

E-cigarette product preferences among Australian young adult e-cigarette users

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The use of e-cigarettes is growing in Australia. The National Drug Strategy Household Survey (NDSHS) revealed significant increases in lifetime use among tobacco smokers and non-smokers between 2013 and 2016.¹ Usage rates are highest among young adults, with 2016 figures indicating that 49% of smokers and 14% of non-smokers aged 18 to 24 years had used an e-cigarette in their lifetime compared to 31% and 5%, respectively, among the entire general adult population.¹

E-cigarettes are powered by a battery and use an atomiser to heat a liquid made of water, propylene glycol, and/or vegetable glycerine. This 'e-liquid' may contain various additives including nicotine and flavourings. Concerns have been raised that use of nicotine-containing e-liquids increases the risk of nicotine addiction and may contribute to the initiation of traditional tobacco products among non-smoking youth and young adults (i.e. the 'gateway' effect).² The commercial supply of e-liquids containing nicotine without lawful authority is prohibited in Australia. However, individual users may be able to lawfully buy nicotine-containing e-liquids from overseas if they meet the strict requirements of the Therapeutic Goods Administration's Personal Importation Scheme,³ and it appears that a substantial black market for e-liquids containing nicotine exists in Australia.⁴

E-liquids are available in thousands of unique flavours, many of which are youth-oriented (e.g. bubblegum, Red Bull).⁵ The availability of

Abstract

Objective: To assess preferences for e-cigarettes containing nicotine and flavourings among Australian young adult e-cigarette users.

Methods: An online survey was administered to 1,116 young adults (18–25 years), 104 of whom had used an e-cigarette in the last 30 days and were the focus of this study. Among users, 53% also smoked tobacco cigarettes, 27% were non-smokers and 20% had never smoked.

Results: Nearly two-thirds (64%) of e-cigarette users preferred nicotine-containing e-cigarettes (71% of smokers, 56% of non-smokers, 55% of never smokers). The vast majority (89%) preferred flavoured e-cigarettes (92% of smokers, 82% of non-smokers, 95% of never smokers), with fruit flavours the most popular.

Conclusions: E-cigarettes containing nicotine and flavourings were popular among users of these devices in this sample of young adults.

Implications for public health: Previous research has documented potential harms associated with e-liquid additives, flavourings, and nicotine. The present results showing strong preferences for nicotine and flavourings among the sampled e-cigarette users suggest that: i) flavourings in e-liquids should be regulated; and ii) existing prohibitions on the unauthorised supply of liquid nicotine should be better enforced. Population-wide monitoring of the use of e-cigarettes with different product characteristics is also warranted.

Key words: e-cigarettes, smoking, young adults, nicotine, flavourings

flavourings is cited by young adult e-cigarette users as contributing to their initiation and continued use of the devices.⁶ Emerging evidence indicates that these flavourings and other additives may be harmful to health. For example, tests of e-liquids indicate that the chemicals used in these flavourings may not be safe when inhaled directly into the lungs.⁷ This risk was raised in a recent parliamentary inquiry into the use and marketing of electronic cigarettes in Australia, resulting in the recommendation of greater regulation of flavourings and colourings used in e-liquids.⁸

Information on the types of e-cigarettes preferred by Australian e-cigarette users is lacking, making it difficult for policy makers to determine where public health efforts should be focused. Given concerns raised in the literature about the impact of nicotine and flavoured e-liquids on smoking initiation in young adults, the present study sought to examine nicotine and flavouring product preferences among young adult e-cigarette users to determine whether concerns regarding the appeal of such e-liquids are founded.

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Submitted: April 2018; Revision requested: August 2018; Accepted: September 2018

The authors have stated they have no conflict of interest.

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Aust NZ J Public Health. 2018; 42:572-4; doi: 10.1111/1753-6405.12842

Method

Sample

A web panel provider (PureProfile) was commissioned to recruit a sample of Australian 18–25-year-olds. In total, 1,116 young adults (mean age=21.56 years [$SD=2.32$], 41% male) were recruited, of whom 104 were current users of e-cigarettes (used e-cigarettes within the last 30 days at a frequency of at least monthly). Subsequent analyses only included these current e-cigarette users. The average age of users was 22.12 years ($SD=2.16$) and 57% were male. Among users, 25% reported using e-cigarettes daily, 33% weekly, 21% fortnightly and 21% monthly.

Measures

Current e-cigarette users were asked whether, if given a choice, they would be more likely to use an e-cigarette that: i) contains nicotine or does not contain nicotine; and ii) is flavoured or unflavoured. Respondents who preferred nicotine-containing e-cigarettes were asked to indicate the strength of e-liquid they usually used (0mg/ml, 6mg/ml, 12mg/ml, 18mg/ml,

24mg/ml, other, don't know). Respondents who preferred flavoured e-cigarettes were asked to indicate the flavour/s of e-liquid usually used (open-ended response option, subsequently coded into categories).

Tobacco smoking status was assessed by asking respondents whether they had ever smoked a tobacco cigarette. Those responding in the affirmative were asked if they had smoked at least 100 cigarettes in their lifetime and if they smoked in the last 30 days. As per previous research,⁹ respondents were classified as 'smokers' if they reported smoking >100 tobacco cigarettes in their lifetime and had smoked in the last 30 days. Respondents were classified as 'never smokers' if they reported never smoking a tobacco cigarette. All other respondents were classified as 'non-smokers'.

