Vaping product access and use among 14–17-year-olds in New South Wales: a cross-sectional study

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Abstract

Objectives: We assessed access to vaping products and types of products used and the factors associated with vaping and smoking among young people in the state of New South Wales (NSW), Australia.

Methods: A cross-sectional survey was conducted with a sample of 721 young people aged 14 to 17 years from NSW recruited through online panels. Poisson regression with robust variance was used to estimate relative risks of ever-vaping and ever-smoking.

Results: Almost one-third of the sample (32%, n=233) reported being an ever-vaper, of which more than half (54%) had never smoked prior to starting vaping. Ever-vaping was independently associated with age and being Aboriginal or Torres Strait Islander, and ever-smoking was independently associated with being male. Ever-smokers were seven times more likely to be ever-vapers than those who had never smoked, and ever-vapers were 18 times more likely to be ever-smokers than those who had never vaped. Among ever-vapers who reported which type of device they were using, 86% reported the use of disposable products. "Flavourings and taste" was rated as the most important characteristic of vapes. More than half of ever-vapers reported getting the last vape they used from their friends (55%, n=130). More than half of ever-vapers had used a vape that they knew contained nicotine (53%, n=123).

Conclusions: Vaping was the strongest risk factor for smoking, and vice versa, suggesting there is not a straightforward, unidirectional relationship between vaping and smoking in young people. Young people appear to be readily accessing nicotine vaping products, which are often disposable and flavoured, through both social and commercial channels.

Implications for public health: Stronger enforcement of federal and state policies designed to protect young people from vaping products is urgently needed.

Key words: electronic cigarettes, public health, tobacco control

The use of vaping products, also known as electronic cigarettes or e-cigarettes, is a rapidly evolving area of public health research and policy development. Compared to other nations with a similar track record of successful tobacco control, Australia has adopted strict measures to control access to nicotine vaping products. Despite nicotine vaping products being positioned as an important cessation aid,[1] including by the tobacco industry,[2] there is limited evidence of effectiveness.[3] To date, the Australian Therapeutic Goods Administration (TGA) has not approved any nicotine vaping product as a safe and effective smoking cessation aid.[4] As of 1 October 2021, Australians require a prescription to legally access nicotine vaping products as an unapproved medicine. The scheduling change closes a regulatory gap between Commonwealth and state and territory laws and is intended to enable current smokers to receive health advice on the use and risks associated with vaping and prevent uptake by non-smokers, especially young people.[4] In New South Wales, and all other states and territories except Western Australia, the retail sale, purchase and use of non-nicotine vaping products by adults, provided no therapeutic claims are made, is legal.[5]

With limited evidence available on the long-term health effects of vaping product use, there are concerns about product safety,[6] and the rapid growth in use by young people.[7] Vaping products contain a number of harmful substances including carcinogens such as formaldehyde, nitrosamines, and metals (e.g. nickel and chromium) and vaping products may increase the risk of cardiovascular diseases and lung disorders.[6,8] Nicotine use by young people is harmful to their developing brains and has adverse effects on the part of the brain that controls attention, learning, mood and impulse control.[9] An Australian study of 18–25-year-old never smokers found

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that e-cigarette users were significantly more curious about trying cigarettes and reported significantly higher intention to smoke within the next six months compared to those who had never used an e-cigarette.[10]

Australian population surveillance shows increasing rates of e-cigarette use.[11] In 2019, one in five (19.6%) non-smokers aged 18–24 years had tried an e-cigarette, up from 13.6% in 2016, and 7.8% of non-smokers aged 14–17 years had ever used an e-cigarette in 2019, with "curiosity" being the most common reason for using an e-cigarette (73.2%).[12] Population data from NSW found that 32.7% of persons aged 16–24 had ever used an e-cigarette in 2021 – the highest rate of all population groups.[13] Media, school and community reports suggest that vaping among young people in NSW has proliferated in recent years.[14,15] This seeming growth in vaping is corroborated by NSW compliance data showing that 54,556 illegal nicotine products were seized from retailers in the first half of 2021, up from 4,667 in the same period of 2020.[16]

Considering the evolving vaping product regulatory environment, the potential health concerns and growing rates of use in Australia, it is critical to understand the extent of current use and access among young people. To date, no Australian study has explored how young people are accessing vaping products, the type of devices they are using or their motivations for use. Such insights are necessary to ensure young people are protected from accessing and using vaping products. This study aims to assess access to vaping products and types of products used, and to explore the relationships between vaping, smoking and various socio-demographic factors among young people aged 14 to 17 years in New South Wales, Australia, prior to the October 2021 nicotine scheduling change.

