Use of nicotine products and withdrawal support among the personnel of the Finnish Defence Forces

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Abstract

Introduction: While the health hazards of smoking are well-known, the harmful effects of smokeless tobacco (snus) and nicotine remain less familiar. This study investigates the prevalence and habits of tobacco use among Finnish Defence Forces (FDF) personnel, focusing on the use of snus and preferred withdrawal support.

Methods: An electronic questionnaire survey was conducted among FDF personnel in 2014 and 2020. The response rates were 18% in 2014 (n=2386) and 27% in 2020 (n=3373). The study examined demographic factors, smoking, snus and e-cigarette use, and preferences for withdrawal support.

Results: Daily smoking decreased significantly from 14% in 2014 to 6% in 2020, while daily snus use increased from 8% to 11%. E-cigarette use remained low (<1% in 2020). The highest prevalence of snus use was among military personnel working with conscripts. About a quarter of snus users (27%) used snus with a nicotine content of 11-20mg/g and 30% snus with a nicotine content of 21-30mg/g. Preferred withdrawal support included nicotine replacement therapy or medication provided by the employer. A significant number of both smokers and snus users did not receive advice to quit from healthcare professionals.

Conclusions: Tobacco use among FDF personnel shows a decrease in smoking but an increase in snus use. There is a need for targeted cessation support programs, with an emphasis on professional advice and employer-provided nicotine replacement therapy. Increased involvement of healthcare professionals in advising quitting could significantly enhance cessation rates.

Keywords: Smoking, Snus, Nicotine, Nicotine content, Tobacco Use, Cessation Support, Finnish Defence Forces, Prevalence, Withdrawal Support, Military

WHAT IS ALREADY KNOWN ON THIS TOPIC

- There are no previous studies on tobacco habits of the personnel in Finnish Defence Forces even though the military environment has historically been considered tobacco-friendly and the prevalence of tobacco use has been higher in the military environment compared to that in the general population.

WHAT THIS STUDY ADDS

- Prevalence of smoking decreased but use of snus increased during our study period.
- Prevalence of both smoking and snus use resembled that of general population but the prevalence of smoking decreased more compared to general population.
- Preferred withdrawal support included nicotine replacement therapy or medication provided by the employer.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- The role of employers o support quitting and increased involvement of healthcare professionals in advising quitting should be increased in practice to enhance cessation rates.

Introduction

Health hazards of smoking are well recognised. However, the harmful effects of Swedish type of smokeless tobacco (snus) and nicotine as such are less familiar. The bioavailability of nicotine and other harmful chemicals from snus is high as they are readily absorbed from the oral cavity. This exposes users to the development of nicotine addiction and increased morbidity.

The prevalence and habits of tobacco use are influenced by demographic, socioeconomic, educational, and cultural factors as well as current social trends. Smoking is more common among males and those with lower socioeconomic and educational background [1, 2]. Corresponding data regarding snus or e-cigarette use are limited.

The psychological component plays a key role in withdrawal from use of tobacco. Strong motivation and understanding of the mechanisms that evoke and maintain the dependence will increase the probability of quitting. For example, the craving to smoke is engendered by the expectation of the occurrence of smoking [3]. Therefore, behavioural interventions alone or in combination with pharmacotherapy are effective [4, 5].

It is highly recommendable that an individual withdrawal plan is made based on discussions on the willingness and readiness to quit using nicotine products, and on the level of nicotine dependence as it increases the probability to succeed and remain tobacco-free [6]. The process starts with building up a trusting and supporting environment. Discussions regarding the history of tobacco use and using habits, emotions connected to use and quitting, current life situation, and concurrent addictions are important. It is recommendable to perform a mini-intervention in healthcare[6, 7].

There are no previous studies investigating the tobacco habits among the personnel in the Finnish Defence Forces (FDF). It is difficult to compare tobacco use among the military personnel in other countries as the structure of the armed forces and conscription are different and there are cultural differences. However, the military environment has historically been considered tobacco-friendly [8, 9]. According to a small questionnaire survey in Sweden (n=52) among conscripts and specialist officers, 46% used tobacco, and of users 50% used snus and 33% smoked [10]. The use of tobacco products among the military personnel in the United States Armed Forces is high. In 2011 almost a half reported use of any nicotine

product. In 2018 almost 40% used tobacco in some form, which was two-fold compared to the prevalence of the general population. Approximately 13% used smokeless tobacco both in 2011 and 2018 [11, 12].

