of social relations when studying the impact on health behaviour. According to Due and colleagues [19], social relations can be divided into *structural* and *functional*. The *structural factors* are a quantitative aspect of the relations and the frequency of contacts. *Functional factors* are a qualitative aspect of the relations; social support is the level of resources provided by other persons [19].

No previous studies have analysed the association between adolescent smoking and social relations as defined by Due and colleagues. The aim of this study was to analyse the association between structural and functional social relations and smoking among adolescents in Greenland. The study reports the prevalence and characteristics of smoking behaviour among Greenlandic adolescents, and secondly explore structural and functional social relations and their associations to adolescent smoking behaviour.

Materials and methods

The study population – Health Behaviour in School-aged Children

The study was based on data from the Greenlandic part of the Health Behaviour in School-aged Children (HBSC) survey that invites all children from grades 5 to 10 to participate. The international HBSC survey is a cross-national study on child and adolescent health and health behaviours collecting data every 4 years. HBSC Greenland have collected data since 1994. The Greenlandic questionnaire in the latest survey in 2018 included approximately 175 questions on demographic factors, health and health behaviours, social and emotional well-being, school factors, facts on friends and family, knowledge of friends' behaviours and attitudes towards health behaviour. Passive consent was obtained via the school boards in accordance with national ethical permissions in Greenland as the study collects data anonymously. Prior to data collection, all children were informed that participation was voluntary and that they could withdraw from the study at any time. For more information on the Health Behaviour in School-aged Children (HBSC) survey, see WHO [5]. The school-children answered the questionnaire during a particular school lesson, based on instructions from the teacher. Data from the 2018 survey included a total of 2,273 students aged 10–17 years, corresponding to approximately 47.6% of all schoolchildren in the target grades, and 59% of all schoolchildren in the schools that participated in the survey. For the present study, schoolchildren at the age below 10.49 years and above 16.5 years were excluded due to a relatively small sample size available in these age groups. The present study included data on 2,118 schoolchildren.

Study design

The study was broadly initiated to describe the prevalence of smoking among Greenlandic adolescents updated to 2018, reporting differences across age, gender and place of residence. To study the association between social relations and smoking, the study made use of the theoretical framework on social relations proposed by Due and colleagues [19]. According to Due and colleagues, social relations can be specified into *functional* relations and *structural* relations, and variables were constructed. The structural aspect of social relations was captured by the number of adults in the main home and the number of close friends, and the functional aspect of social relations were captured by a question on the feeling of belonging to one's class and whether one had parents and/or friends to turn to for support if needed (see *Study variables*).

Study variables/measures

Dependent variable – adolescent smoking

Adolescent smoking status was assessed by one question in the survey, "*How often do you smoke right now?*" with the original response categories (1) *Every day*, (2) *At least once a week, but not every day*, (3) *Less than once a week*, (4) *I don't smoke*. For the purpose of logistic regression, answers were dichotomised into (0) *non-smokers* and (1) *smokers*. Respondents who answered, (1), (2) and (3) were categorised as smokers. Adolescents who answered (4) were categorised as non-smokers.

Independent variable – social relations

The structural aspect of social relations was included with two measurements; number of friends and number of adults in the main home.

Respondents were asked two questions regarding the number of close friends; *"How many close friends*

do you have right now?" with two sub-questions relating to boys and girls, respectively. With the total number of close friends as a measure of a structural aspect of social relations, the answers on number of male and female close friends were added to compose a combined measure not differentiating gender. The response categories to the question were four categories; (1) *no friends*, (2) *one friend,* (3) *two friends,* (4) *three or more friends*, and for the purpose of the present study, answers (1) and (2) were combined and so a response variable with three categories was made; (1) *no or one friend,* (2) *two friends,* (3) *three or more friends* to separate the respondents with none or very few friends from the ones with several (>2) friends, and leaving a middle category to be able to detect a trend if present.

