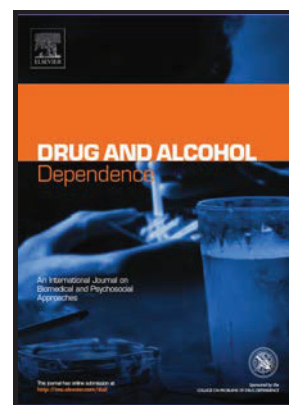


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Awareness, use and perceptions of cigarillos, heated tobacco products and nicotine pouches: a survey among Dutch adolescents and adults

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ABSTRACT

Objectives: Many tobacco and related products (TRPs) are less strictly regulated and marketed as less harmful than cigarettes. Little is known about their awareness, use, user profile, use behavior, reasons for use and risk perception, especially for the newest products. In an

exploratory survey study among Dutch adolescents and adults, we have investigated three examples of non-cigarette TRPs available on the worldwide market.

Methods: In a two-step web-based design, data on cigarillos, heated tobacco products (HTPs) and nicotine pouches were collected. In the first step (N=5805), a representative sample (≥ 13 years) was studied to quantify their awareness, ever and current use in the Dutch population. In the second step (N=526), in-depth data regarding use behavior, reasons for use and risk perception were collected among users and non-users.

Results: Awareness ($< 50\%$) and use ($< 15\%$ ever use and $< 2\%$ current use) is relatively low for all three products, but overall higher among men, (e-)cigarette users and respondents with higher education and social economic status. Most participants became aware of the products through people they knew. Reasons for use were mainly curiosity, pleasant taste, flavour variety, and lower harmfulness. All products were perceived as (slightly) less harmful and addictive than cigarettes.

Conclusions: This study is one of the first to investigate awareness and use of cigarillos, HTPs and nicotine pouches. To prevent increased use, we recommend regulators to extend flavour and smoking bans to these products. In addition, public information may discourage use by increasing awareness of health risks.

KEY WORDS

New tobacco products, survey research, tobacco control, consumer perceptions, product appeal

1. INTRODUCTION

While cigarettes are still the most often used tobacco product globally, they have become more strictly regulated in recent years in comparison to other tobacco and related products (TRPs). For example, characterizing flavours other than tobacco have been banned in cigarettes, but not in

(most) other TRPs in Europe and the US. Other aspects that are less regulated in TRPs other than cigarettes include warnings, (plain) packaging, package size, and excise tax. For example, little cigars and cigarillos, sometimes equipped with a filter, resemble cigarettes in size and shape, and can contain candy or fruit flavours that appeal to adolescents and young adults (Villanti et al., 2013). In addition to characterizing flavours, they have lower taxation and fewer units per package, which makes them affordable and appealing (Kong et al., 2020). Nicotine pouches (tobacco-free “snus”), a more recent TRP available in various flavours, sizes and nicotine strengths (Plurphanswat et al., 2020; Robichaud et al., 2019), are currently not covered by tobacco laws in any country. It is concerning that such new products are not yet duly regulated, as they may lead to new nicotine-addicted users. Altogether, differences in product regulation may increase the appeal of other TRPs and contribute to increased use of these products relative to cigarettes.

Another important factor in the appeal of non-cigarette TRP is that many of them are considered to have less severe risks than cigarettes, and are often marketed as such. For example, heated tobacco products (HTPs) are increasingly marketed as a less harmful alternative to smoking combustible products (Caputi, 2016; A. Ratajczak et al., 2020) and perceptions of reduced harm are reported as reasons for using nicotine pouches (Plurphanswat et al., 2020). Overall, cigarillos, HTP and nicotine pouches may all be attractive as an alternative to cigarette smoking, due to less restricted regulations and/or reduced harm perceptions.

These differences in appeal and (perceived) harmfulness between TRP affect their potential impact on public health and are important for regulators to consider when designing policy. As

TRPs other than cigarettes are on the rise as potential alternatives to smoking, and the tobacco landscape continues to change, it is important to understand use prevalence and attitudes toward different types of TRPs, including those with differing health risk profiles. E-cigarettes are now widely known and their use and risk profile have been subject of many studies. However, for cigarillos, HTPs and especially nicotine pouches much less data on use and user profiles are available.

For example, little is known about the prevalence of cigarillo use in Europe. In 2017, EU-wide prevalence of ever cigarillo use was 6.35% and of at least weekly cigarillo use 0.46% (Filippidis et al., 2019). Regarding HTP use, a recent survey among 11 EU countries found that 27.8% of the participants were aware of HTPs, 1.8% were ever users, and 0.1% were current users (Gallus et al., 2021). One recent European report provides detailed data on patterns of use and consumer perceptions regarding cigarillos, HTPs and a few other TRPs (Lupiáñez-Villanueva F., 2020). It indicates that while both cigarillo and HTP users often started out of enjoyment and social reasons, HTP use was most frequently initiated in order to quit or reduce consumption of another TRP. For nicotine pouches, there is currently no published data on prevalence or consumer attitudes.

In the Netherlands, HTP's have been introduced in 2017 and nicotine pouches have rapidly spread on the market since 2020, whereas cigarillos have been on the market for years. However, strong concerns exist that this product category gained a new position within the TRP spectrum, possibly leading to new user groups.