Results

Almost two-thirds of current e-cigarette users preferred to use e-cigarettes containing nicotine (Table 1). When analysed by smoking status, this preference was evident among nearly three-quarters of users who were

cigarette smokers and just over half of non-smokers or never smokers. Among those who preferred e-cigarettes with nicotine, the most popular nicotine strengths were 6mg/ml and 12mg/ml.

The majority of current users preferred flavoured over unflavoured e-cigarettes (Table 1). Fruit flavours (e.g. apple, strawberry) were most popular, followed by candy flavours (e.g. bubblegum, chocolate) and then dessert (e.g. apple pie, vanilla), mint, and beverage (e.g. Red Bull, coffee).

Discussion

Although the sale of e-cigarettes containing nicotine is illegal in Australia, more than half of e-cigarette users in the present study preferred using nicotine-containing e-cigarettes. Of concern is that more than half of never smokers preferred these products relative to non-nicotine equivalents. Given never smokers are not using e-cigarettes for smoking cessation purposes, and concerns have been raised that use of nicotine-containing e-cigarettes has the potential to: i) increase risk of nicotine addiction; and ii) act as a potential gateway effect to other forms of nicotine,² research examining the motives behind never smokers' preferences for nicotine-containing e-cigarettes is needed.

Consistent with previous research conducted in the US,¹⁰ the vast majority of young adult e-cigarette users in this study preferred flavoured over non-flavoured e-cigarettes. Given that: i) the availability of flavourings is frequently cited by e-cigarette users as contributing to their initial and continued use of these devices;^{6,10} and ii) the chemicals used in flavoured e-liquids may not be safe when inhaled,¹¹ efforts are needed to limit the appeal of e-cigarettes to young adults^{5,6} and raise awareness of the possible toxicity of e-liquid flavourings.

This study has several limitations, most notably the use of an online panel provider to recruit respondents and the small sample of e-cigarette users, both of which limit the generalisability of results. Caution should be exercised when interpreting findings by smoking status, given the small numbers in each subgroup. A further limitation is that the present study assessed nicotine and flavouring preferences rather than the actual use of e-cigarettes with these characteristics. Nonetheless, these preliminary findings indicate that further exploration of e-cigarette product preferences is required, and it is

Table 1: E-cigarette preferences and usual consumption among young adult e-cigarette users, stratified by tobacco cigarette smoking status.

	Smoking status ^a			
	Overall (N=104) n (%)	Smoker (n=52) n (%)	Non-smoker (n=27) n (%)	Never smoker (n=20) n (%)
Nicotine preference				
No nicotine	38 (36)	15 (29)	12 (44)	9 (45)
Nicotine	66 (64)	37 (71)	15 (56)	11 (55)
Of those preferring nicotine, strength used:				
0mg/ml	2 (3)	1 (3)	0 (0)	1 (9)
6mg/ml	22 (33)	11 (30)	6 (40)	3 (27)
12mg/ml	24 (36)	15 (41)	4 (27)	4 (36)
18mg/ml	11 (17)	5 (14)	3 (20)	3 (27)
24mg/ml	2 (3)	2 (5)	0 (0)	0 (0)
Other	1 (2)	0 (0)	1 (7)	0 (0)
Don't know	4 (6)	3 (8)	1 (7)	0 (0)
Flavouring preference				
Unflavoured	11 (11)	4 (8)	5 (18)	1 (5)
Flavoured	93 (89)	48 (92)	22 (82)	19 (95)
Of those preferring flavoured, flavours used:				
Fruit	51 (55)	24 (50)	15 (68)	8 (42)
Candy	11 (12)	5 (10)	4 (18)	2 (11)
Dessert	9 (10)	4 (8)	3 (14)	2 (11)
Mint	9 (10)	4 (8)	2 (9)	2 (11)
Beverage	5 (5)	3 (6)	2 (9)	0 (0)
Tobacco	4 (4)	1 (2)	2 (9)	1 (5)
Menthol	3 (3)	0 (0)	2 (9)	1 (5)

Note:

a: 'Smokers' had smoked in the past 30 days and >100 cigarettes in their lifetime; 'never smokers' had never smoked a tobacco cigarette; 'non-smokers' comprises all other respondents. An accurate assessment of smoking status could not be ascertained for 5 respondents due to inconsistent responses across smoking status items.

recommended that large-scale population-representative surveys such as the NDSHS routinely ask respondents about the contents of the e-liquid they consume.

To conclude, results suggest that substantial proportions of young adult e-cigarette users, including never smokers, exhibit a preference for e-cigarettes that contain nicotine and flavourings. Efforts should be made to better enforce existing restrictions on the supply of liquid nicotine in Australia and on its importation from overseas for personal use, especially in light of evidence suggesting that e-cigarette use has the potential to result in subsequent tobacco cigarette initiation among young adults.¹² Such efforts could be facilitated by routinely asking NDSHS respondents about where they purchase their e-liquids. The results also support the recommendation of a recent parliamentary inquiry for the establishment of a regulatory process that assesses and restricts the colourings and flavourings used in e-liquids⁸ (as is the case with fruit and confectionery flavours in tobacco cigarettes deemed most appealing to youth).¹³ Research that involves ongoing monitoring of the use of e-cigarettes with different product characteristics and the impact of these characteristics on subsequent initiation of tobacco use appears warranted.

Funding statement

This work was supported by the Western Australian Health Promotion Foundation (Healthway), research grant #24335. The funding source had no involvement in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication.

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