Respondents were also asked about the number of adults in the main home by the following question; *"Who lives in your home, and if you have two homes, it is the home you stay the most?"* with eight possible response categories (1) *mother*, (2) *father*, (3) *stepmother (or father's girlfriend),* (4) *stepfather (or mother's boyfriend),* (5) *Grandmother,* (6) *Grandfather,* (7) *Foster family, School home, Orphanage,* (8) *Other, write who*. Responses to this variable were recoded into three categories (1) *Foster family, School home, Orphanage*, (2) *Live with one adult* and (3) *Live with at least two adults* to be able to distinguish the single-parent families from families with more than one adult, and keeping the place of living with (typically) no adults to itself.

The functional aspect of social relations was initially included with two measurements; whether the respondent had someone (friends or parents) to confide in and talk to about problems – *social support* and the sense of belonging to one's classmates and feeling accepted – *social anchorage*. The variables on confiding were combined into a scale combining the two.

Respondents were asked the following question; *"The other students accept me as I am"* with five response categories ranging from *Strongly disagree* to *Strongly agree*. For the purpose of the analyses in the present study, the two extremes on the original response scale were combined and three categories of responses were made on social anchorage; (1) *disagree* (2) *neither agree nor disagree* and (3) *agree* to distinguish the "neutral" from the positive and negative, and detect a trend if present.

Respondents were also asked the following two questions; *"I can talk about my problems with my family"* and *"I can talk about my problems with my friends"* with seven response categories ranging from *Strongly disagree* to *Strongly agree*. The answers were dichotomised into (0) *disagree/neither agree nor disagree* and (1) *agree*. The dichotomised questions measuring social support were recoded into a combined social support scale with three categories; (1) *Low* answered a negative response (0) to both questions on social support, (2) *medium* answered a negative response (0) to one of the questions and a positive response (1) to the other question, (3) *high* answered a positive response (1) to both questions on social support.

Co-variates

Since smoking increases significantly with age, and there are different associations between genders and smoking behaviour, analyses were generally adjusted for age and gender. Since there has been a historic focus on whether respondents lived in the capital Nuuk, towns or settlements on smoking, place of residence was also included as a confounding variable on the association between social relations and smoking.

Statistical analysis

The prevalence of smoking was assessed by descriptive statistics, stratified on age and gender (Table 1). Cross-tabulation and chi-square tests were performed for categorical variables to assess the significance of the associations between the proportion of adolescents who smoked and adolescents who were non-smokers on various structural and functional social relations, as well as the covariates, age, gender and hometown (Table 2). Crude OR's were calculated for each independent variable on the outcome (Table 2). Adjusted binary logistic regression analyses were performed to examine the associations between adolescent smoking and structural and functional social relations (Table 3). Four different models were made; model 0; adjusted for age, gender and residence (Nuuk/other town/village), model 1; additionally adjusted for structural relations, model 2; adjusted for age gender, hometown and functional relations and model 3; additionally adjusted for structural relations. In all models, the reference group, respectively, was set as; boys, age 15, Nuuk, 3 or more friends, live with at least 2 adults, *agree* to social anchorage and *high* social support score.

Results

The present study included data on 2,118 schoolchildren aged 10–16 years old, whereof 783 were classified in the youngest age group (10.5–12.49 years old), 794 were classified into the middle age group (12.5–14.49 years old), and 541 students were in the oldest age group (14.5–16.49 years old) (data not shown). Table 1 presents the

Table 1. Descriptive table of the included variables, item text and response categories based on gender.