Overall, limited data on prevalence and user perceptions of these products may be a barrier to enacting appropriate regulations to protect public health. Thus, more data regarding the

prevalence of awareness and use, user profile (e.g. age, gender, education and smoking status), and reasons for using or not using these products are needed to better understand the risks they pose at population level and inform policy making. A regulatory priority is protecting the most vulnerable group in the population, i.e. young never users, from becoming addicted to nicotine. Therefore, it is especially relevant to know whether these products are used among and attractive to adolescents. In an exploratory survey study among a representative sample of the Dutch population (≥ 13 years), we investigated the similarities and differences between cigarillos, HTP and nicotine pouches regarding the following research questions:

- 1) What is the prevalence of awareness, ever use, and current use of these products?
- 2) What are characteristics of users and non-users who are aware of these products?
- 3) What is the use behavior of current users in terms of frequency and circumstances of use?
- 4) What are reasons for (not) using these products?
- 5) What are the perceived risk and addictive potential of these products among users and non-users (who are aware of the product) as compared to cigarettes?

The outcomes of this study may inform policy making and risk communication about these specific TRPs and TRPs in general.

2. METHODS

2.1. Design

We used a two-step web-based survey, which was disseminated by research agency Kantar Public. The first step was to collect data on awareness and use of cigarillos, HTPs and nicotine

pouches among a representative sample of the Dutch population. In the second step, more in-depth data regarding use behavior, reasons for (non) use and risk perception were collected among users and people with awareness of these TRPs. The research protocol was approved by the Ethics Review Committee Health, Medicine and Life Sciences (FHML-REC) of Maastricht University in the Netherlands (FHML-REC/2020/087). Before the start of the survey, informed consent was obtained online from each study participant. Children under the age of 16 were approached via and with permission of their parents or legal guardian, who were instructed to let their child fill out the survey independently to obtain reliable answers.

2.2. Step 1

2.2.1. Participants and procedure

Participants (n = 5805) were recruited from an online panel managed by Kantar Public, to form a representative sample of the Dutch population (≥ 13 years) with respect to their demographic characteristics (e.g. gender, age, education level, socio-economic status), and were all included in step 1 of the study. Demographic characteristics were obtained from Kantar Public. The fieldwork took place from 30 September until 11 October 2020.

2.2.2. Survey

First, participants were presented the name and a typical image of one of the TRPs (figure 1). Then, awareness and ever use were investigated with the following questions: (1) *Were you already aware of X before this study, that is, have you ever seen, heard about or read about X?*’, participants who answered yes to this question were asked (2) *Have you ever used an X?*’. Further, several questions were provided to investigate cigarette use behavior and current use of other TRPs. Completion took 2.35 (± 1.66) minutes time on average.

2.3. Step 2

2.3.1. Participants and procedure

Kantar Public selected suitable respondents (ever users and never users with awareness of at least one product) from the sample of step 1 and an additional recruitment round among their panel to obtain a sufficient number of respondents for each product. In total 526 were included, comprising ever users (cigarillos n = 207, HTPs n = 61 and nicotine pouches n = 39) and never users with awareness of the product (cigarillos n = 428, HTPs n = 218 and nicotine pouches n = 139). The fieldwork period was from 4 November 2020 until 15 November 2020.

2.3.2. Survey

To investigate use behavior, ever-users of each of the three products were asked: (1) *'How often do you CURRENTLY use X?'* (Daily | Less than daily, at least once a week | Less than once a week, at least once a month | Less than monthly, but occasionally | Regular use in the past, but not currently | Occasional use in the past, but not currently - *The first four answering options were classified as current use.*), (2) *'During the days that you use X, how many units do you use?'* (Over 20 | 16-20 | 11-15 | 5-10 | Less than 5), (3) *'When do/did you use X?'* (At home | With friends | At a party | While working/studying | After exercising | When bored | When tense/stressed – for nicotine pouches two additional answer options were available: At a place where a smoking ban is in effect | To use nicotine discretely).

To investigate reasons for (non) use, we asked (non) users of each product to rank the three most important reasons out of a list of 10 predefined options (see figure 2). To measure risk perception, all participants were asked: (1) *'To what extent do you think the following tobacco products are harmful to your health'*, (2) *'To what extent do you think the following tobacco*

products are addictive For each question, all products they were aware of and/or used, and cigarettes as a comparison, were listed. Below each product a scale from 0 to 100 was presented where participants could move a bar to indicate their perceived level of risk. Completion of step 2 took 5.48 (\pm 3.23) minutes time on average

2.4. Data analysis

Data were processed and analyzed in R (version 4.0.2) and Microsoft Excel. Data for step 1 included a user weight to help better reflect the overall Dutch population. Data for step 2 focused on answers at the participant levels and were therefore not weighed. For both step 1 and 2, results are either expressed as the percentage of all participants, the percentage of the cohort or a subgroup that gave a specific answer, the percentage that met a criterion, or the average value for answers involving a quantitative scale. For step 1, demographic user characteristics that occurred 1.5 times or more frequently in a subgroup compared to the overall cohort were considered overrepresented.