Methods

Study design

This study is part of a larger ongoing study of vaping among Australian young people called *Generation Vape*. The *Generation Vape* project involves data collection activities (qualitative and quantitative) with four population groups (including 14–17-year-olds, 18–24-year-olds, parents of 14–17-year-olds and secondary school educators) at multiple time points during a three-year period. This paper reports on the first wave of quantitative data collection, involving an online cross-sectional survey of 14–17-year-old young people residing in New South Wales. Data collection was conducted in September 2021, prior to the national implementation of nicotine scheduling changes. It was designed to examine vaping product use and related awareness, perceptions, attitudes, and knowledge among young people. The questionnaire (see Supplementary File 1) was pre-tested for clarity with young people before the administration of the survey.

Procedure

Eligible participants were those who self-reported being aged between 14 and 17 years inclusive and were living in NSW at the time of the survey. We aimed for a minimum sample size of 700 participants, who were identified and recruited through multiple online panels via a third-party research provider. Recruitment through multiple online panels allowed us to extend the reach of the survey beyond the scope and size of one panel, as well as reducing skews and biases that may be present in individual panels. Young people who were members of these panels were recruited either directly through email invitation or indirectly through parents of 14–17-year-olds. All respondents were required to complete three screening questions to ensure they met the eligibility criteria: "What is your postcode?", "How old are you?" and "Have you ever seen or heard of vapes or e-cigarettes?", with the definition of a vape/e-cigarette provided. The latter question was deemed necessary to ensure only respondents who had prior knowledge of vaping products could participate. To ensure the sample was closely representative of the population, key demographic characteristics, including age, gender, location (metropolitan and non-metropolitan areas of NSW) and education (school grade), were monitored throughout data collection. To prevent the data from being skewed, pre-established caps were placed on gender and age. Parental consent was required of all participants before they started the survey. Respondents were also required to consent to participation in the study after receiving a Participant Information Statement. Ethics approval for the survey was granted by the University of Sydney Human Research Ethics Committee (Project number: 2021/442) in July 2021.

Measures

Sociodemographic variables

Demographic characteristics recorded included gender, age, current education level, remoteness (metro vs. non-metro areas of NSW), language spoken at home (English and/or another language) and Aboriginal and/or Torres Strait Islander status.

Vaping and smoking status

All teenage participants aged 14–17 years were asked: "Have you ever used a vape? How many times?" with response options "No, I've never vaped", "Yes just a few puffs", "Yes, I have vaped on fewer than 10 occasions in my life", "Yes, I have vaped on more than 10 but fewer than 100 occasions in my life" and "Yes, I have vaped more than 100 times in my life". Those who indicated that they had ever vaped were further asked: "Before you first tried vaping, how many tobacco cigarettes had you smoked in your lifetime?" with response options "None", "Just a few puffs", "Less than 10 tobacco cigarettes" and "Ten or more tobacco cigarettes". Responses to the above two questions were used to determine which participants were vapers and smokers, and whether smoking or vaping was tried first. Ever-vapers were also asked how many days they had vaped in the last 30 days, and during a typical month with no COVID-19 restrictions in place, since NSW was under COVID-19 lockdown restrictions, including home learning, at the time of data collection.