		Gender											
		Boys				Girls				Subtotal			
		Age				Age				Age			
		11	13	15	Subtotal	11	13	15	Subtotal	11	13	15	Subtotal
How often do you smoke cigarettes? (n=1970)	Every day	7	11	57	75	3	36	78	117	10	47	135	192
	At least once a week, but not every day	3	6	10	19	5	11	10	26	8	17	20	45
	Less than once a week	5	1	5	11	0	4	7	11	5	5	12	22
	I don't smoke	323	334	186	843	371	341	156	868	694	675	342	1711
How many close friends do you have? (n=1800)	No friends	3	5	3	11	3	4	1	8	6	9	4	19
	1 friend	9	11	5	25	8	14	10	32	17	25	15	57
	2 friends	19	17	11	47	22	16	17	55	41	33	28	102
	3 or more friends	261	295	206	762	309	333	218	860	570	628	424	1622
How many adults live in your primary home? (n=2118)	Others, write who	63	68	58	189	59	51	36	146	122	119	94	335
	Live with 1 adult	74	80	68	222	87	100	67	254	161	180	135	476
	Live with at least 2 adults	220	222	132	574	260	247	147	654	480	469	279	1228
	Live in foster family, school home or orphanage	10	15	13	38	10	11	20	41	20	26	33	79
I can talk about my problems with my family (n=1728)	Disagree	63	52	42	157	45	44	29	118	108	96	71	275
	Neither agree nor disagree	13	32	17	62	18	53	32	103	31	85	49	165
	Agree	199	227	145	571	285	255	177	717	484	482	322	1288
I can talk about my problems with my friends (n=1716)	Disagree	56	82	41	179	41	43	29	113	97	125	70	292
	Neither agree nor disagree	26	37	18	81	27	34	28	89	53	71	46	170
	Agree	188	189	150	527	265	280	182	727	453	469	332	1254
The other students accept me as I am (n=1651)	Disagree	19	32	20	71	25	44	24	93	44	76	44	164
	Neither agree nor disagree	31	48	28	107	47	75	53	175	78	123	81	282
	Disagree	202	226	161	589	239	228	149	616	441	454	310	1205
Place of residence (n=2100)	Nuuk	147	152	97	396	192	171	93	456	339	323	190	852
	Town	155	169	147	471	164	172	150	486	319	341	297	957
	Village	59	58	25	142	60	63	26	149	119	121	51	291

Table 2. Cross-tabulations, chi-square and crude odds ratios for adolescent smoking behaviour and the included independent variable.

	Smoking status					
	Smoking		Non-smoking		P-value	Crude OR
	n	%	n	%	*p*	*OR (95% CI)*
Gender					*0.008*	
Boys	75	7.9	873	92.1		*1*
Girls	117	11.4	905	88.6		*1.5(1.11–2.04)**
Age					*0.000*	
15	136	26.1	385	73.9		*1*
13	48	6.4	704	93.6		*0.2 (0.14–0.27)**
11	10	1.4	714	98.6		*0.04 (0.02–0.08)**
Hometown					*0.000*	
Nuuk	41	5	776	95		*1*
Town	129	14.4	764	85.6		*3.2 (2.22–4.61)**
Village	22	8.1	249	91.9		*1.7 (0.98–2.86)*
Structural relations:						
• Close friends					*0.479*	
3 or more friends	156	9.8	1434	90.2		*1*
2 friends	9	7.6	110	92.4		*0.8 (0.37–1.51)*
No or 1 friend	7	6.9	94	73.1		*0.7 (0.31–1.50)*
• Family structure					*0.000*	
Live with at least 2 adults	89	7.4	1116	92.6		*1*
Live with 1 adult	52	11.2	412	88.8		*1.6 (1.10–2.27)**
Live in foster family, school home or orphanage	18	23.4	59	76.6		*3.8 (2.16–6.77)**
Functional relations						
• Social support scale					0.082	
High	78	7.8	923	92.2		1
Medium	45	11.1	359	88.9		1.5 (1.01–2.18)*
Low	23	11	187	89		1.5 (0.89–2.38)
• Social anchorage					0.278	
Agree	101	8.6	1073	91.4		1
Neither agree nor disagree	31	11	251	89		1.3 (0.86–2.01)
Disagree	18	11.5	138	88.5		1.4 (0.81–2.36)

Note: *p-value < 0.05.

descriptions of the original questions asked to the participants and the distribution on age. Generally, it shows that 90% of all the participants have three or more close friends and that 58% of the participants live with at least two adults in their primary home. Approximately 4% of the participants live in foster families, school homes or in an orphanage, and this is roughly equally distributed between the three age groups, with a tendency towards more in the oldest age group. Additionally, Table 1 shows that the majority of the participants agreed on being able to talk about problems with both their family and friends and felt accepted by one's classmates. Lastly, Table 1 illustrates an equal distribution between the participants living in Nuuk or in smaller towns, and a lower number of participants living in settlements.

