Research Paper

Public support for further regulating smoking, snus and e-cigarettes in Norway, and its associations with risk perceptions and tobacco use

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A B S T R A C T

Background: Public support is an indication of the legitimacy of governmental tobacco interventions. Little is known about what it is that shapes the support for various tobacco policy measures. We examine whether there are differences in public support for new measures against smoking, snus, and e-cigarettes in Norway, and whether public support is associated with user status and perceptions of the products' harm potential.

Data and methods: In December 2017, 4,002 people aged between 16 and 89 answered a web-based questionnaire. The sample was randomly drawn from Norstat's web panel, and pre-stratified by gender, age, region, and education in order to obtain an approximate country-representative sample. Respondents were asked to indicate their support for eight possible future measures to further restrict accessibility of tobacco (asked separately with regard to smoking tobacco, snus and e-cigarettes respectively), on a five-point scale from 1 = 'no support' to 5 = 'full support'. We utilized means and t-tests to address differences in support between measures. We then constructed sum scores to assess the total support for regulating each tobacco product and subjected these indexes to linear regression analyses, controlling for background variables.

Results: For six of the eight proposed measures, public opinion is less supportive of e-cigarette regulations than of similar regulations for snus and, especially, smoking tobacco. In all three regression models, significant associations with risk perception, user status and gender were maintained after multiple controls. The associations with risk perceptions were stronger for support of snus and e-cigarette regulation than for smoking tobacco.

Conclusion: Overall, these findings illustrate the key role of risk perceptions in forming public opinions regarding tobacco-preventive regulations and underline the importance of information to ensure that population risk perceptions are accurate.

Introduction

Tobacco sales and tobacco use are strongly regulated activities in contemporary society. Tobacco and nicotine markets are also increasingly complex, as new products have entered the nicotine market on an almost regular basis over the last decade (Staal, van de Nobelen, Havermans, & Talhout, 2018). Consequently, regulation of the markets has become more complex (Ashley et al., 2015). While most countries/jurisdictions have tended to employ existing restrictions on combustible tobacco on any new nicotine product, based on the precautionary principle (Institute for Global Tobacco Control, 2021a, 2021b), others, such as the UK, have sought to regulate and promote products based on the proportionality principle of their relative harms (Stimson, 2016). Regardless of the strategy employed, in order to have further regulations adopted, politicians and stakeholders who want an even stricter tobacco policy will also be dependent on support from the public. Public support for potential policy measures is an important indication of the extent to which government intervention has legitimacy in the population (Burstein, 2003). If the authorities implement measures with limited or low support, this may more readily result in non-compliance and enforcement problems. Furthermore, low support for population-level intervention might give greater legitimacy to legal countermoves by the tobacco industry.

Public support for regulating the sale and use of tobacco has tended to increase over time (Blendon & Young, 1998; Braverman, Ceraso, Sporrer, & Rockler, 2021; Siahpush & Scollo, 2001). Such trends have also coincided with a decline in smoking prevalence (Pacheco, 2011). Tobacco policy measures that achieve the highest support are often the least interventionist measures and those aimed at children and adolescents (Sæbø & Lund, 2019). Measures already introduced also tend to achieve great support (Diepeveen, Ling, Suhrcke, Roland, & Marteu, 2013).

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What can explain differences in public support for various tobacco policy measures? Conditions often linked to support for tobacco policy measures are gender (higher support among women), age (higher support among older people) and education (higher support among long-educated people) (Doucet, Velicer, & Laforge, 2006). However, the most distinguishing variable is user status, as people who smoke often express significantly more resistance to regulation than those who have never smoked and former tobacco users (European Commission, 2017; Lund, 2011, 2016). Attitudes towards new preventive measures - not only against smoking, but against snus use and vaping too - may also be related to the perceived danger of the product (Mello, Bigman, Sanders-Jackson, & Tan, 2016; Czoli, Fong, Mays, & Hammond, 2017). Tobacco and nicotine products can be ranked on a continuum of risk to health from use (Nutt et al., 2014), and perceived risks may vary accordingly. However, risk perceptions have seldom been studied as predictors in previous research of tobacco policy support (but see Chen, Ho, Leung, Wang, & Lam, 2019).