3. RESULTS

3.1. Prevalence of awareness and use

Prevalence of awareness, ever use and current use of cigarillos, HTPs and nicotine pouches among participant subgroups based on demographic characteristics are presented in table 1. Less than half of the participants indicated awareness of any of the TRPs and less than 15% ever used one. Awareness, ever use and current use are highest for cigarillos, then HTPs and lowest for nicotine pouches. Among adolescents, current use does not occur and ever use is below 1%. Awareness, ever use and current use of the three TRPs are consistently higher among men than women. While awareness and use of cigarillos and HTPs are relatively evenly distributed

between all age groups, awareness of nicotine pouches is higher among adolescents and younger adults (<45 years), whereas ever use of nicotine pouches is relatively high among adults aged 18-44 and current use only occurs among 25-44 year old adults. Awareness and use of all TRPs are higher among most subgroups with middle or high educational attainment. Product awareness and use of HTPs and nicotine pouches are generally higher among participants in higher social classes, whereas awareness and use of cigarillos is more evenly distributed over social classes. For cigarillos and HTPs, awareness and/or use is higher in higher urban density regions, whereas for nicotine pouches this is more evenly distributed between high and low urban density areas. For all three TRPs, awareness and/or use is higher among participants not of native Dutch origin. For all products, awareness and/or use is higher among ever and current smokers, regardless of the number of cigarettes per day. Overall awareness and/or use of all three products is highest among participants who indicated a preference for menthol flavoured cigarettes, and those who use products that give a menthol flavour to cigarettes or roll your own (RYO) tobacco. Not only current use of cigarettes, but also current use of other TRPs is associated with higher awareness and/or use of cigarillos, HTPs or nicotine pouches. These overrepresentations of smoking characteristics are overall more pronounced than those of personal characteristics.

3.2. Use behavior

Data regarding use behavior are shown in table 2. The majority of ever users no longer used the product. Current users are equally divided across daily, weekly, monthly, or less than monthly use, and are mostly light users. Participants indicated using all three products most frequently “with friends”, “at a party” and “at home”(figure 2). The most common reason why participants became aware of the products was because they knew someone who uses that product (figure 2).

3.3. Reasons for use

The most frequently indicated reasons for using cigarillos and HTPs are “it is tasty and/or pleasant”, “out of curiosity”, and “they are available in different flavours”. For nicotine pouches, the availability of different flavours was not commonly indicated as reason for use, whereas “I think it’s less unhealthy than cigarettes” was (figure 2).

The two main reasons for not using a TRP provided by never-users are that the products are considered unhealthy and addictive (figure 2). Cigarillo never-users also frequently indicated that the products are “bad tasting and unpleasant” and that “the smoke is bothersome for others”. Never-users of nicotine pouches frequently indicated that the products are bad for their teeth.

3.4. Risk perception

Overall, all TRPs are estimated to be slightly less harmful and addictive compared to cigarettes (see figure 3). Nicotine pouches are rated less harmful, but not less addictive than other TRPs (including cigarettes). Generally, harmfulness and addictiveness ratings slightly increased from current users to ever users, to never users.

4. DISCUSSION

This study surveyed awareness and use of cigarillos, HTPs and nicotine pouches among Dutch adolescents and adults. We found that awareness and use of these products is relatively low, with less than 50% of the population being aware of any of them and less than 15% having ever used one. Current use among adults is 2.1% for HTPs and even lower for other TRPs. This is ten times as low as current cigarette use among Dutch adults in 2019, which was 21.7% ((RIVM);, 2020) and much lower than current cigarette use among our participants which is 19.1%. Among adolescents, ever use of any of the TRPs is below 1% and current use does not occur. In

comparison, in 2019, 17% of 13-16 year old Dutch adolescents were ever- and 8% were current cigarette smokers (defined as past month use) (Rombouts & Tuithof, 2020). Ever and current use of HTPs is also lower compared to Italy and several other EU countries (Cerrai et al., 2020; Gallus et al., 2021), the U.S. (Marynak et al., 2018; Nyman et al., 2018), Japan (Kinjo et al., 2020; Sutanto et al., 2019), Korea (Kim et al., 2018; Kim & Cho, 2020), Taiwan (Chang et al., 2020) and Guatemala (Gottschlich et al., 2020), and ever and current use of cigarillos is lower than in the U.S. (Rostron et al., 2020; Trapl et al., 2015) and Canada (Atiya et al., 2018). The low awareness and use of HTPs and nicotine pouches in our study is not surprising, as these products are relatively new on the market. Indeed, we observed that awareness and use decrease in the order cigarillos > HTPs > nicotine pouches, the same order as their appearance on the market. The still relatively low awareness and use of cigarillos may be caused by their minor presence in daily life in The Netherlands; as few people use them, they are not commonly sold in stores other than tobacconists, and there is an advertising ban in place, not many people may come across them.

