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Polysubstance abuse among sexually abused in alcohol, drug, and gambling addiction treatment in Greenland: a cross sectional study

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ABSTRACT

This study aims to investigate the association between earlier sexual abuse and polysubstance abuse among persons in alcohol, drug and gambling addiction treatment in Greenland. The study included 431 individuals treated in 2017–2019. Data on exposure (sexual abuse), outcome (polysubstance abuse), and potential confounders (age, sex, school education, further education, labour market affiliation, physical abuse and emotional abuse) were extracted from The National Database on Substance Abuse Treatment. Polysubstance abuse was defined as both smoking cannabis more than once a week and having an AUDIT score >15. Logistic regression was used to estimate odds ratios (ORs). In total, 61% reported having been sexually abused. Women were more often sexually abused and had more often been physically and emotionally abused when compared to men. Polysubstance abuse (OR 2.06, 95% CI: 1.22; 3.48) and cannabis abuse (OR 1.89, 95% CI: 1.20; 2.98), but not alcohol abuse, were more frequent in sexually abused when compared to non-victims of sexual abuse. This study found polysubstance abuse to be more frequent in sexually abused treatment seekers. It is recommended that the findings are taken into account in the planning of treatment services and in training of counsellors.

Introduction

As in many other Inuit communities, both sexual abuse and substance abuse constitute significant public health concerns in Greenland [1], Larsen CLV, 2019; Larsen CVL, 2019. Although the prevalence of sexual abuse has been decreasing in Greenland since the late 1970s, sexual abuse is still frequent. It has recently been found that more than 40% of the population born in 1970–1979 report having been sexually abused, whereas 20% of those born after 1995 report having been sexually abused [2,3], Larsen CVL, 2019. Significant gender differences in the occurrence of sexual abuse are found. Compared to men, women are more often victims of sexual abuse and approximately 30% of women and 10% of men report having been victims of sexual abuse [3].

Sexual abuse is not an isolated problem, as it occurs in a larger social, cultural, historical, and socioeconomic context. Sexual abuse is often occurring alongside other adverse childhood experiences such as neglect, household alcohol abuse, exposure to domestic violence, separation from family, and family financial problems. Furthermore, previous studies link the European colonisation of Inuit regions with high rates of sexual abuse.

Today, sexual abuse more often occurs in more isolated and disadvantaged areas of Greenland [3–7].

It is well documented that being a victim of sexual abuse often entails great psychological, physical, and social consequences such as depression, anxiety, somatisation, social isolation, troubled relations, and suicide [8–12]. Additionally, sexual abuse is strongly associated with alcohol and drug abuse later in life.

Substance abuse offers a temporary escape from personal problems and trauma [10,13,14]. Therefore, it is not surprising that a majority of people in substance abuse treatment are victims of sexual abuse [11,13–15].

Several international studies have investigated the association between sexual abuse and the severity of substance abuse, including polysubstance abuse. Highly elevated polysubstance abuse among victims of sexual abuse has been documented, thus indicating that victims of sexual abuse are more likely to have more severe substance abuse problems compared to non-victims of sexual abuse [13–16].

The aim of this study is to investigate the association between sexual abuse and polysubstance abuse among individuals in alcohol, drug and gambling treatment in Greenland. No prior studies have investigated this association, and it is our hope that this

study will provide a better understanding of the needs of victims of sexual abuse in alcohol, drug, and gambling addiction treatment. Furthermore, the aim of the Greenlandic law on abuse treatment is to secure simultaneous treatment of substance abuse and other needs [17]. Therefore, it is our hope that this study will bring attention to the need for coordination in treatment between service providers of alcohol, drug, and gambling addiction treatment and sexual abuse treatment in Greenland.

Materials and methods

This study examines the prevalence of polysubstance abuse in the two groups: sexually abused and non-sexually abused in a cross-sectional sample.

Setting

Greenland has a population of approximately 56,000 people living in 16 towns and 60 villages. There are no roads between habitations and the only way to travel is by boat or plane. Due to these geographical challenges, the treatment organisation offers different methods and services according to the place of residence: 62% of the population live in a town with an Allorfik treatment centre (Ilulissat, Aasiaat, Sisimiut, Nuuk and Qaqortoq). Citizens who live outside these cities are treated locally by travelling counsellors or by a private provider in Nuuk. All providers are by law compelled to register citizens in treatment in the National Database of Substance Abuse Treatment. The Government of Greenland is the sole payer of treatment including travel and accommodation costs [16].