The aim of this study was to investigate the use of tobacco products and to assess the preferred withdrawal support among the FDF personnel. In addition, changes in the use of tobacco and nicotine products between the study years 2014 – 2020, and the strength of snus used, were investigated.

Material and methods

Study population

An electronic questionnaire study was conducted in years 2014 and 2020 among the personnel of the FDF as a part of the project ’Promotion of a tobacco free environment in the FDF’. The number of employees in the FDF was 13 513 in the year 2014 and 12 578 in the year 2020. Approximately 80% of the employees were males and of these 73% were working in a military position in 2020. A fifth of the employees were females, and of them 17% were working in a military position in 2020. In total, 39% and 34% in 2014 and 2020 respectively, worked in a civil position.

Data collection

The questionnaires of 2014 and 2021 included questions on age, gender, educational background, working position, smoking, use of snus and e-cigarettes and willingness to quit. The questionnaire of 2020 included an added question on the strength of snus used.

The personnel replied to the surveys anonymously using an electronic survey tool. To respond, an Internet link was available in the FDF intranet “Torni”, which directed the respondent to answer the survey. In both studies all the units were informed by the Deputy Chief of Staff of the FDF and one reminder was send. Additionally, a promotional banner was placed on the homepage of the FDF intranet.

Data variables

Age was used as a categorised variable. Gender was classified into male and female in the questionnaire of 2014 and into male, female and not specified in the questionnaire of 2020. The educational level was categorised as comprehensive school, vocational school, upper secondary school, postsecondary education (e.g., institute/university of applied sciences) and university education. Work assignment was divided into military and civil position. The questionnaire of 2020 included an additional category, healthcare professionals.

The history of tobacco, snus and e-cigarette use was classified into four categories: daily, occasional, former, or never. The 'never'-group was defined by the statement "I have never smoked/used snus/used e-cigarettes on a daily basis". The strength of snus was categorised in the 2020 questionnaire as follows: 1-10 mg/g, 11-20 mg/g, 21-30 mg/g, 31-40 mg/g, > 40 mg/g, or `I do not know´.

Preferred withdrawal support was categorised as follows: personal meetings with healthcare professional, nicotine replacement therapy (NRT) or medication offered by the employer, mobile support, group support, support from family or friends, and ´I do not need support´. In the 2020 questionnaire advice received to quit in the last 12 months was categorised as follows: by a doctor, healthcare professional, dentist, dental hygienist, pharmacist, employer, family, and none of the mentioned.

The Main focus of results was on the year 2020 findings, as this data provides more recent information, and the response rate was higher. Hence only data of the year 2020 are provided on most occasions.

Statistical methods

The Chi-Square Test or Fisher´s exact test of independence was used to assess if there is a relationship between two categorical variables.

To study the associations with quitting of smoking or snus use multinomial regression models were used with age, sex, education and occupation as explanatory variables. As our interest mostly lies in using and quitting, results of the models are shown only for using and quitting with using as a reference outcome. We used a relative risk ratio (RRR) as a risk measure in

the regression models. Calculations were done using Stata 18.0., StataCorp Lakeway Dr College Station, TX USA.

Results

A total of 2386 employees out of 13 513 (response rate 18%) and 3373 employees out of 12 520 (response rate 27%) answered the personnel survey in 2014 and in 2020, respectively. A majority of respondents were males, 74% (N=1,754) in 2014 and 76% (N=2,545) in 2020. Females accounted for 26% (N=630) in 2014 and 23% (N=761) in 2020, with 0.3% (N=9) and 2% (N=67) not specified.

The mean age of the respondents was 42.5 (SD ±11.8) years in 2014 and 42.1 (SD ±11.1) years in 2020. Approximately 20% worked in a military position with conscripts (22% in 2014 and 20% in 2020). The number of respondents working in civilian positions was 44% and 35%, respectively. Approximately 3% of the respondents in 2020 were healthcare professionals. 38% of respondents in 2014 and 49% in 2020 had a university degree. Of the year 2014 cohort 28% and of the year 2020 cohort 18% had other postsecondary education.