Ever use of cigarillos (13.4%) is higher than in 2017 in The Netherlands (5.03%) and most other European countries (Filippidis et al., 2019). This might indicate a shift from people smoking menthol flavoured cigarettes to smoking cigarillos after the introduction of the ban on characterizing menthol flavours in cigarettes and RYO tobacco in May 2020 (The European Parliament and The Council of the European Union, 2014). This notion is supported by our finding that awareness and use of cigarillos, HTPs and nicotine pouches was highest among participants who indicated a preference for menthol flavoured cigarettes, and those who used products that provide a menthol flavour to cigarettes or RYO tobacco.

While awareness and use of cigarillos and HTPs is relatively evenly distributed between age groups, awareness and use of nicotine pouches seems higher among adolescents and younger adults. These patterns differ from smoking prevalence in The Netherlands, which is highest among 20-24 year old adults and decreases with age ((RIVM);, 2020). Although nicotine pouches are currently only used by adults, the relatively high awareness among adolescents and young adults is concerning, as these age groups are more sensitive to develop long term addiction to nicotine due to their ongoing brain maturation (England et al., 2015; O'Dell, 2009).

Awareness and use of all TRPs are also higher among subgroups with middle or high education, and awareness and use of HTPs and nicotine pouches are higher among participants in higher social economic classes. These findings are opposed to smoking prevalence, which is generally higher among people with lower education ((RIVM);, 2020) and social economic status (SES) (Huisman et al., 2012). A possible explanation for this difference is that higher educated people may be more aware of smoking risks (Pacek & McClernon, 2018; Siahpush et al., 2006) and therefore use TRPs that they consider to be less harmful, such as HTPs and nicotine pouches. Moreover, people with low SES have more difficulty to quit smoking, for example because they experience less social support (Pisinger et al., 2011; Sorensen et al., 2002), and thus may also be less likely to switch to another TRP.

We found that awareness and use of all TRPs is higher among cigarette smokers compared to non-smokers. This is in line with previous findings regarding HTPs (Kim et al., 2018; Kim & Cho, 2020; Kinjo et al., 2020; Aleksandra Ratajczak et al., 2020), and may reflect some smokers considering a less harmful alternative. Moreover, smokers are more interested in TRPs, know more others who smoke or use TRPs and are more likely to come across these products in stores where they buy cigarettes. All three products are also known and used more by men than women,

which may be moderated by the higher smoking prevalence among men in The Netherlands ((RIVM);, 2020). Most users of cigarillos, HTPs and nicotine pouches reported also using cigarettes or other tobacco products, most commonly e-cigarettes, cigars and cigarillos. This pattern of dual or poly tobacco product use is in line with previous findings (Hwang et al., 2020; Hwang et al., 2019).

Reported reasons for using cigarillos and HTP in our study are similar to the ones recently reported in the EU (Lupiáñez-Villanueva F., 2020). The availability of flavours is the second most endorsed reason for use of HTPs (together with tastiness and after curiosity), and the third for cigarillos (after curiosity and tastiness). These findings add to the existing literature indicating that flavours are appealing to adolescents and adults and are a reason for initiating TRP use (Kong et al., 2017; Rostron et al., 2020; Villanti et al., 2013). Strikingly, the availability of different flavours was not a commonly indicated reason for using nicotine pouches, even though these are marketed in many different flavours. This indicates that future regulation of flavours may reduce appeal and use of cigarillos and HTPs, but may not be sufficient to prevent or reduce use of nicotine pouches. Curiosity was by far the most frequently indicated reason for using nicotine pouches, suggesting that people may be interested to try, but not structurally use this product. This is also evidenced by the very low, and for some groups absent, percentage of current use.

Overall, both users and non-users seem to be aware of the health risks of the three studied TRPs, as addictiveness and harm of all three products were rated relatively high, but slightly lower than for cigarettes. Users generally rated addictiveness and harm slightly lower than non-users. These patterns of harmfulness ratings of cigarillos and HTPs are in line with recent findings across the

EU (Lupiañez-Villanueva F., 2020). Moreover, never-users most commonly indicated addictiveness and harm to their health as reasons for not using these products.

4.1. Limitations

Due to the low prevalence of use of the three products, sample sizes in the second part of the questionnaire were small. As a consequence, the data did not allow for statistical comparisons between groups. Differences between groups are therefore only described and should be interpreted with caution, particularly for nicotine pouches users, which was the smallest group. This also indicates a need for larger, fully powered studies to address questions surrounding use and perceptions of nicotine pouches and HTPs. Moreover, qualitative studies may provide more in-depth information about user behavior and attitudes.

It should also be noted that this questionnaire was conducted during a time that people were spending more time at home and socially distant, due to the outbreak of Covid-19. Recent studies demonstrated both increases and decreases in smoking and e-cigarette use among different subgroups of smokers and e-cigarette users during the pandemic (Elling et al., 2020; Sokolovsky et al., 2021; Vanderbruggen et al., 2020; White et al., 2021; Yingst et al., 2021). It is therefore difficult to predict how the pandemic has influenced the use of the studied TRPs. However, answers regarding circumstances of use are likely to have been affected such that the number of participants using these products in social situations is lower compared to the usual situation, whereas the number of participants using the product at home is higher than usual. Moreover, perceived health risk of the smokable TRP (HTPs and cigarillos), may have been increased in relation to Covid-19(White et al., 2021; Yang et al., 2021; Yingst et al., 2021).