Data collection

The study includes all citizens who have received treatment for alcohol, drug, or gambling problems in the years 2017–2019 and were registered in The National Database on Substance Abuse Treatment, in total 1,949 citizens. The database includes, among others, information on alcohol use obtained through the Alcohol Use Disorders Identification Test (AUDIT) [18] and questions about cannabis use and other drugs obtained at referral, although use of other drugs than cannabis is nearly not reported. The database also includes information obtained from the Addiction Severity Index (ASI) questionnaire at start of

treatment [19]. This includes questions concerning sex, age, sexual abuse, physical abuse, emotional abuse, school- and further education, and labour-marked affiliation.

Variables

Information on exposure to sexual abuse was obtained from the question: "Has anyone sexually abused you (e.g. forced sexual services, sexual harassment) – at some point in your life?" (Yes/No). The citizens were categorised as "sexually abused" or "non-sexually abused".

The outcome variable was constructed based on answers from the AUDIT questionnaire and the questions about cannabis use, as this is the only drug seen in the national substance abuse treatment so far. AUDIT consists of 10 questions each scoring 0–4 points. An AUDIT score (ranging from 0 to 40 points) was calculated and recoded into a binary outcome variable: "Alcohol problem" and "No alcohol problem". A score of >15, corresponding to harmful drinking or strong indication of alcohol addiction, was regarded as an alcohol problem [18].

Cannabis abuse was dichotomised as "More than once a week" and "Less than once a week" based on the question "How often have you smoked cannabis during the past year?"(Do not smoke cannabis, No more than once a month, 1–4 times a month, More than once a week). Polysubstance abuse was defined as smoking both cannabis more than once a week and having an AUDIT score >15.

School education, registered as "No school education (8 years or less), Finished public school, High school or more. Further education (None, Very short vocational, Short vocational, Long vocational, Bachelor, Master or more)", was trichotomised into "No further education", "Vocational education", and "Higher education". Labour market affiliation in the past three years (Full time, Part time regularly, Part time irregularly, Self-employed fisher/hunter, Other self-employed, On welfare, Other, Stay-at-home) was dichotomised as "No affiliation with labour market" and "Affiliation with labour market". Information on physical and emotional abuse was obtained from the questions: "Have you been physically abused (e.g. been hit or in other ways harmed physically) – At some point in your life?" and "Have you been emotionally abused (e.g. humiliation or psychological terror) – At some point in your life?". (See table A2 for complete variable list).

Statistical analyses

All statistical analyses were performed using Excel 2016 and SPSS version 25. For descriptive analysis, Pearson x^2-test with a two-sided significance level of 5% was used, and an ANOVA test of variance was used to analyse means. A power of more than 70% was considered acceptable for the main analysis. Participants with missing data on either exposure, outcome or confounders were excluded from the analysis (see flowchart). A descriptive analysis was performed in order to determine how sex, age, school education, further education, labour marked affiliation, physical- and emotional abuse were distributed among the exposure and non-exposure group.

First, the association between sexual abuse and polysubstance abuse was tested using binary regression. Two models were used: Model 1 is unadjusted and Model 2 is adjusted for potential confounders.

Secondly, the association between sexual abuse and alcohol and cannabis problems was analysed respectively. A binary regression model was used to determine the odds ratio between the exposure and non-exposure group. Model 1 is unadjusted and Model 2 is adjusted for confounders.

A response analysis was performed in order to determine if the citizens, who were excluded due to missing information, differed significantly from those included in the study. (See table A1).

Results

The target population comprised 1,949 citizens, who had received alcohol, drug, and gambling addiction treatment in 2017–2019. 1,110 citizens were excluded due to missing data on ASI, 112 citizens due to missing information on sexual abuse, 228 due to missing information on alcohol and cannabis use, and 68 were excluded due to missing information on potential confounders. The final study population comprised 431 citizens (see Figure 1).