Prevalence of daily smoking, snus use, and e-cigarette use in years 2014 and 2020

The daily smoking prevalence decreased from 14% to 6 % from year 2014 to year 2020. The daily use of e-cigarettes decreased from 2% to <1 %. The amount of daily snus use increased from 8% to 11%. The non-overlapping confidence intervals in all categories give strong evidence of the difference between the study years. (Figure 1)

In the 2020 survey 6% (n=162) of males, 5% (n=40) of females and 9% (n=6) of subjects with not specified gender were daily smokers. The corresponding figures for snus use were 14% (n=349), 1% (n=10) and 16% (n=11). Among all respondents 0.5% (n=16) both smoked and used snus daily.

Prevalence of daily and former smokers, snus users and e-cigarette users by educational background

In year 2020, the prevalence of daily smoking was lowest among those with an university and an upper secondary education and highest among those with comprehensive or vocational school education. The lowest prevalence of snus use was among those with a postsecondary education and highest among those with an upper secondary education. The use of e-cigarettes was low regardless of educational background. (Supplementary figure 1)

Nearly a third of the 2020 cohort were former smokers. The highest rates of former smokers were observed among individuals with comprehensive (37%) and vocational (38%) education.

The amount of former snus users was similar, around 9-12%, in all educational groups. Four percent had quit e-cigarette use. The highest percentage of former e-cigarette users was among those with comprehensive education (12%). (Supplementary figure 2)

Prevalence of daily and occasional smoking, snus use and e-cigarette use by personnel group

A quarter (25.4%) of the military personnel working with conscripts and a tenth (11.6%) of the military personnel not working with conscripts used snus daily. Daily smoking was most common among civilian personnel (8.4%). E-cigarette use was rare in all groups. (Table 1**)**

Table 1. The prevalence of daily snus use, smoking and e-cigarette use according to the personnel groups in the Finnish Defence Forces in the survey of 2020.

	***Snus use N (%)**	****Smoking N (%)**	***** E-cigarettes N (%)**
Personnel group	***Daily***	***Daily***	***Daily***
Military personnel working with conscripts (N=670)	170 (25.4%)	40 (6.0%)	0 (=%)
Military personnel not working with conscripts (N=1429	166 (11.6%)	69 (4.8%)	11 (0.8%)
Civilian personnel (N=1164)	31 (2.7%)	96 (8.3%)	7 (0.6%)

Health care personnel (N=110)	3 (2.7)	3 (2.7%)	1 (0.9%)
TOTAL	***370 (11.0%)***	***208 (6.2%)***	***19 (0.6%)***

p-value *p < 0.001, **p < 0.001, ***p = 0.032

Predictive factors for quitting smoking and snus use

The multivariate analysis of the data of year 2020 showed that female gender, a higher educational level, a civil position, not working with conscripts in a military position and a previous history of quitting snus use were associated with quitting smoking. Female gender, an older age, a previous history of quitting of smoking, and a civil work position were associated with quitting snus use. (Table 2)

Table 2.

The multivariate analysis of the associative factors with quitting smoking and snus use.

Variable	**Quitting of smoking**			**Quitting of snus use**		
	RRR	95% CI	p-value	RRR	95% CI	p-value
Gender						
Female	1			1		
Male	0.56	0.41–0.77	<0.001	0.24	0.16–0.36	<0.001
Age *						
18–33	1			1		
34–42	0.46	0.33–0.63	<0.001	2.88	2.16–3.83	<0.001
43–50	0.70	0.49–1.0	0.052	4.57	3.28–6.36	<0.001
51–	0.67	0.46–0.97	0.034	8.20	5.45–12.35	<0.001
Current snus use/smoker	1			1		
Quitted snus use	3.08	2.29–4.16	<0.001			
Quitted smoking				3.28	2.43–4.44	<0.001
Never used snus	1.25	0.82–1.90	0.295			
Never smoked				0.81	0.59–1.11	0.184
Education						