The Norwegian tobacco market is internationally unique, in that both snus and e-cigarettes are available to nicotine-addicted people who smoke, as possible harm-reducing alternatives. While smoking in Norway has been denormalised and stigmatised (Sæbø, 2017; Sæbø & Lund, 2020), with smoking prevalence dropping from 42% in 2000 to 17% in 2020 (Statistics Norway, 2021b), snus use has increased from 7% to 17% in the same period (Norwegian Institute of Public Health, 2021d). E-cigarette use, on the other hand, being only partially legal (nicotine liquid sales are prohibited, but import for own use is legal), has hitherto been low and may perhaps best be classified as a marginal behavior, with a combined prevalence in 2016–2020 of 3% in the adult population (Norwegian Institute of Public Health, 2021c). (This may change as e-cigarettes will be legalised after implementation of the Tobacco Products Directive next year). Risk perceptions of these various tobacco products vary, and misconceptions exist, especially regarding the relative risk between Swedish snus and combustible cigarettes (Lund & Scheffels, 2014; Lund & Vedøy, 2019) and e-cigarettes and combustible cigarettes (Norwegian Institute of Public Health, 2021a, 2021b). The Norwegian population perceives a degree of harm from using snus that corresponds to 79% of the degree of harm from smoking tobacco cigarettes, the degree of harm from using e-cigarettes being 68% (Norwegian Institute of Public Health, 2021b). Little is known about the associations between various tobacco behaviors, risk perceptions of different products and public support for tobacco control measures for different products.

In this article, we will examine if differences in support for similar measures against smoking, snus and e-cigarettes exist, and investigate if such differences are associated with perceptions of the risk of these three forms of tobacco use, tobacco use status and socio-demographic background variables.

Data and methods

Data

The data collection was conducted by the commercial pollster Norstat between 8 November and 18 December 2017. The respondents were recruited from Norstat's nationally representative web panel of 81,000 participants. This panel is not based on self-recruitment. About 80% of the panellists are recruited by phone invitation, and the remaining 20% through other web surveys and Facebook.

The final sample was randomly drawn from the web panel and consists of 4002 people between the ages of 16 and 89 who answered the entire questionnaire. A pre-stratification by gender, age, region and education was undertaken to obtain an approximately nationally representative sample. The stratification was monitored and new questionnaires were sent out daily by stratum during the collection period, so that all strata in the sample were followed up.

Informed consent was obtained from all participants in the study, and the study was approved by the Data Protection Officer at the Norwegian Institute of Public Health.

Measures

In the survey, support for a number of potential tobacco prevention measures was assessed, using the following question: "Several new measures may be relevant for reducing tobacco harms in society. What view would you take if the authorities were to propose these measures on smoking [snus use] [e-cigarette use]?" Support for eight sales/purchase restrictive measures was assessed separately for smoking tobacco products, snus, and e-cigarettes, respectively. These measures were:

- Prohibit purchase over the internet
- Raise minimum age for purchase to 20 years
- Prohibit flavours
- Mandatory plain packaging
- Increase the excise duty on tobacco (for e-cigarettes: introduce special duty)
- Total sales ban in 10 years
- Provide the pharmacies with exclusive sales rights
- Provide the State Wine and Liquor Monopoly with exclusive sales rights

For each possible measure, responses were provided on a five-point scale, from no support (= 1) to full support (= 5).

Risk perceptions in terms of expressed *absolute* harm potential for different use patterns of different products were measured using the following formulation: "How much danger do you think there is of health damage due to contact with tobacco in the following ways? Daily smoking, daily use of snus, daily use of e-cigarettes with nicotine." Response options for all user patterns were 'very high danger', 'quite high danger', 'little danger', 'no danger', and 'do not know'.

Tobacco use was measured as follows: "What are your current smoking habits?" (smoke daily, smoke occasionally, smoked previously, never smoked). Snus: "Do you use snus?" (Yes, daily; Yes, sometimes; No, never). E-cigarettes: "Have you tried e-cigarettes?" (No, Yes). If so, do you use e-cigarettes 'regularly, i.e. weekly, or more often', 'occasionally but less frequently than every week', 'have only tried them once or a few times'. In the successive analysis, regular and occasional use of e-cigarettes were combined into current use of e-cigarettes.