Baseline characteristics *(Table 1)*

Of the final study population, 61% reported having been a victim of sexual abuse. Of these, 68.1% were women and 31.9% were men (p < 0.001). The mean age was 38.9 years (SD 11.6 years) for sexually abused and 37.3 years (SD 12.1 years) for non-sexually abused (NS). A majority had no further education after primary education, although only one in four did not have any affiliation with the labour market (NS between sexually abused and non-sexually abused). A greater part of sexually abused reported having been victim of physical abuse (p < 0.001) or emotional abuse (p < 0.001). A greater part of sexually abused had a polysubstance abuse (p = 0.006). No statistically significant difference
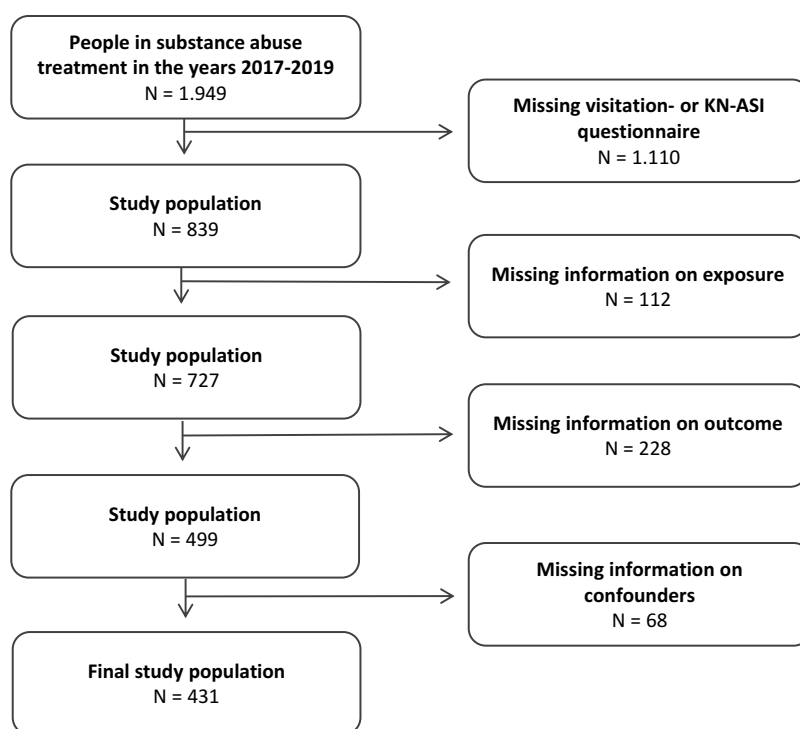

Figure 1. Flow diagram.

Table 1. Baseline characteristics (N = 431).

	Sexually abused N = 263 (61%)	Not sexually abused N = 168 (39%)	P-value
Sex N (%)			< 0.001
Men	84 (31.9%)	117 (69.6%)	
Women	179 (68.1%)	51 (30.4%)	
Age Mean (SD)			0.174
Years	38.9 (11.6)	37.3 (12.1)	
School education N (%)			0.293
No school education	93 (35.4%)	48 (28.6%)	
Primary education	160 (60.8%)	111 (66.1%)	
Secondary education	10 (3.8%)	9 (5.4%)	
Further education N (%)			0.582
No further education	179 (68.1%)	121 (72%)	
Vocational education	76 (28.9%)	41 (24.4%)	
Higher education	8 (3%)	6 (3.6%)	
Labour market affiliation N (%)			0.622
Yes	190 (72.2%)	125 (74.4%)	
No	73 (27.8%)	43 (25.6%)	
Physical abuse N (%)			< 0.001
Yes	218 (82.9%)	99 (58.9%)	
No	45 (17.1%)	69 (41.1%)	
Emotional abuse N (%)			< 0.001
Yes	222 (84.4%)	100 (59.5%)	
No	41 (15.6%)	68 (40.5%)	
Polysubstance abuse N (%)			0.006
Yes	85 (32.2%)	34 (20.2%)	
No	178 (67.7%)	134 (79.8%)	
Alcohol abuse N (%)			0.181
AUDIT score 0–7	55 (20.9%)	36 (21.4%)	
AUDIT score 8–15	41 (15.6%)	32 (19%)	
AUDIT score 16–19	24 (9.1%)	24 (14.3%)	
AUDIT score > 20	143 (54.4%)	76 (45.2%)	
Cannabis abuse N (%)			0.122
Do not smoke cannabis	57 (21.7%)	48 (28.6%)	
No more than once a month	32 (12.2%)	18 (10.7%)	
1–4 times a month	26 (9.9%)	24 (14.3%)	
More than once a week	148 (56.3%)	78 (46.4%)	

between the two exposure groups was found for alcohol and cannabis abuse.