Vocational school	1			1		
Comprehensive school	1.36	0.56–3.32	0.502	1.16	0.35–3.79	0.811
Other	1.60	0.70–3.62	0.266	1.52	0.52–4.41	0.441
Upper secondary school	2.28	1.56–3.33	<0.001	0.94	0.66–1.34	0.727
Postsecondary education	1.65	1.15–2.38	0.007	0.79	0.53–1.20	0.270
University education	3.10	2.32–4.14	<0.001	1.52	0.79–1.41	0.722
Work assignment						
Civil position	1			1		
Military, working with conscripts	0.94	0.69–1.40	0.906	0.22	0.15–0.32	<0.001
Military, not working with conscripts	1.39	1.12–2.0	0.006	0.26	0.18–0.37	<0.001
Health care	2.39	1.16–9.12	0.025	1.25	0.37–4.22	0.722

*Missing N=1

Amount of tobacco products used

According to the 2020 survey, daily snus users (n=370) used 12 (±SD 6.2) pouches daily, and one snus portion was kept 41 minutes (±SD 38.4) in the mouth. About 44% of daily and occasional users (N=234/535) kept snus in their mouth nearly the entirety of their waking hours. On average, participants had been using snus for 10 years. Daily smokers (n=172) smoked 14 (±SD 6.1) manufactured cigarettes daily. Average duration of smoking was almost 20 years.

Nicotine content of snus

About a quarter of daily or occasional snus users (27%, n=144) used snus with a nicotine content of 11-20mg/g and 30% (n=159) with a nicotine content of 21-30mg/g. A quarter 26% (n=138) did not know the nicotine content of the snus they used. (Figure 2)

Preferred withdrawal support

In year 2020, 30% of daily smokers and 51% of daily snus users did not express the need for any quitting support. The most preferred form of support was nicotine replacement therapy (NRT) or withdrawal medication provided by the employer among both smokers (61%) and snus users (41%). (Figure 3).

Received advice for quitting tobacco use

Almost half of both daily smokers and snus users had not received advice to quit from anyone. Of smokers 33%, and of snus users 37%, had received advice to quit from a family member. Received advice from health care professionals was rare. (Figure 4)

Discussion

We conducted a survey among the personnel of Finnish Defence Forces in year 2014, and another survey six years later in year 2020. Between the years, there was a notable decrease in smoking but an increase in snus use.

In the year 2014 smoking prevalence was very similar to the overall Finnish population [13]. In 2020 the prevalence had more than halved to 6%, which was significantly less than that of 12% among the general population [14] and was in line with the prevalence in Sweden and Norway, which were approximately 6% and 8%, respectively [15, 16].

Snus use increased moderately, from 8% to 11%. It is possible that the increase is partly explained by the shift from smoking to snus use. An analogous rise in snus use has been observed in the general Finnish population, with a pronounced rise among males under the age of 50. In 2020, 7% of Finnish males, aged 20-64 reported daily snus use and 12% of those of 20-34 years. [14]. A comparable rise in daily snus use was noted in Norway, where the overall prevalence was approximately 20% for males and 5% for females in the year 2020 [16, 17]. Sweden has a long history of snus use, which is reflected in the consistent usage statistics. In 2020, 16% of Swedes were daily users [15, 18, 19].

Our analysis suggest that demographic and occupational characteristics significantly influence the likelihood of quitting. Smoking prevalence and snus use was notably higher among military personnel who work closely with conscripts compared to other personnel in our study. Additionally, this group exhibited a lower likelihood of quitting smoking or snus use. The difference may be attributed to the younger age of soldiers working with conscripts and the influence of an environment involving frequent exercises, though further investigation is needed to confirm these factors. Given their influential role as leaders and role models for conscripts, it is crucial to address this issue to promote healthier behaviors

within the military community. Historically, the use of tobacco products has been more frequent in the military environment compared to the general population [20-22], although studies regarding the tobacco habits of the military personnel in the Nordic countries are scarce.

According to our survey, a majority of snus users preferred snus with a high nicotine content. This preference of snus nicotine content is similar to that used by Norwegians [17]. High nicotine content increases the risk for nicotine addiction. Finnish Current Care Guidelines for treating nicotine addiction recommend low-threshold services that recognise specific characteristics of the target group and their tobacco habits. [6].

To aid in developing withdrawal support strategies, we surveyed participants to understand their preferences. Daily smokers were more open to receiving support compared to snus users. Both groups preferred employer support for purchasing nicotine replacement therapy or medication for nicotine dependence. Surprisingly, only a few participants wanted personal support from healthcare professionals or participation in support groups. However, smokers in our study were more positive towards personal support from healthcare professionals and support groups than snus users, likely due to their greater awareness of smoking's health hazards. Snus users often perceive snus as less harmful, making them less likely to seek quitting support. In contrast, smokers are more aware of the health risks associated with smoking and are more likely to use cessation aids [23-25].