Socio-demographic background variables were gender (male vs female), continuous age (16–89 years), and education level (primary/secondary versus university).

Statistical analysis

Univariate analysis of means was applied to investigate the level of support and to compare the differences in support between measures, using t-tests to detect significant associations.

Exploratory factor analysis of 24 public support measures (8 measures x 3 tobacco products) identified three underlying factors, which did not correspond to differences between products. It was thus decided to establish one measure for each product, based on a sum score for each respondent's individual scores. As there were two (quite similar) items tapping the licensing dimension, while there was only one item addressing general sales limitations (prohibit internet sales), one addressing prevention among kids (age limits), one addressing product regulation (flavor), one addressing design regulation, one addressing economic regulation (increasing taxation) as well as one of a total sales ban, we decided to create a subscale for the two licensing items. We thus used seven items for each tobacco product, with sum scores ranging from 7 to 35. Cronbach's alpha was 0.89 (for the smoking measures) 0.91 (for the snus measures) and 0.93 (for the e-cigarette measures). This suggests that the reliability of the indexes is high, so that sum scores may be created for further analyses.

Table 1
Descriptive statistics. Percentages (*N* = 4002).

Absolute risk perception – daily smoking	
no danger	0,5%
little danger	3,7%
quite high danger	25,8%
very high danger	67,7%
don't know	2,3%
Absolute risk perception – daily snus use	
no danger	2,9%
little danger	23,4%
quite high danger	43,9%
very high danger	25,4%
don't know	4,5%
Absolute risk perception – daily e-cig with nicotine use	
no danger	4,0%
little danger	30,5%
quite high danger	37,8%
very high danger	13,5%
don't know	14,2%
Smoking	
never smoked	47,6%
smoked previously	31,9%
smoke occasionally	10,4%
smoke daily	10,1%
Snus use	
no snus use	85,2%
occasional snus use	5,7%
daily snus use	9,1%
E-cigarette use	
never tried	80,3%
tried once/few times	15,8%
use occasionally	1,9%
use daily	2,0%
Gender	
male	50,6%
female	49,4%
Age	
16–89 (continuous)	x̄ = 45,7 (SD = 18,3)
Education	
primary	26,5%
secondary	40,6%
university	32,9%

Linear regression was utilized to control for background variables. Those who answered 'do not know' on the risk perception measures were excluded from the regression analysis. Including them in the analysis did not alter the results significantly. (Nor did a sensitivity test using life-time use rather than current use as a cut-off for e-cigarette use yield other significant results). We also checked whether the statistical correlations between the independent variables would entail a multicollinearity problem. This was not the case, as none of the correlations were anywhere near the border score of *r* = 0.60.

Results

Descriptive statistics of the sample

Risk perceptions, measured as the expressed absolute harm potential of daily use of different products, are shown in Table 1. There was an almost uniform perception in the sample that daily cigarette smoking is associated with danger (93.5%), either 'very high' (67.7%) or 'quite high' (25.8%). Regarding snus, 69.3% believed that daily use of snus is associated with 'very high' (25.4%) or 'quite high' (43.9%) danger. About one in two respondents believed that daily vaping of e-cigarettes is associated with 'very high' (13.5%) or 'quite high' (37.8%) danger.

Note that far more people checked that they 'do not know' in respect of e-cigarettes compared to snus and cigarettes.

The tobacco use measures show that 20.5% of the respondents currently smoked cigarettes: 10.1% on a daily basis and 10.4% occasionally. Comparable national statistics from 2017 are 8% and 11%, respectively (Statistics Norway, 2021b). 14.8% used snus: 9.1% on a daily basis and 5.7% occasionally. Comparable national statistics are 11,3% and 4,1% (Norwegian Institute of Public Health, 2021d). 3.9% used e-cigarettes: 2.0% on a regular basis and 1.9% occasionally. Comparable national statistics are 2,3% and 0,9% (Norwegian Institute of Public Health, 2021c). "Ever use" of e-cigarettes in the sample was 19.7%.