Results showed a statistically significant gender difference in smoking behaviour, with 11.4% of the girls reported to be smoking compared to 7.9% of the boys corresponding to an OR of 1.5 (95% CI: 1.11–2.04) (Table 2). A statistically significant difference was also found for a place of residence with an OR of 3.2 (95% CI: 2.22–4.61) for living in a town compared to Nuuk, and an OR of 1.7 (95% CI 0.98–2.86) for living in a settlement.

Number of adults in the primary home was statistically significantly associated with smoking (Table 2). Where 7.4% of the adolescents living in families with two adults reported to be smoking, the proportion of smokers was 11.2% in homes with one adult, and among adolescents living in foster families, school homes and orphanages, 23.4% reported to be smokers corresponding to an OR of 3.8 (95% CI 2.16–6.77) (Table 2). The total number of close friends was not significantly associated with smoking status (p=0.479) (Table 2).

Looking at the functional aspects of social relations, the OR for smoking when reporting a *low* score in the functional aspect of social relations was 1.5 (95% CI 0.89–2.38) and 1.5 (95% CI 1.01–2.18) for *medium*, only the latter being significant (Table 2). The social anchorage aspect of the functional social relations and the association to smoking turned out insignificant, p=0.278. Although insignificant, there was a tendency showing that if the respondents disagreed or neither agreed nor disagreed, the odds of smoking were higher, with OR's being, respectively, 1.4 (95% CI 0.81–2.36) and 1.3 (95% CI 0.86–2.01).

The results of the binary regression analyses showing the associations between our social relations and smoking were reported in Table 3 in four different models. Model 0 shows the crude OR's between our selected covariates and smoking, which all turned out to be significant. Girls were more likely to smoke, OR=1.8 (95% CI 1.26–2.45) and living outside of Nuuk, in either smaller towns or settlements raised the odds of smoking, OR=2.9 (95% CI 1.96–4.24) and OR=2.0 (95% CI 1.11–3.46). Model 0 shows lower odds of smoking the younger you were, OR=0.2 (95% CI 0.13–0.27) for the age group 13 and OR=0.04 (95% CI 0.02–0.08) for the age group 1, both compared to the age group 15.

Model 1 introduces the two of our four main independent variables adjusted for age, gender and place of residence: *Structural relations* – with both *Number of close friends* and *Number of adults in main home*, of which only the latter turned out to be significant. Living with both one adult or in a foster family, school home or in an orphanage was positively associated with the odds of smoking, OR=1.5 (95% CI 1.00–2.25, p=0.049) and 2.07 (95% CI 1.05–4.11, p=0.036).

Model 2 presents the last two of our main independent variables: *Social support scale* and *Social anchorage* adjusted for age, gender and place of residence, which both turned out insignificant. Although not significant, it showed a tendency that having a *medium* and *low* level of social support was related to higher odds of smoking, with OR's being, respectively, 1.3 (95% CI 0.83–2.09, p=0.236) and 1.4 (95% CI 0.76–2.46, p=0.297).

Table 3. Logistic regression of the association between social relations and adolescent smoking – adjusted odd ratios (and 95% confidence intervals).