4.2. Policy recommendations

Current awareness and use of all three TRP are relatively low. However, if their use increases over time, several policy recommendations could follow from our findings. First of all, flavours are an important reason for using cigarillos and HTPs and it might be the case that (former) cigarette smokers have switched to these products, after the ban on characterizing (menthol) flavours in cigarettes and RYO tobacco. Regulators should thus consider applying flavour regulation to a broad range of TRPs. Second, some (former) cigarette smokers may use HTPs or nicotine pouches as less harmful alternatives. However, all TRPs are harmful and their use among never smokers should be discouraged. Moreover, switching to a different TRP does not necessarily reduce smokers' health risk, as many remain dual users. Therefore, it is important for regulators to inform the public about the harmful consequences of using these products. Awareness of these may discourage use, as perceived harmfulness was by far the most frequently reported reason for never-users not to use TRPs. We found that people became aware of cigarillos, HTPs and nicotine pouches through people they know, who use these products, and that many use them in social situations. A recent European report also describes „socialising“ as one of the most cited reasons for starting or trying to smoke cigarillos and HTPs (Lupiáñez-Villanueva F., 2020). Thus, by extending smoking bans to other TRPs, regulators can potentially reduce not only the opportunities for using these products, but also possible occasions of non-users getting acquainted with these products. Finally, since awareness and use of products change over time, as a consequence of new policies and due to market introduction of other products, it is necessary to keep monitoring this by regularly repeating studies like ours .

5. CONCLUSIONS

This study is one of the first to investigate awareness and use of cigarillos HTPs and nicotine pouches in Europe. We found that current prevalence of awareness and use of these products in The Netherlands is relatively low. The most important reasons for using these products are curiosity and the availability of different flavours. We therefore recommend regulators to extend flavour and smoking bans to multiple TRPs. In addition, public information may discourage use by increasing awareness of health risks.

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7. FIGURE CAPTIONS



Figure 1: Images of cigarillos, HTP and nicotine pouches as shown to participants.

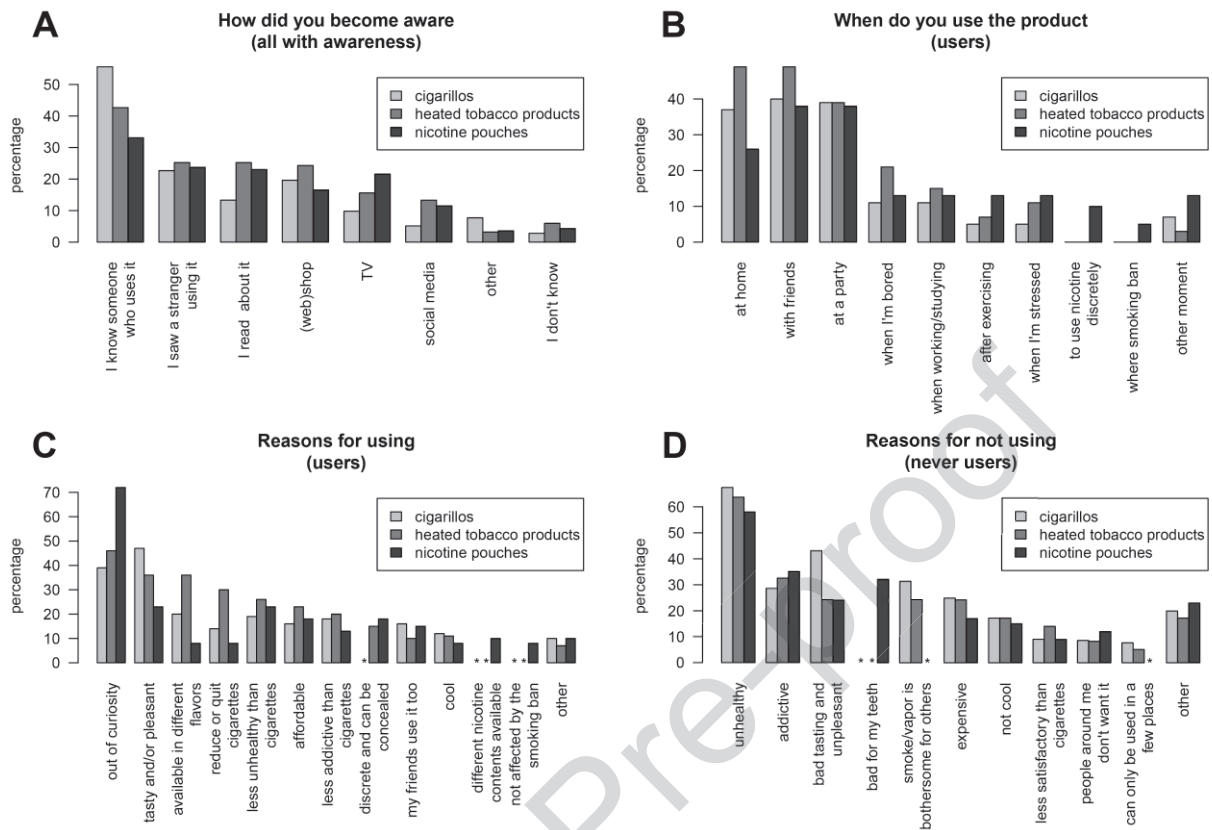


Figure 2: Bar graphs showing participants' responses regarding (A) How they became aware of the TRP, (B) When they use it, (C) Reasons for using it and (D) Reasons for not using it. Bars with different shading for the three different TRP.