The association between sexual abuse and polysubstance abuse (Table 2)

Being sexually abused was statistically and significantly associated with greater odds of having a polysubstance abuse in the unadjusted analysis (OR 1.88, 95% CI: 1.19; 2.97) (p = 0.007) and when adjusting for sex, age, school education, further education, labour market affiliation, physical abuse, and emotional abuse (OR 2.06, 95% CI: 1.22; 3.48) (p = 0.007).

Table 2. Association between sexual abuse and polysubstance abuse (N = 431).

	Model 1		Model 2[a]	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Not sexually abused (ref.)	1.00		1.00	
Sexually abused	1.88 (1.19; 2.97)	0.007	2.06 (1.22; 3.48)	0.007

[a]Adjusted for sex, age, school education, further education, labour market affiliation, physical abuse and emotional abuse

The association between sexual abuse and alcohol abuse (Table 3)

When analysing the association between sexual abuse and alcohol abuse, no statistically significant association was found.

The association between sexual abuse and cannabis abuse (Table 4)

A significant association between sexual abuse and cannabis abuse was found for the unadjusted analysis (OR 1.49 95% CI: 1.01; 2.19) and when adjusting for

Table 3. Association between sexual abuse and alcohol abuse (N = 431).

	Model 1		Model 2[a]	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Not sexually abused (ref.)	1.00		1.00	
Sexually abused	1.18 (0.80; 1.76)	0.407	1,03 (0.65; 1.63)	0.891

[a]Adjusted for sex, age, school education, further education, labour market affiliation, physical abuse and emotional abuse

Table 4. Association between sexual abuse and cannabis abuse (N = 431).

	Model 1		Model 2[a]	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Not sexually abused (ref.)	1.00		1.00	
Sexually abused	1.49 (1.01; 2.19)	0.046	1.89 (1.20; 2.98)	0.006

[a]Adjusted for sex, age, school education, further education, labour market affiliation, physical abuse and emotional abuse

potential confounders (OR 1.89, 95% CI: 1.20; 2.98) (P = 0.006).

Discussion

A majority of about 61% of citizens in alcohol, drug, and gambling treatment in Greenland are also victims of sexual abuse. A rate similar to findings in earlier studies [14,20,21]. Still, the problem is relatively bigger in Greenland as nearly 650 citizens sought substance abuse treatment each of the study years, corresponding to more than 1% of the adult population each year.

Generally, treatment seekers have completed less school education and less further education compared to the general population. Only 16.7% of the adult population have not finished public school [22] and 35% have a further education [23]. Although no difference between sexually and not sexually abused was found, the results indicate that citizens in substance abuse treatment generally constitute an underprivileged group.

A majority of sexually abused were women, which has consistently been found in Greenlandic population surveys and treatment in general [3,16] Larsen CVL, 2019; as well as internationally. Women constitute more than half of the treatment-seeking population and have – measured with AUDIT – at least as heavy substance abuse problems at referral as men [16].

When looking at the general population, young women are now heavier users of alcohol than men (Larsen CVL, 2019). The fact that the majority of treatment seekers are women is unique compared to other Nordic and Arctic countries [24–26]. The reasons behind larger proportions of women in treatment have not been investigated, although it might be related to the high rate of sexual abuse and other trauma [6].

This study found that victims of sexual abuse in alcohol, drug, and gambling addiction treatment are more than twice as likely to suffer from polysubstance abuse compared to non-victims of sexual abuse.

Furthermore, victims of sexual abuse were nearly twice as likely to be cannabis abusers, even though cannabis abuse is seen less frequent in women in treatment [16]. However, this association was not present for alcohol abuse. These findings suggest that the significant difference in polysubstance abuse between sexually abused and non-sexually abused is mainly driven by the differences in cannabis use in the two exposure groups.

Our findings are consistent with results from other studies in native and non-native populations. An association between sexual abuse and polydrug use was found in a study investigating Adverse Childhood Experiences among Native Americans, and according to a study on sexual abuse among substance abuse patients, victims of sexual abuse are more likely to report polysubstance abuse as their primary self-reported drug when compared to non-victims of sexual abuse [13,15]. Moreover, the use of multiple substances among students was more frequent among victims of physical and sexual abuse [13]. In addition, a longitudinal follow-up study concluded that childhood sexual abuse was associated with an increased risk of subsequent substance disorders such as alcohol dependence and severe drug dependence in both men and women [10].