Vape products used and access

Participants who reported ever using a vape were asked: "Can you please describe the vape you use? For example, what kind of device is it? How does it work?". Open-ended responses to the question were manually coded into the following categories: "Disposable vape"; "Refillable vape"; "Pod vape"; "Heated tobacco product"; "Unsure" and "Not specified". Ever-vapers were also asked to rate the importance of various characteristics of vapes and vaping behaviour, such as "Flavouring and taste", "Price" and "Being able to make big vapour clouds" on a five-point scale from "Not at all important" to "Very important", as well as whether they had ever used a vape that they knew contained nicotine (Yes/No or Don't know).

Ever-vapers were also asked a series of questions relating to the last time they vaped, including if they had purchased the vape themselves (Yes/No), and how they got the

vape. There were different response options for those who purchased the vape (such as "From a friend or someone selling them"; "At a petrol station"; "At a tobacconist"; "Through a website"; "Through Facebook"), and for those who did not purchase the vape (such as "Friends gave/shared it with me"; "My parents or legal guardians gave/shared it with me"; "My brother or sister gave/shared it with me"). Ever-vapers were also asked how easy or hard it is to get a vape, with a 7-point response scale from "Very hard" to "Very easy".

Statistical methods

Poisson regression with robust variance was used to estimate the associations between the dichotomous dependent variable ever-vaping (vs. never-vaping) and various independent variables (with relative risks [RRs] as a measure of effect). The same regression technique was also used to estimate the associations between the dichotomous dependent variable ever-smoking (vs. never smoking) and independent variables. In these analyses, ever-vaping and ever-smoking were defined as ever having a few puffs or more of vapes or cigarettes, respectively. We selected the set of independent variables derived from the questionnaire that we hypothesised to be independently associated with the dependent variables or potential confounders of the effects of other selected independent variables, or that were associated with the dependent variables in bivariate analyses. In this paper, we report the estimates from the bivariate analyses and fully adjusted models containing all of the selected independent variables. For each independent variable, we report a *p*-value corresponding to a test of the null that all RRs equal one.

Results

Participant characteristics

A total of 721 young people aged 14 to 17 years participated in the survey, which comprised 359 males, 359 females and 3 non-binary and other participants (Table 1). Female participants tended to be older than male participants, with females more likely to be aged 16–17 than males (63% vs. 49% respectively). Five per cent of participants were Aboriginal or Torres Strait Islanders, 88% lived in a metropolitan area and 79% spoke English only.

Vaping patterns

Sixty-five per cent of participants had never smoked or vaped and 23% had both smoked and vaped (Table 2). Close to one-third of the sample (32%, *n*=233) reported being an ever-vaper (defined as having at least a few puffs of a vape), 16% (*n*=114) reported vaping in the last 30 days (49% of ever-vapers) and 5% (*n*=35) reported vaping between 10 and 30 days of the last 30 (15% of ever-vapers). However, in a typical month without COVID-19 restrictions in place, 62% (*n*=145) of ever-vapers reported vaping at least once and 19% (*n*=44), 10–30 times. Of the 233 ever-vapers, 125 (54%) had never smoked before they first tried vaping

Associations between ever-vaping, ever-smoking and socio-demographic factors

Ever-vaping was independently associated with age (p=0.010), being Aboriginal or Torres Strait Islander (p=0.010), smoking status (p<0.001) and lifetime quantity smoked (p<0.001); see Table 3. Specifically, after adjustment for participant characteristics (specified below in Table 3), 17-year-olds were 51% more likely to be ever-vapers than 14-year-olds (RR=1.51, 95%CI[1.15, 2.00]), and Aboriginal or Torres Strait Islander peoples were 35% more likely to be ever-vapers than non-Indigenous young people (RR=1.35, 95%CI[1.10, 1.66]). Participants who were ever-smokers were seven times more likely to be ever-vapers than those who had never smoked (RR=7.01, 95%CI[5.51, 8.92]). Also of note, 100% of ever-smokers who had smoked more than a few puffs in their lifetime were ever-vapers.

Ever-smoking was independently associated with gender (p=0.014), vape status (p<0.001) and lifetime vape quantity (p<0.001); see Table 4. Specifically, females were 22% less likely to be ever-smokers than males (R=0.78, 95%CI[0.66, 0.93]) and ever-vapers were 18 times more likely to be ever-smokers than

Table 1: Demographic characteristics of the 721 teenage study participants.