A striking finding was that only a fifth of smokers and a tenth of snus users had received advice to quit from a health care professional. Healthcare providers may prioritize other health issues, perceive snus as less harmful, lack adequate training or confidence, or face systemic barriers such as insufficient integration of cessation programs. Additionally, patient attitudes and cultural norms towards tobacco use can influence the likelihood of receiving cessation advice [26-28]. Research consistently indicates that the simplest intervention—merely asking patients about their tobacco use—can significantly impact quitting rates. Implementing a brief intervention, and if necessary, recommending nicotine replacement therapy (NRT) or medications, can dramatically increase the likelihood of cessation. These strategies should be more widely promoted and integrated into routine healthcare practice to support tobacco users in quitting [29, 30].

One interesting finding in our survey was that the decrease in smoking in FDF has been more pronounced than the general trend in the society. This can be due to active promotion of a nicotine-free environment within the FDF in general and the implementation of the project ’Promotion of a tobacco free environment in the FDF’. This project has been a multiprofessional action performed by the occupational health care of FDF, Filha (Finnish Lung Health Association) and various stakeholders in FDF, not to forget to mention the support from the top management of the FDF.

Strengths and limitations

This study is the first of its kind to comprehensively analyse tobacco and nicotine use among the personnel in the Finnish Defence Forces. Overall, this kind of information from other European countries is very limited, which increases the value of the data presented. Moreover, information regarding the quantity and nicotine content of snus has not been previously reported from Finland. Generally, data on this aspect is sparse across the Nordic countries.

Even though the number of respondents can be considered sufficient to provide reliable data for analyses, the response rates were not high. The gender distribution and the work position of the respondents in both cohorts was very similar to those of the employees of the FDF in general, which does not point towards a strong selection bias. Because of the lower response rate particularly in year 2014, we wanted to focus on the results of year 2020, providing also more recent data.

There has been a significant increase in the use of nicotine pouches in the last three years in Finland. However, this trend was not visible in 2020 when the last survey was conducted and therefore the use of nicotine pouches has not been reported here.

Conclusions

Despite the downward trend of smoking among military personnel it is vitally important that healthcare professionals ask about smoking and use of tobacco and nicotine products, give tailored advice to quit the use, and give their support to a person willing to quit.

Snus use is getting alarmingly common, but still the increase was moderate compared to the decrease in smoking prevalence. Snus containing a high amount of nicotine is preferred

among regular snus users. According to the responses very few snus users had received any advice to quit use, and hence there is room for improvement on this matter.

It is still possible to prevent further increase in the use of snus and e-cigarettes. This calls for proactive actions on all levels of healthcare. Continued efforts in FDF are still needed, and emphasis should be given to timely and easily accessible support services.

List of abbreviations

Confidence index (CI)

Finnish Defence Forces (FDF)

Nicotine replacement therapy (NRT)

Relative risk ratio (RRR)

Declarations

Ethical issues

The personnel survey was implemented as part of the project ’Promotion of a tobacco free environment in the FDF’. The survey was conducted anonymously, without forming a person register. The answering was voluntary. The FDF granted a permission to conduct the surveys. According to Finnish legislation, no permission from the ethics committee was needed.

Ethics approval and consent to participate

The survey was conducted anonymously, without forming a person register. The answering was voluntary. According to Finnish legislation, no permission from the ethics committee was needed. All data were processed according to the EU general data protection regulation (EU2016/679).

Consent for publication

All data was anonymised. This research does not include direct or indirect identifiers of the participants.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to unpublished material that will be used in future publications but is available from the corresponding author upon reasonable request.

Declaration of Competing Interest

All authors declare no financial or non-financial competing interests.