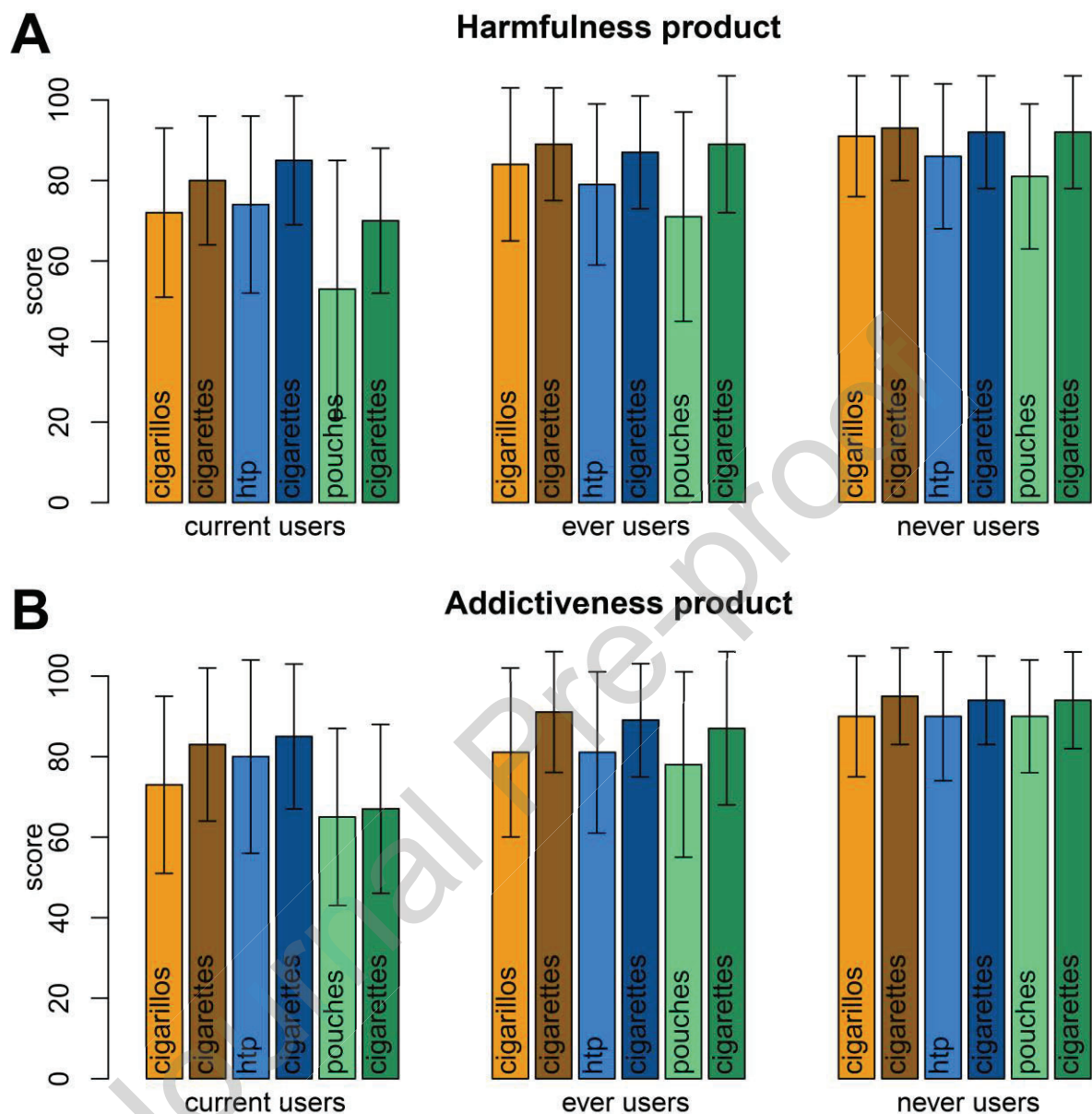


Figure 3: Average scores of (A) harmfulness and (B) addictiveness that participants (current users, ever users and never users with awareness) attributed to the three TRP. In brown for cigarillos, in blue for HTP and in green for nicotine pouches. Darker shaded bars indicate the average scores of harmfulness and addictiveness for cigarettes, according to the subgroup in the corresponding colour. Ever users include all participants who have ever used the respective product, thus also current users.