The sample was evenly distributed as far as gender is concerned, and the mean age was 45,1 (SD = 18,3). Reflecting national statistics closely, there were 26,5% respondents with primary education, 40,6% with secondary education and 32,9% with higher education (Statistics Norway, 2021a).

Support for similar measures against cigarettes, snus, and e-cigarettes

Table 2 shows that, for six of the eight proposed measures, public opinion was gradually less supportive of further regulation when moving from cigarettes to snus, and then from snus to e-cigarettes. The differences are small, but statistically significant. The exceptions are the proposals to grant exclusive sales rights to the pharmacies or the State Wine and Liquor Monopoly. Sales through the latter were supported to approximately the same extent for cigarettes, snus, and e-cigarettes, while the proposal for sales through pharmacies had more support for e-cigarettes than for cigarettes and snus.

In general, the overall support for prohibiting purchases over the internet, raising the age limit to 20 years, prohibiting flavourings and introducing mandatory plain packaging was moderately strong, with means varying from 3.12 to 3.67 on the 1–5 scale for all three product types. Support for a total sales ban and for licensing arrangements were weaker, with means varying from 2.13 to 2.81.

Support for further tobacco policy measures: regression analyses with multiple controls

Table 3 shows the results from three models of linear regression: one in which support for further measures against smoking tobacco is the dependent variable (a sum score for seven proposed measures, ranging from 7 to 35), one for further measures against snus, and finally one for further measures against e-cigarettes.

Concerning socio-demographics and tobacco use, the findings are almost similar for all three types of tobacco products. Females expressed higher support for further measures than males, and those with higher education supported further measures against sales more than did those with primary or secondary education. No significant associations between age and support of further regulation of tobacco were found. Furthermore, any use of tobacco was significantly associated with lower support in all three models: the greater the intensity of use of smoking tobacco and snus, the lower the support.

Risk perceptions were significantly associated with support for tobacco policy measures - the more dangerous smoking tobacco, snus and e-cigarettes were perceived to be, the higher the support for further regulation of these products. However, the effects of risk perceptions were stronger for snus (beta = 0.19) and e-cigarettes (beta = 0.18) than for smoking tobacco (beta = 0.10).

Discussion

The results from this study have shown statistically significant differences in support for preventive measures aimed at curbing the use of cigarettes, snus, and e-cigarettes, with prohibition of internet sales receiving the largest support across all three tobacco types and providing

Table 2
Public support of further measures for restricting sales of/access to smoking tobacco, snus and e-cigarettes. Means (SD) on a scale from 1 to 5. N = 4002.

	Smoking tobacco[a]	Snus[b]	E-cigarettes[c]	Sig (t-test)
Prohibit purchases over the internet	3.67 (1,57)	3,44 (1,68)	3,27 (1,66)	ab:*** ac:*** bc:***
Raise age limit for purchases up to 20 years	3,51 (1,59)	3,37 (1,66)	3,13 (1,65)	ab:*** ac:*** bc:***
Prohibition of flavourings	3,48 (1,56)	3,4 (1,64)	3,2 (1,65)	ab:*** ac:*** bc:***
Mandatory plain packaging	3,33 (1,59)	3,17 (1,66)	3,12 (1,63)	ab:*** ac:*** bc:**
Increase the excise duty on tobacco (for e-cigarettes: introduce special duty)	3,13 (1,65)	3,09 (1,68)	2,8 (1,60)	ab:** ac:*** bc:***
Total sales ban in 10 years	2,81 (1,61)	2,76 (1,63)	2,72 (1,58)	ab:** ac:*** bc:*
Provide the pharmacies with exclusive sales rights	2,24 (1,51)	2,23 (1,52)	2,38 (1,56)	ab:n.s. ac:*** bc:***
Provide the State Wine and Liquor Monopoly with exclusive sales rights	2,13 (1,47)	2,15 (1,49)	2,14 (1,47)	ab:n.s. ac:n.s. bc:n.s.

the State Wine and Liquor Monopoly with exclusive sales rights receiving the lowest support. Across all three products, perceptions of high danger were systematically associated with more support for preventive measures, while current tobacco use (especially daily use) was associated with less support.