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Author´s Contributors

M Danielsson, A Lammi, P Sandström, S Siitonen, J Ollgren, L Pylkkänen, and T Vasankari participated in designing the study. The acquisition of data was conducted by M Danielsson, A Lammi, P Sandström, S Siitonen, L Pylkkänen and T Vasankari. The study was conducted by M Danielsson, T Vasankari, A Lammi, P Sandström and S Siitonen. The first draft was prepared by M Danielsson. All statistical analyses were done by M Danielsson and J Ollgren. M Danielsson, A Lammi, J Ollgren, L Pylkkänen, and T Vasankari contributed to the interpretation of data, reporting, writing, and editing of the manuscript. M Danielsson, A Lammi, P Sandström, S Siitonen, J-P Ruohola, J Ollgren, L Pylkkänen, and T Vasankari read and approved the final version of the manuscript.

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Figure 1. The change in the prevalence of daily smoking, daily use of snus and e-cigarettes among the personnel of Finnish Defence Forces in the years 2014 and 2020.

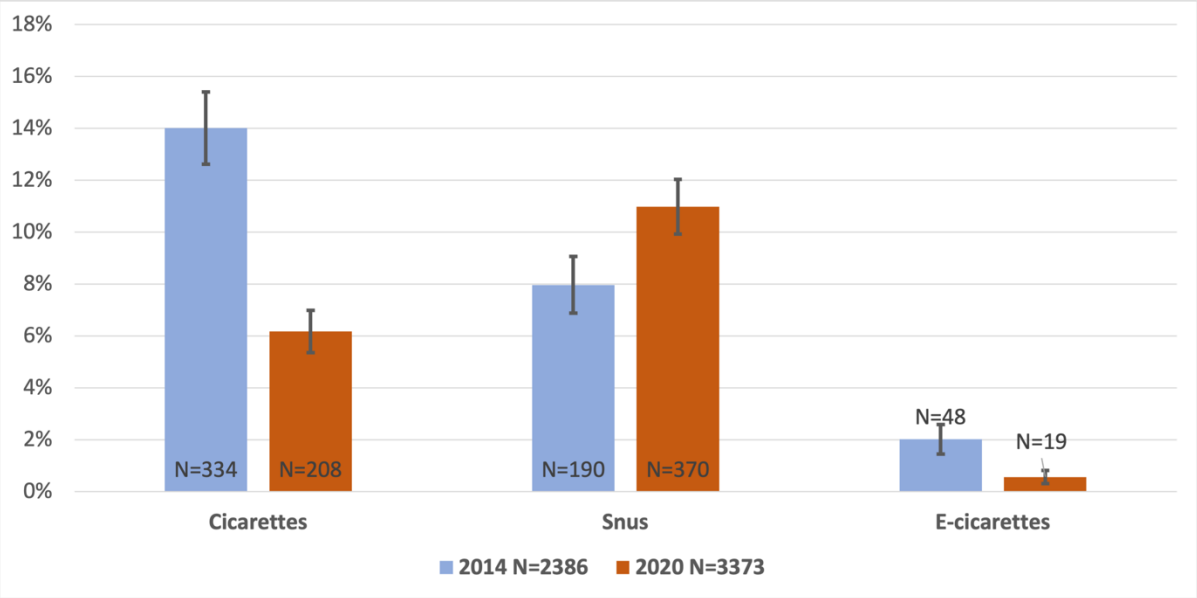


Figure 2. Strength of snus used by the personnel according to the survey of 2020 (N=397). Missing information for n=138.