8. TABLES

Table 1: Prevalence of awareness, ever use and current use of cigarillos, HTP and nicotine pouches among subgroups based on various demographic characteristics

Item	Group	Nr. of (weigh ted) parti cipants	Cigarillos			HTP			Nicotine pouches		
			Awar eness (%)	Eve r use (%)	Cur rent use (%)	Awar eness (%)	Eve r use (%)	Cur rent use (%)	Awar eness (%)	Eve r use (%)	Cur rent use (%)
Total	Total	5805	47.30	13.41	1.98	23.14	3.00	0.40	6.88	0.56	0.06
Gender	Male	2870	53.44	19.15	2.90	27.06	3.44	0.49	8.32	0.92	0.13
	Female	2935	41.30	7.80	1.07	19.31	2.57	0.32	5.47	0.21	0.00
Age group	13 – 17 (adolesc.)	406	12.56	0.29	0.00	20.39	0.95	0.00	9.09	0.31	0.00
	18+ (adults avg.)	5399	49.9	14.4	2.1	23.3	3.2	0.4	6.7	0.6	0.07
	18 - 24	587	31.00	6.62	1.81	29.05	4.22	0.53	10.16	0.88	0.00
	25 - 44	1662	44.29	14.65	2.44	28.28	4.24	0.50	9.19	1.34	0.22
	45 - 64	1911	58.54	16.44	2.43	23.06	3.07	0.59	4.62	0.21	0.00
	65 +	1239	53.12	14.60	1.39	14.47	1.33	0.07	4.98	0.00	0.00
Education	Low	1950	38.74	10.02	1.78	19.03	2.44	0.23	5.56	0.24	0.00
	Middle	2255	50.48	14.44	2.16	23.97	3.50	0.65	6.93	0.52	0.12
	High	1587	53.34	16.13	1.97	27.14	2.96	0.28	8.48	1.01	0.06
	Don't know/no answer	14	44.49	11.92	0.00	6.14	6.14	0.00	0.00	0.00	0.00
Social Class*	A (high)	1479	50.15	14.10	2.20	29.27	3.68	0.51	8.98	0.73	0.00
	B1	1390	45.73	12.51	1.66	23.23	3.17	0.66	6.76	0.86	0.06
	B2	1158	45.00	12.91	2.01	24.09	2.64	0.27	7.75	0.42	0.17

					14.			2.8		0.1	
C		973	51.35	91	2.11	20.40	2	0.18	4.82	8	0.09
					12.			2.2		0.4	
D (low)		806	43.20	61	1.89	13.67	0	0.22	4.46	1	0.00
Urban density°	Very high	1255	49.39	48	2.38	24.93	9	0.42	8.94	1.0	0.00
					14.			3.0		0.4	
	High	1946	51.23	50	2.07	23.58	4	0.75	6.86	8	0.13
					12.			2.7		0.3	
	Moderate	1010	43.86	22	1.98	23.04	6	0.17	5.89	5	0.00
					12.			2.9		0.4	
	Low	1091	44.24	71	1.79	21.76	7	0.18	5.66	0	0.00
					10.			1.9		0.3	
	Not	503	40.45	43	1.01	20.14	1	0.00	6.44	9	0.22
Origin	Native Dutch	5246	46.68	00	1.80	22.68	2	0.27	6.54	9	0.05
					19.			4.4		0.2	
	Western (migrated)	294	63.83	93	4.05	26.03	5	1.31	6.18	9	0.00
	Non-western (migrated)	220	38.59	53	3.02	29.13	0	1.68	13.18	2	0.00
					18.			8.6		1.8	
	Unknown/no answer	46	54.40	38	4.20	28.79	3	3.98	19.33	2	1.82
Smoked > 100 cigarettes/ ryo in a lifetime		2812	62.17	05	3.41	26.70	8	0.80	6.52	1	0.13
Did not smoke > 100 cigarettes/ ryo in a lifetime		2993	33.33	2	0.63	19.80	6	0.03	7.21	3	0.00
Current smokers/ryo users		1106	65.31	29.99	6.94	36.01	11.02	1.95	7.96	1.9	0.33
				9.5			1.1			0.2	
Current non-smokers/ryo users		4699	43.06	1	0.81	20.11	1	0.04	6.62	5	0.00
Nr. of cigarettes/ day	>20 cigarettes (1 pack) or ryo	145	71.74	35.80	6.76	39.01	15.10	3.58	6.27	1.1	1.19
				34.			13.			2.5	
	15 - 20 cigarettes/ ryo	208	72.80	96	7.69	36.68	71	2.53	10.10	9	0.00
				24.			8.8			1.2	
	10 - 15 cigarettes/ ryo	221	61.34	18	5.30	35.30	4	2.05	5.67	0	0.00
				27.			10.			1.0	
	5 - 10 cigarettes/ ryo	213	64.37	66	4.54	40.68	71	0.81	7.12	4	0.00
				29.			8.8			2.9	
	< 5 cigarettes/ ryo	308	60.70	31	9.27	31.78	2	1.60	9.17	8	0.64
				40.			18.			0.0	
	Unknown	11	66.25	18	9.11	26.25	04	0.00	18.57	0	0.00
^Use products that give a menthol flavour to cigarettes or ryo		108	75.92	51.46	22.8	57.59	34.88	5.94	17.99	5.8	1.61
Do not use products that give a menthol flavour to cigarettes or ryo		999	64.17	27.67	5.22	33.69	8.4	1.52	6.88	1.4	0.20
Preference for menthol flavoured cigarettes		131	62.54	37.64	16.0	46.56	23.48	4.88	14.29	6.2	1.32