Preventive measures, such as restrictions on the sale of and places to consume tobacco, are important tools to help reduce the prevalence of tobacco use in the population and to hinder recruitment of tobacco users in younger age groups. However, to reduce enforcement problems, it is important that these measures are viewed as reasonable by the population, and to identify the underlying reasons for any lack of support. The current results clearly point at risk perceptions as a significant factor behind public support of tobacco-preventive measures. Firstly, the population levels of support for restrictive measures seem to be in accordance with the average levels of perceived risk for each type of tobacco and nicotine product. Thus, in the current sample, both average risk perception and support for restrictions were higher for smoking tobacco regulations, somewhat lower for regulations concerning snus, and lowest for e-cigarette measures.

Secondly, differences in risk perception between people seem to translate into differences in the individual levels of support. In the current sample, the effect of this was stronger for e-cigarettes and snus than for cigarettes, probably reflecting a larger variability in perceptions for the first two products than for the last. As shown both here and in other studies (Norwegian Institute of Public Health, 2021b), there is an almost uniform perception in the Norwegian population that daily cigarette smoking is associated with considerable danger to health. This is a perception that harmonizes well with medical consensus about the harms to health from smoking (U.S. Department of Health and Human Services, 2014).

However, for snus and e-cigarettes, there is less agreement between popular risk perceptions and scientific findings. Our findings that almost seven in ten believed that daily snus use was associated with quite high or high danger, while 1 in 2 thought daily e-cigarette use was as harmful as snus use, suggest that the substantially lower risk profiles of these products (Royal College of Physicians, 2007; Scientific Committee on Emerging and Newly Identified Health Risks, 2008; Nutt et al., 2014; McNeil et al., 2015; National Academies of Sciences, Engineering & Medicine, 2018) have not become universally known. This also

indicates that the Norwegian population (including those who smoke) hold many of the same misconceptions about snus as they did 10 years ago (Lund & Scheffels, 2014; Lund & Vedøy 2019; Norwegian Institute of Public Health, 2021b). In addition, it is worth noting that far more people checked that they were unsure or did not know about the harms of e-cigarettes compared to snus and cigarettes. It is likely that this reflects the e-cigarettes' shorter time span on the market (compared to cigarettes and snus), as well as many contradictory messages in media outlets about potential adverse effects (Kwon & Park, 2020; Rooke & Amos, 2014; Saw, Morphett, Puljevic, Bromberg, & Gartner, 2019; Wackowski et al., 2020).

In line with earlier studies (Dixon, Lowery, Levy & Ferraro, 1991; European Commission, 2017; Lund, 2016; Chen, Ho, Leung, Wam, & Lam, 2019; Sæbø & Lund, 2019), this study found personal tobacco use to be associated with lower support for stricter restrictions. This extended beyond restrictions on the "own" product, such that a smoker would also tend to be less supportive of restrictions on snus and e-cigarettes. It is interesting in this respect to note that users of the less harmful alternatives of snus and e-cigarettes would also tend to be less supportive of restrictions aimed at preventing use of the more harmful cigarettes. This might reflect a large occurrence of dual use, or that many snus and e-cigarette users have smoked previously (Lund & Sæbø, 2022). However, it might also be that, given the widespread belief that the harms from these products are almost identical, attitudes to restrictions will be the same for all products. Influential entities in the tobacco control community and in health governance (such as the WHO, medical associations and NGOs) strongly communicate that *any* tobacco use is unacceptable and that the promotion of harm-reduction products may increase the prevalence of nicotine addiction in the population and perhaps even lead to a renormalisation of smoking (cf. the position of Scientific Committee on Health, Environmental and Emerging Risks, 2021). These arguments may be interpreted as all nicotine products being addictive, but also misunderstood to mean that all nicotine products are equally harmful. Such views may disseminate among the population as well.

Norway (along with Sweden and partially USA) is in a unique situation internationally, in that Swedish snus is allowed on the tobacco market alongside smoking tobacco and e-cigarettes. This market situation enables empirical comparison of risk perceptions of both smoking,

Table 3

Public support of further measures for restricting sales of/access to smoking tobacco, snus and e-cigarettes. Unadjusted and adjusted* beta-coefficients, linear regression.