Characteristic	Male (n=359)	Female (n=359)	Non-binary and other (n=3)	Total (n=721)
Age (years)				
14	86 (24%)	55 (15%)	1 (33%)	142 (20%)
15	98 (27%)	77 (21%)	1 (33%)	176 (24%)
16	90 (25%)	126 (35%)	1 (33%)	217 (30%)
17	85 (24%)	101 (28%)	0 (0%)	186 (26%)
Current education level				
Year 7-8	49 (14%)	29 (8%)	0 (0%)	78 (11%)
Year 9	79 (22%)	52 (14%)	1 (33%)	132 (18%)
Year 10	92 (26%)	96 (27%)	1 (33%)	189 (26%)
Year 11	81 (23%)	91 (25%)	1 (33%)	173 (24%)
Year 12	46 (13%)	73 (20%)	0 (0%)	119 (17%)
Not in school	12 (3%)	18 (5%)	0 (0%)	30 (4%)
Aboriginal or Torres Strait Islander				
No	341 (95%)	337 (94%)	3 (100%)	681 (94%)
Yes	17 (5%)	21 (6%)	0 (0%)	38 (5%)
Prefer not to say	1 (0%)	1 (0%)	0 (0%)	2 (0%)
Remoteness of residence				
Metropolitan area	314 (87%)	320 (89%)	3 (100%)	637 (88%)
Non-metropolitan area	45 (13%)	39 (11%)	0 (0%)	84 (12%)
SES of residence area				
1 - Lowest SES	56 (16%)	36 (10%)	0 (0%)	92 (13%)
2	47 (13%)	65 (18%)	1 (33%)	113 (16%)
3	47 (13%)	50 (14%)	0 (0%)	97 (13%)
4	58 (16%)	69 (19%)	0 (0%)	127 (18%)
5 - Highest SES	151 (42%)	139 (39%)	2 (67%)	292 (40%)
Language				
English only	293 (82%)	274 (76%)	3 (100%)	570 (79%)
Another language only	13 (4%)	17 (5%)	0 (0%)	30 (4%)
English and another language	53 (15%)	68 (19%)	0 (0%)	121 (17%)

Note:
Numbers are frequencies and column percentages

those who had never vaped (RR=17.96, 95%CI[11.47, 28.12]).

Vaping products

When asked to describe the vaping product they used, 52% of ever-vapers described a disposable vape device (*n*=121), 3% described a vape that could be refilled with e-liquid (*n*=8), 3% described a vape that would be refilled with pods (*n*=8) and 1% described a heated tobacco product (*n*=3). More than one-third of ever-vapers did not specify details of the type of vape they used (34%, *n*=80). For example, some responses noted that the device was electric and contained a flavour, but did not say whether it was disposable, refillable or a heated tobacco product: "You breathe in the smoke from the device and it tastes like mangoes". Some ever-vapers also noted they were unsure of what product they had used (6%, *n*=13). Hence, among ever-vapers who reported which type of device they were using, 86% reported the use of disposable products.

More than half of ever-vapers had used a vape that they knew contained nicotine (53%, *n*=123), while 20% (*n*=47) said they had not used a nicotine-containing vape and 27% (*n*=63) did not know whether they had used a vape containing nicotine or not. When asked to consider the importance of various characteristics of vapes and vaping behaviour on a scale of 1 to 5, with a score of 5 being "very important" and a score of 1 being "not at all important", "Flavourings and taste" was rated the most important (mean importance score 3.9, 95%CI[3.7, 4.0]), followed by "Price", (mean importance score 3.6, 95%CI[3.4, 3.8]), and "Being able to hide the vape and vapour" (mean importance score 3.4, 95%CI[3.2, 3.6]). The reported importance of five other vaping characteristics among ever-vapers can be found in Supplementary File 2.

Table 2: Smoking and vaping usage characteristics of the 721 teenage study participants.