	Model 0		Model 1		Model 2		Model 3	
	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p	OR (95% CI)	p
Gender								
Boys	1		1		1			
Girls	1.8 (1.26–2.45)	0.001	1.7 (1.19–2.53)	0.004	1.9 (1.26–2.87)	0.002	2.1 (1.31–3.24)	0.002
Age								
15	1		1		1		1	
13	0.2 (0.13–0.27)	0.000	0.2 (0.12–0.28)	0.000	0.2 (0.10–0.25)	0.000	0.2 (0.11–0.27)	0.000
11	0.04 (0.02–0.08)	0.000	0.03 (0.01–0.07)	0.000	0.01 (0.003–0.05)	0.000	0.007 (0.001–0.5)	0.000
Place of residence								
Nuuk	1		1		1		1	
Town	2.9 (1.96–4.24)	0.000	2.7 (1.75–4.07)	0.000	2.8 (1.75–4.44)	0.000	2.6 (1.61–4.34)	0.000
Village	2.0 (1.11–3.46)	0.020	2.1 (1.13–3.77)	0.018	2.1 (1.10–4.06)	0.025	2.3 (1.18–4.60)	0.015
Structural relations								
• *Close friends*								
3 or more friends			1		-	-	1	
2 friends			0.6 (0.25–1.38)	0.225	-	-	0.5 (0.21–1.40)	0.201
No or 1 friend			0.6 (0.23–1.65)	0.335	-	-	0.2 (0.02–1.18)	0.071
• *Family structure*								
Live with at least 2 adults			1		-	-	1	
Live with 1 adult			1.5 (1.00–2.25)	0.049	-	-	1.8 (1.11–2.81)	0.016
Live in foster family, school home or orphanage			2.07 (1.05–4.11)	0.036	-	-	2.1 (0.95–4.63)	0.066
Functional relations								
• *Social support scale*								
High					1		1	
Medium					1.3 (0.83–2.09)	0.236	1.5 (0.88–2.38)	0.141
Low					1.4 (0.76–2.46)	0.297	1.3 (0.68–2.52)	0.420
• *Social anchorage*								
Agree					1		1	
Neither agree nor disagree					1.0 (0.62–1.70)	0.935	1.0 (0.56–1.67)	0.932
Disagree					1.2 (0.67–2.29)	0.501	1.5 (0.77–2.78)	0.246

Notes: Model 0: adjusted for gender, age, place of residence.
Model 1: additionally adjusted for structural relations.
Model 2: adjusted for gender, age, place of residence and functional.
Model 3: additionally adjusted for structural relations.

Model 3 incorporates all of the four main independent variables, both the *structural* and *functional* aspect of social relations, adjusted for age, gender, place of residence, and now also for one another. Looking at the structural relations, the association between number of close friends and smoking was still not significant, although showing an even more negatively tendency, as compared to model 1. The odds of smoking when having two friends did not change significantly, 0.5 (95% CI 0.21–1.40, p=0.201), but the odds of smoking while having no friends or only one friend decreased and the association also became stronger, OR=0.2 (95% CI 0.02–1.18, p=0.071). Regarding the association between the number of adults in one's main home and smoking, now showed only a significant difference between living with one adult, but this association became stronger, with an OR being 1.8 (95% CI 1.11–2.81, p=0.016). There was also a positive tendency between smoking and living in either a foster family, a community home or in an orphanage, but this relation weakened and became insignificant, when adjusting for the functional social relations, OR=2.1 (95% CI 0.95–4.63, p=0.066). In model 3, we also explored the social support scale, and adjusting this variable with the structural social relations and the social anchorage, did not change the association. There was an insignificant positive relation between having a *medium* social support score and smoking, compared to having a *high* score, with the odds being 1.5 (95% CI 0.88–2.38, p=0.141). The last part of the scale showeds a non-significant positive tendency with odds ratios being 1.3 (95% CI 0.68–2.52, p=0.420) for the category *low*. Social anchorage remained insignificant in model 3 and showed no association with smoking. Since the fully adjusted model (model 3) did not provide with additional information or changed the estimates from model 1 or

model 2 remarkably, it was not possible to conclude on any of the two types of relations to be superior in association with smoking.

Discussion

The most important finding of the present study was firstly that Greenlandic girls have a significantly higher prevalence of smoking (11.4%) compared with boys (7.9%) and there is a significantly higher prevalence of smoking in towns (14.4%) and settlements (8.1%) compared with Nuuk (5%). The last HBSC-report from Greenland in 2013/14 also showed that the number of smoking adolescents was higher outside of Nuuk, but there has been improvement since 2013/14, where the percentile of smokers in the settlements where 37% of the 15–17-year olds were daily smokers in. Recent Danish studies from 1998 to 2002 have also found that girls have the highest smoking prevalence among adolescents [20]. These findings are important when considering target groups for further preventable interventions in smoking behaviour.