	Smoking tobacco		Snus		E-cigarettes	
	Unadj	Adj	Unadj	Adj	Unadj	Adj
Absolute risk perceptions:						
Daily smoking						
-little or no danger	ref	ref	-	-	-	-
-very or quite high danger	.17***	.10***				
Daily snus use						
-little or no danger	-	-	ref	ref	-	-
-very or quite high danger			.33***	.19***		
Daily e-cig (w/nicotine) use						
-little or no danger	-	-	-	-	ref	ref
-very or quite high danger					.31***	.18***
Tobacco use:						
Smoking						
-never smoked	ref	ref	ref	ref	ref	ref
-smoked previously	−0.19***	−0.14***	−0.19***	−0.13***	−0.18***	−0.13***
-smoke occasionally	−0.30***	−0.20***	−0.30***	−0.20***	−0.30***	−0.20***
-smoke daily	−0.40***	−0.33***	−0.40***	−0.33***	−0.40***	−0.32***
Snus use						
-no snus use	ref	ref	ref	ref	ref	ref
-occasional snus use	−0.13***	−0.06***	−0.13***	−0.04**	−0.13***	−0.05***
-daily snus use	−0.27***	−0.21***	−0.28***	−0.16***	−0.27***	−0.18***
E-cigarette use						
-never tried	ref	ref	ref	ref	ref	ref
-tried once or a few times	−0.26***	−0.08***	−0.26***	−0.07***	−0.27***	−0.08***
-occasional or regular use	−0.20***	−0.08***	−0.20***	−0.06***	−0.21***	−0.08***
Socio-demographics:						
Gender						
-male	ref	ref	ref	ref	ref	ref
-female	.12***	.07***	.12***	.05**	.12***	.06***
Age (cont.)	.01	.00	.01	.00	.02	.02
Education						
-primary or secondary	ref	ref	ref	ref	ref	ref
-university	.12***	.06***	.12***	.06***	.12***	.05**
r2		.28		.31		.30
N	(3911–4002)	(3911)	(3822-4002)	(3822)	(3435–4002)	(3435)

*Adjusted for all other variables in the model.

snus and e-cigarettes and their associations with support of possible new regulations of tobacco. While a previous study of Hong Kong adolescents found that harm perceptions of smoking tobacco predicted public support of future smoking regulations only among non-smoking youth (Chen et al., 2019), the findings of our study suggest that harm perceptions contribute to explain public support also at a population level and across all three types of tobacco products. As Norway scores high on the tobacco scale (Joossens, Feliu & Fernandez, 2019), the findings of our study should be of relevance to countries lower on the scale currently aiming to regulate new nicotine products, some of which may have a less risk of harm than regular cigarettes (such as e-cigarettes). In Europe, the Tobacco Products Directive goes a long way towards framing this regulation, but member states do still have freedom to manoeuvere at the national level in the implementation process. Anyway, the association between risk perception and the support of measures underlines the importance of informing the population about product risk, also on the basis that public support of tobacco control policies as far possible

should be founded on rationality and evidence. Accurate, unambiguous, and accessible information about risks and relative risks might lead to reduced individual variability in risk perceptions and provide better legitimacy for enforcing stricter regulations of more harmful products in the future. Supplying trustworthy evidence-based information to the population is important, particularly in the contemporary environment of information overload, and easy access to information from more unreliable sources. A risk of undercommunicating risk differences is loss of trust, and increased use of other, less authoritative sources of information.

Limitations

There are some limitations to this study.

Possible leading wording: The research design, with respondents being repeatedly asked to consider agreement with several quite similar-sounding questions about various possible measures, may cause

respondents to tick the same answers through inertia. If so, this may underestimate varieties in perceptions and boost similarities in response patterns.

Sample representativeness: As the respondents are drawn from a web panel, the sample may to some extent be characterized by lower initial eligibility of people with low digital competency or data access and/or people in difficult life situations. However, the top-up sampling procedure of education level ensured that the sample is in fact representative even for education, an often-tricky variable when it comes to the representativity of samples in social science research.

Conclusion

Overall, these findings illustrate a need for more information and campaigns to raise the awareness of the adverse effects of various tobacco products. The authorities should be careful not to base future polices on the support of misinformed public opinion.

Funding

Ethics approval

The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

Declarations of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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