Characteristic	Male (n=231)	Female (n=236)	Non-binary and other (n=2)	Total (n=469)
Smoking/vaping status				
Never smoked or vaped	231 (64%)	236 (66%)	2 (67%)	469 (65%)
Smoked but never vaped	12 (3%)	7 (2%)	0 (0%)	19 (3%)
Vaped but never smoked	24 (7%)	41 (11%)	0 (0%)	65 (9%)
Smoked and vaped:	92 (26%)	75 (21%)	1 (33%)	168 (23%)
Smoked and vaped, tried vaping first (subtotal)	28 (8%)	32 (9%)	0 (0%)	60 (8%)
Smoked and vaped, tried smoking first (subtotal)	64 (18%)	43 (12%)	1 (33%)	108 (15%)
Lifetime vape quantity				
Never-vaper	243 (68%)	243 (68%)	2 (67%)	488 (68%)
A few puffs	57 (16%)	52 (14%)	0 (0%)	109 (15%)
More than a few puffs but <10 occasions	23 (6%)	24 (7%)	0 (0%)	47 (7%)
10 to <100 occasions	15 (4%)	23 (6%)	0 (0%)	38 (5%)
100+ occasions	21 (6%)	17 (5%)	1 (33%)	39 (5%)
Lifetime smoke quantity				
Never-smoker	255 (71%)	277 (77%)	2 (67%)	534 (74%)
A few puffs	70 (19%)	49 (14%)	1 (33%)	120 (17%)
More than a few puffs but <10 cigarettes	15 (4%)	15 (4%)	0 (0%)	30 (4%)
10 to <100 cigarettes	12 (3%)	9 (3%)	0 (0%)	21 (3%)
100+ cigarettes	7 (2%)	9 (3%)	0 (0%)	16 (2%)
Days of vaping in last 30 days (during Covid restrictions)				
Never vaper	243 (68%)	243 (68%)	2 (67%)	488 (68%)
0 days	55 (15%)	64 (18%)	0 (0%)	119 (17%)
1-2 days	24 (7%)	22 (6%)	0 (0%)	46 (6%)
3-5 days	15 (4%)	9 (3%)	0 (0%)	24 (3%)
6-9 days	5 (1%)	4 (1%)	0 (0%)	9 (1%)
10-19 days	7 (2%)	3 (1%)	0 (0%)	10 (1%)
20-30 days	10 (3%)	14 (4%)	1 (33%)	25 (3%)
Days of vaping during an average month (no COVID-19 restrictions)				
Never vaper	243 (68%)	243 (68%)	2 (67%)	488 (68%)
0 days	39 (11%)	49 (14%)	0 (0%)	88 (12%)
1-2 days	30 (8%)	31 (9%)	0 (0%)	61 (8%)
3-5 days	12 (3%)	10 (3%)	0 (0%)	22 (3%)
6-9 days	13 (4%)	5 (1%)	0 (0%)	18 (2%)
10-19 days	7 (2%)	5 (1%)	0 (0%)	12 (2%)
20-30 days	15 (4%)	16 (4%)	1 (33%)	32 (4%)

Note:
Numbers are frequencies and column percentages

Access to vapes

Of ever-vapers who did not purchase their last vape (70%, *n*=163), 80% (*n*=130) reported getting it from friends. A further 8% (*n*=13) reported that a sibling shared it, 7% (*n*=11) got someone to buy it for them, 3% (*n*=5) took it from home without parental permission and 2% reported that their parents or legal guardians gave or shared it with them (*n*=3). One person did not answer the question. Of ever-vapers who did purchase their last vape (30%, *n*=70), 49% (*n*=34) reported buying it from a friend or someone selling them, 31% (*n*=22) purchased it from a retailer such as a petrol station, tobacconist or convenience store, 9% (*n*=6) from social media such as Snapchat, Instagram or Facebook, 7% (*n*=5) from a website, 1% (*n*=1) from a vape store and 3% (*n*=2) from another source. Nearly 80% of ever-vapers found it very easy, easy or quite easy to access vapes (*n*=179) while less than 10% of ever-vapers found it quite hard, hard or very hard (*n*=20). Tables outlining the results relating to young people's access to vapes (where 14–17-year-olds obtained or purchased the last vape they used and reported ease of access to vaping products) can be found in online Supplementary File 2.