Sexual abuse is strongly associated with substance abuse; however, an association at the same level has also been found for a large range of other Adverse Childhood Experiences (ACEs) [6]. The evidence points to the importance of early intervention. ACEs are not only associated with substance abuse. They have been found to be associated with a large range of physical health effects including cancer, heart disease and respiratory disease as well as psychiatric diseases including PTSD, suicide, and personality disturbances [6,9,10]. Furthermore, they have been found to be associated with homelessness, educational achievement, and social status in adulthood [27–29].

In Greenland, alcohol is the most commonly used drug – introduced more than 250 years ago in early colonial times [30]. Its use peaked in 1987 with 22 litres of pure alcohol a year for all 15 + year olds but has now decreased to less than 10 litres of pure alcohol a year. Cannabis was introduced in the 1970s and, although the drug is illegal, it is found all over Greenland today. While only 19% of the population never drink alcohol, 63% have never tried cannabis. Although the proportion with a high use is nearly equal as 12.1% used cannabis weekly or more often and 10.6% had an AUDIT score >15 indicating harmful drinking or

probable addiction. The high proportion with use of both alcohol and cannabis in our study gives rise to the speculation, that citizens suffering from traumatic events, including sexual abuse, prefer cannabis over alcohol because of its hedonic and mood-changing qualities [31]. Differences in primary drug preference among sexually abused and not sexually abused has also been found for other drugs [14].

The rate of an AUDIT score >15 was equally distributed among sexually abused and non sexually abused. That a smaller proportion score corresponding to dependency in Greenland treatment seekers compared to other western societies has also been found earlier in a Greenlandic treatment population [32]. It is our view that the amount of alcohol or cannabis used in the treatment population in general is primarily limited by the very high alcohol prices and the low economic power of the individuals. It is still controversial whether the treatment outcome is worse and the need post-treatment services higher among sexually abused substance treatment seekers. A study by Fiorentine e.g., that examined the possible effects of sexual and physical abuse in a two year follow up period, found the impact of abuse on treatment outcomes to be minimal and stated that addressing the abuse could only be justified on humanistic grounds [33]. However, others have found that a history of abuse is associated with worse treatment outcomes [21,34,35] or a history of abuse to have an impact on post-treatment needs of psychiatric status disease [14]. Despite the disagreements, the concurrent substance abuse and trauma following sexual abuse constitute a challenge for service providers. In Greenland, the treatment of different types of substance abuse is integrated and takes place in the same institutions. This organisation is highly expedient considering the high frequency of treatment seekers with polysubstance abuse [16].

The substance abuse treatment is by law obligated to coordinate substance abuse treatment with social services and the health care sector. Despite an obvious need for service providers of substance abuse and sexual abuse treatment to coordinate their treatment effort, it has not been possible. Furthermore, there is an urgent need for more education of substance abuse counsellors on how they in the best possible way can provide services for the vulnerable group of citizens with combined substance abuse problems and struggles with trauma from earlier sexual abuse.

Limitations of the study

Several definitions of polysubstance abuse are found in the literature, and no shared definition can be found (13–15). We included the two types of substance abuse (alcohol and cannabis) met by the national treatment service. Other drugs might be on their way but because of Greenland's remoteness, the supply chain is vulnerable, and dependency of other drugs has not yet been claimed for. Still, an unambiguous definition would improve interpretation and generalisation of the results.

Furthermore, sexual abuse is a broad term. Although the ASI questionnaire provides examples of the meaning of the question, it was to some extent for the citizen herself/himself to define what sexual abuse means to her/him.

Selection bias associated with both exposure and outcome might have occurred. Treatment is demanding, and those who do not seek treatment might therefore be worse off regarding sexual abuse and polysubstance abuse than those who do seek treatment, leading to an underestimation of the association between sexual abuse and polysubstance abuse.

Due to the high exclusion rate of 77.9%, an analysis of response (Appendix) was performed. It was found that responders and non-responders were different with regard to sex, school education, and further education. This has implications for the generalisability of the study.