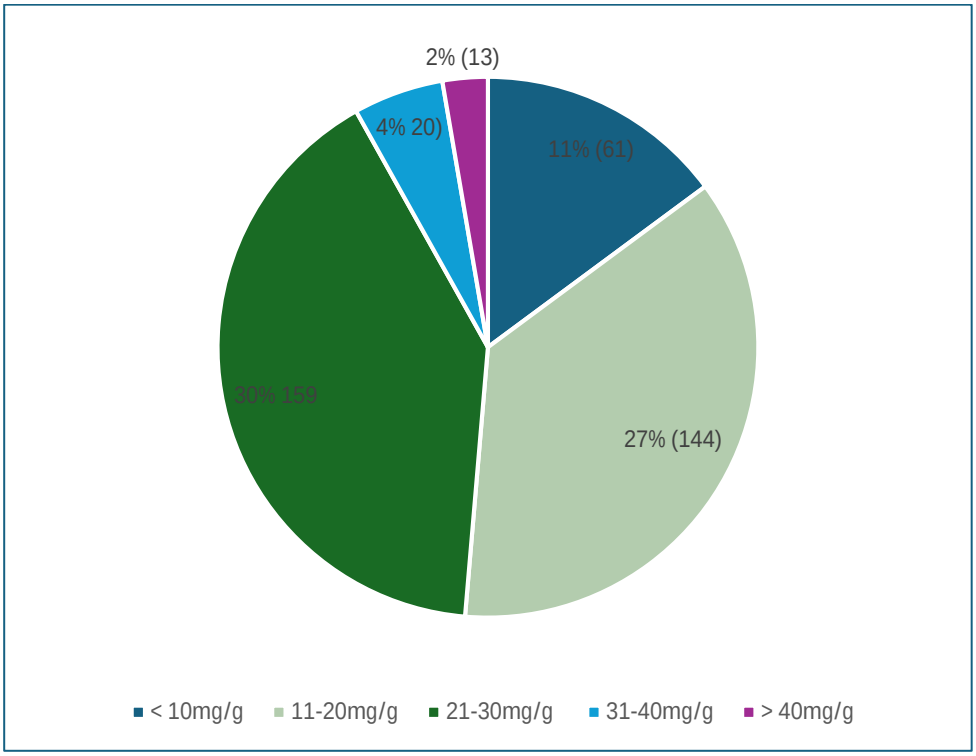


Figure 3. The preferred type of support among daily smokers and snus users, year 2020.