Regression analyses of the associations of structural and functional social relations to adolescent smoking behaviour showed that social relations may be associated with adolescent smoking behaviour, but only few results were significant. The main limitation of the present study was the use of cross-sectional data on a study examining an association, where the direction of the association between social relation and smoking was bi-directional. Earlier studies have both pointed to the association that low level of social relation may lead to smoking [12], but also that there is a high level of social cohesion in smoking with one's peers [10]. Given that data on the cause and effect in the present were collected at the same time point, it is not possible to examine the causal association. Future studies with a longitudinal design may contribute to the research question and assessing the causal direction.

Working through model 1 to 3 (Table 3), there was no noticeable change in the associations between the two aspects of social relations and adolescent smoking. We had expected to find an association between social relations and adolescent smoking, but this association turned out insignificantly, except when looking at social support from one's family. Data included information on life and lifestyle, but the social condition that adolescent smoking is associated to smoking among parents and peers, could be confounding factors that would have been more optimal to include into the analyses. Data on this variable were not available in the HBSC data. The spurious findings could also be due to a small sample size or possible opposite mechanisms between the social relations aspects.

The present study operationalised the social relations according to the definition by Due and colleagues [19], to be able to distinguish the type of social relations and was able to analyse associations for functional and structural relations separately. Future studies could ideally distinguish formal relations and relational strain, as they are part of the theory proposed by Due and colleagues, and not included in the data set used. If future HBSC Greenland studies would include data on these aspects of social relations, more detailed analyses could be performed. Potential studies that are able to operationalise social relations and distinguish even better between function and structure will contribute significantly to the research area of social relations among adolescents and the association to smoking, and test in more details whether the functional aspect of social relations has a greater impact on health than the structural aspect of social relations [19].

Public health practice in Greenland has had a focus on smoking for decades, and health interventions supporting that adolescents do not start smoking are an important focus area in public health policy in Greenland [9]. Actions to decrease smoking has included counselling, smoke-free school class competitions, campaigns [21] as well as one of the highest prices of tobacco in a western country. These efforts have contributed to the decrease among adult smokers from 68% in 1993 to 52% in 2018 [22]. Even though there has been a positive development among especially the number of the youngest smokers, the 11-year-olds, specific factors that decrease the rate of adolescents initiating smoking are still sought [8]. In this study, we identified several risk factors for smoking. Adolescents living in school homes were an at-risk group, so anti-smoking policies where adolescents live when they move to the city or capital Nuuk to attend school would prevent smoking to be taken up at these locations. The current study also identified adolescents living outside of Nuuk, in smaller towns or settlements, being at higher risk of becoming smokers. It is well known that children and adolescents are influenced by the context in which and where they grow up and live. Previous HBSC-reports from Greenland have shown significant geographically differences in both health, diet, smoking, and the level of physical activity [8] and the place of residence may be one of the explanatory factors. The living conditions differ relative to where you live and it is therefore very important to have in mind, when thinking about health, including smoking behaviour, in Greenland [22]. Bearing in mind that the prevalence of adolescent smoking still is higher outside

Nuuk, there is a need for a tailored anti-smoking campaign taking the different mechanisms into consideration and target urban areas. Being able to prevent smoking in these areas, it must be taken into account, that smoking often is seen as a social activity, that creates a social community, especially among adolescents. Despite selling tobacco products to persons under the age of 18, it is considered easy to buy cigarettes, which is part of the reason that smoking among adolescents continues. Preventing smoking among adolescents in Greenland could be done by reducing the availability of cigarettes, regulate places cigarettes can be bought, and even higher prices, as a part of structural prevention. Implementation of those and similar structural interventions, in particular in the rural areas of Greenland, would reduce adolescent smoking.

In conclusion, our study showed that structural relations in the form of how many adults were living in the main home of the adolescent were associated with odds of being a young smoker, whereas the functional aspect of social relations turned out insignificant. It would have been interesting to have looked at the closeness of the relations even more and to really establish the contact frequency and the social support. Once these mechanisms are elucidated in more detail, there may be a great future preventative potential in involving social relations in smoking cessation programmes.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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