The AUDIT questionnaire was used to collect information on alcohol abuse. AUDIT is widely used for the identification of alcohol use disorders. Its reliability and validity have been established in different settings, however not in Greenland or in other Arctic or indigenous populations [18]. Furthermore, AUDIT is developed for use as a screening instrument in general practice. Neither the questions regarding cannabis use or the ASI have been validated even though it has been used for many years. Thus, there is a general need for validation of measurement instruments in Greenland and in other Arctic contexts.

All data in this study are obtained through questionnaires. This especially raises concerns about non-differential misclassification regarding the outcome. Furthermore, recall bias or e.g. repression of traumatic memories of sexual abuse might have influenced the answers leading to weakened association [36].

It is not possible to draw conclusions about the causal relationship between sexual abuse and polysubstance abuse. Substance abuse can be a result of the trauma of sexual abuse, especially because sexual abuse often takes place during childhood. However, substance abusers may also be at greater risk of being sexually abused.

Conclusion

Our study found that about 61%, of citizens in substance abuse treatment in Greenland have experienced sexual abuse with an overweight of women, which is in line with international research. Polysubstance abuse (alcohol and cannabis) is twice as frequent in sexually abused compared to non-sexually abused. The same was found for cannabis abuse but not for abuse of alcohol. Despite some disagreement about the consequences of sexual abuse regarding relapse rates in substance abuse treatment and treatment outcomes, there is a need for service providers of substance abuse and sexual abuse treatment to coordinate their treatment. Last but not least, the results call for a more intensified focus on early intervention.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

Table A1. Response analysis (N = 597).

	Responders N = 431 (72.2%)	Non-responders N = 166 (27.8%)	P-value*
Sex N (%)			0.014
Men	201 (46.6%)	59 (35.5%)	
Women	230 (53.4%)	107 (64.5%)	
Age Mean (SD)			0.010**
Years	38.3 (11.8)	41.1 (12.1)	
School education N (%)			0.010
No school education	141 (32.7%)	39 (23.5%)	
Primary school education	271 (62.9%)	111 (66.9%)	
Secondary school education	19 (4.4%)	16 (9.6%)	
Further education N (%)			0.004
No further education	300 (69.6%)	92 (55.4%)	
Vocational education	117 (27.1%)	65 (39.2%)	
Higher education	14 (3.2%)	9 (5.4%)	
Labour market affiliation N (%)			0.920
Yes	315 (73.1%)	122 (73.5%)	
No	116 (26.9%)	44 (26.5%)	
Physical abuse N (%)			0.892
Yes	317 (73.5%)	123 (74.2%)	
No	114 (26.5%)	43 (25.9%)	
Emotional abuse N (%)			0.451
Yes	322 (74.7%)	119 (71.7%)	
No	109 (25.3%)	47 (28.3%)	

* Pearson χ^2-test (significance level 0.05)
** ANOVA-test (significance level 0.05)

Table A2. Overview of variables.

Variables	Questions*	Response categories
Exposure variable		
Sexual abuse	"Have you been sexually abused (e.g. forced sexual performance or sexual harassment) – At some point in your life?"	0 = No 1 = Yes
Co-variates		
School education	"Which school education have you finished?"	0 = No school education 1 = Primary school education 2 = Secondary school education
Further education	"Which further education have you finished?"	0 = No further education 1 = Vocational education 2 = Higher education
Affiliation with labour market	"What has your labour market affiliation been for the past 3 years?"	0 = No affiliation with labour market 1 = Affiliation with labour market
Physical abuse	"Have you been physically abused (e.g. been hit or in other ways harmed physically) – At some point in your life?"	0 = No 1 = Yes
Emotional abuse	"Have you been emotionally abused (e.g. humiliation or psychological terror) – At some point in your life?"	0 = No 1 = Yes
Outcome variables		
Polysubstance abuse	Computed score based on alcohol abuse and hashish abuse. Smoking hashish more than once a week and having an alcohol problem is considered a polysubstance abuse.	0 = No polysubstance abuse 1 = Polysubstance abuse
Alcohol abuse	Calculated AUDIT score based on 10 questions about alcohol use. • Score 1–15 = No alcohol problem • Score ≥16 = Alcohol problem	0 = No alcohol problem 1 = Alcohol problem
Hashish abuse	"How often have you smoked hashish during the past year?"	0 = Less than once a week 1 = More than once a week

* Translated from Danish