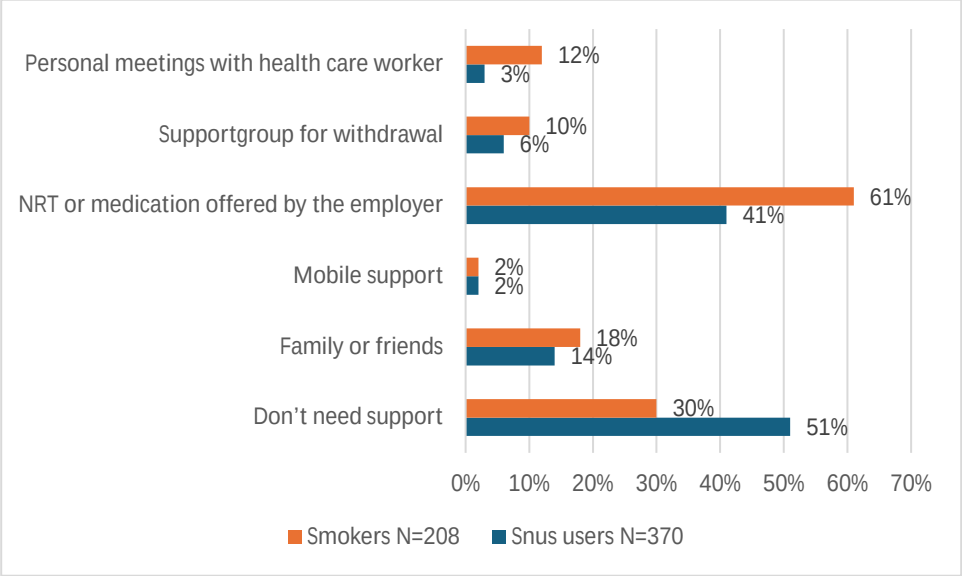
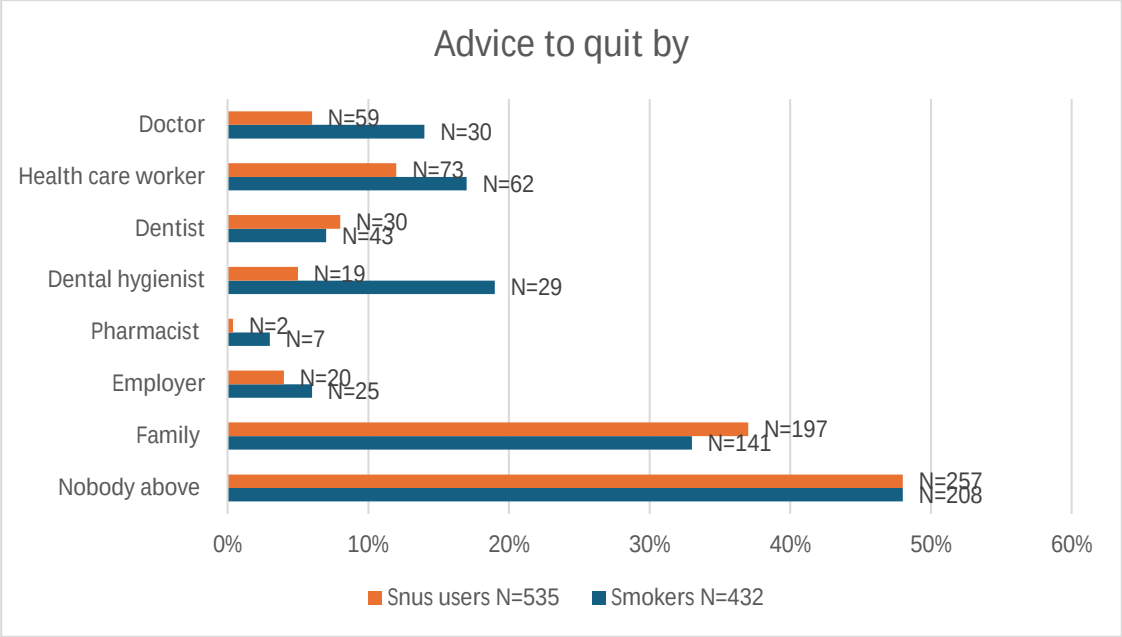
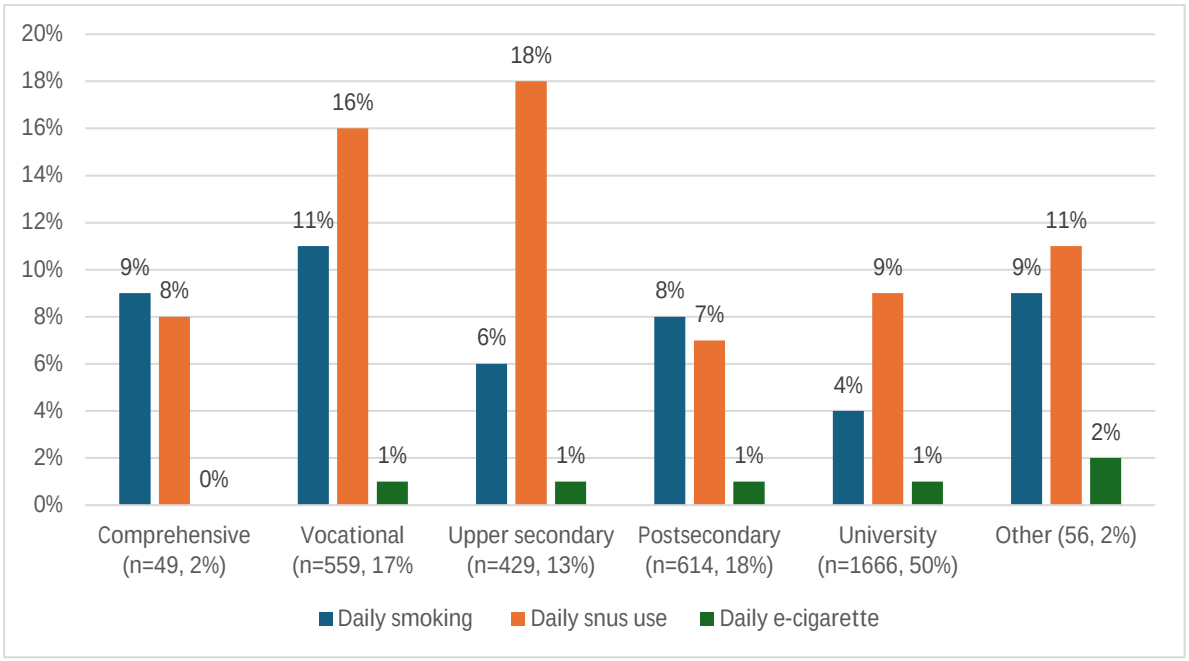


Figure 4. Received advice to quit use in the last 12 months reported by daily snus users and smokers.



Supplementary figure 1. The number of daily smokers, snus users and e-cigarette users by educational background among the personnel of Finnish Defence Forces in the year 2020 (n=3373).



Supplementary figure 2. The number of former smokers, snus users and e-cigarette users by educational background among the personnel of Finnish Defence Forces in the year 2020 (n=3373).