No preference for menthol flavoured cigarettes	975	65.68	28.96	5.71	34.60	9.35	1.56	7.11	1.33	0.20
Concurrent TRP use			29.			11.			1.9	
Cigarettes/ ryo	1106	65.31	99	6.94	36.01	02	1.95	7.96	1	0.33
			58.	21.6		15.			5.8	
Cigars	191	79.54	92	0	40.53	08	2.52	14.20	0	1.94
			94.	100.		20.			7.3	
Cigarillos	115	97.54	33	00	49.81	85	6.82	21.45	4	2.27
			56.	27.4		24.			13.	
Pipe	38	76.89	06	3	47.48	15	7.60	20.54	09	5.00
			48.	12.4		26.			5.1	
E-cigarette	165	77.34	84	9	55.46	43	5.70	21.16	1	1.05
			49.	33.3		100	100.		16.	
HTP	23	87.59	08	9	100.00	.00	.00	31.81	29	7.38
			35.	16.7		25.			10.	
Waterpipe	92	60.66	27	5	54.77	54	5.21	26.13	21	1.87
			54.	42.9		54.	20.3		20.	20.3
Oral tobacco	9	54.59	59	4	66.82	59	5	42.94	35	5
			71.	71.7		100	58.6		56.	25.3
Nasal tobacco	7	100.00	70	0	100.00	.00	7	56.30	30	3
Nicotine pouches (no tobacco)	4	100.00	100	70.5		100	46.7		100	100.
			.00	4	100.00	.00	6	100.00	.00	.00
			90.	54.0		90.	32.4		55.	43.2
Snus (with tobacco)	9	90.29	29	4	100.00	29	0	66.55	20	7

Overrepresentations of subgroups relative to the overall average are colour-coded in shades of blue: light blue, 1.5 to 2-fold overrepresentation; dark blue, 2-fold or higher overrepresentation.

Explanation of variables:

* Social class: grouping developed by the association of executing market agencies (MarktOnderzoekAssociatie - MOA) in collaboration with Statistics Netherlands (Centraal Bureau voor de Statistiek -CBS). Social class levels are based on the socioeconomic situation in the Netherlands in 2016 and each of the five classes (A, B1, B2, C, D) contains around 1/5 of the Dutch households. The level is based on a ranking for the head of the household's highest education and occupation. ° Urban density: Very high (≥ 2500 addresses/km²), high (1500 - 2500 addresses/km²), moderate (1000 - 1500 addresses/km²), Low (500 – 1000 addresses/km²), Not (<500 addresses/km²)

^ Products that give a menthol flavour to cigarettes or ryo tobacco can be for example menthol flavoured cards that can be inserted in cigarette packs, or menthol flavoured drops that can be added to tobacco.

Table 2. Use of cigarillos HTPs and nicotine pouches among all ever users (including current users).

	Cigarillos	HTPs	Nicotine pouches
Total nr. of ever users	207	61	39
How often do you currently use this product?			
Daily (%)	7.2	14.8	10.3
Less than daily, but at least once a week (%)	7.7	14.8	2.6
Less than weekly, but at least once a month (%)	7.2	1.6	15.4
Less than monthly, but occasionally (%)	7.7	9.8	2.6
Used to use regularly, but no longer (%)	12.1	19.7	5.1
Used to use occasionally, but no longer (%)	58.0	39.3	64.1
For current users only: on days when you smoke/use, how many units do you use on average?			
More than 20 (%)	4.8	8.0	8.3
16 to 20 (%)	6.5	12.0	25.0
11 to 15 (%)	8.1	16.0	16.7
5 to 10 (%)	9.7	24.0	8.3
less than 5 (%)	71.0	36.0	41.7
I don't know (%)	0.0	4.0	0.0

AUTHOR DISCLOSURES

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Anne Havermans: Conceptualization, Methodology, Writing - Original Draft, **Jeroen LA Pennings:** Methodology, Formal analysis, Writing - Review & Editing, **Ingrid Hegger:** Conceptualization, Writing - Review & Editing, **Jan M Elling:** Conceptualization, Writing - Review & Editing, **Hein de Vries:** Conceptualization, Writing - Review & Editing, **Charlotte GGM Pauwels:** Conceptualization, Writing - Review & Editing, **Reinskje Talhout:** Conceptualization, Writing - Review & Editing

Conflict of interests

No conflict declared.

Data availability

Data can be made available upon reasonable request.

AUTHOR STATEMENT

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CONFLICT OF INTEREST STATEMENT

No conflict declared.

Journal Pre-proof

HIGHLIGHTS

- Less than 50% of the Dutch are aware of cigarillos, HTPs or nicotine pouches.
- Ever use of these products is less than 15%.
- There is no current use of these products among adolescents in this sample.
- The main reasons for use are curiosity, pleasantness, flavours, and reduced harm.
- Extending flavour and smoking bans to these products could further reduce use.
- Public information may discourage use by increasing awareness of health risks.