Discussion

Our study findings indicate that young people in New South Wales can readily access vaping products through both social and commercial channels. Flavoured, disposable vaping products that contain nicotine are commonly used, however, a number of respondents were unsure what type of device they used or whether or not it contains nicotine. These flavoured, disposable devices are marketed as easy for beginners to use, do not require liquid refilling and are simply activated by inhaling on the mouthpiece. Each device can contain hundreds of puffs and can cost as little as $5.00, making them highly affordable.[15] These products often contain nicotine salts which have a lower pH than free-base nicotine, allowing high levels of nicotine inhalation with less throat

irritation.[17] Non-nicotine vaping products sold at retail outlets in NSW have been tested and found to illegally contain nicotine;[18] our study confirms young people readily acquire these products.

Despite being positioned as cessation products that are only marketed to and used by older, adult smokers who have struggled to quit by other means, flavoured, disposable products appear to be highly appealing to NSW young people. This echoes data from the US where the disposal vaping product JUUL is the preferred product of young people[19] and has driven the explosive rise in youth vaping rates.[20]

In our study, vaping was the strongest risk factor for smoking, and vice versa. Young people who were classified as ever-vapers were 18 times more likely to be ever-smokers than those who had never vaped. However, among participants who were ever-vapers, more than half had never smoked before they started vaping. This suggests there is not a straightforward, unidirectional relationship between vaping and smoking in young people, that vaping does not necessarily preclude subsequent smoking initiation and that the dual use of cigarettes and vaping products is common.[21] Vaping may also be considered a separate behaviour from smoking among young people.[22] Vaping is not displacing smoking in young people in NSW, as evidenced by low smoking rates and low social acceptability of smoking by young people prior to vaping gaining popularity in Australia.[23]

Table 3: Relative risk of ever-vaping (vs never vaping) among the 721 teenage study participants.

Characteristic	Ever vaper n/N (%)	RR for ever-vaping (vs never-vaping) Unadjusted RR	Adjusted RR^
Total:	233/721 (32%)		
Gender			
Male	116/359 (32%)	ref.	ref.
Female	116/359 (32%)	1.00 (0.81, 1.24)	1.14 (0.99, 1.32)
Non-binary and other	1/3 (33%)	1.03 (0.21, 5.15)	0.96 (0.55, 1.68)
p-value		0.999	0.190
Age (years)			
14	27/142 (19%)	ref.	ref.
15	55/176 (31%)	1.64 (1.10, 2.46)	1.23 (0.90, 1.67)
16	73/217 (34%)	1.77 (1.20, 2.61)	1.18 (0.90, 1.56)
17	78/186 (42%)	2.21 (1.51, 3.22)	1.51 (1.15, 2.00)
p-value		0.001	0.010
Aboriginal or Torres Strait Islander			
No	206/681 (30%)	ref.	ref.
Yes	26/38 (68%)	2.26 (1.77, 2.89)	1.35 (1.10, 1.66)
Prefer not to say	1/2 (50%)	1.65 (0.41, 6.65)	1.43 (0.81, 2.53)
p-value		<0.001	0.010
Remoteness			
Metro	207/637 (32%)	ref.	ref.
Non-metro	26/84 (31%)	0.95 (0.68, 1.34)	0.79 (0.60, 1.02)
p-value		0.778	0.070
SES of residence area			
1 - Lowest SES	27/92 (29%)	ref.	ref.
2	41/113 (36%)	1.24 (0.83, 1.85)	1.07 (0.83, 1.39)
3	28/97 (29%)	0.98 (0.63, 1.54)	1.07 (0.77, 1.49)
4	34/127 (27%)	0.91 (0.59, 1.40)	0.95 (0.70, 1.28)
5 - Highest SES	103/292 (35%)	1.20 (0.84, 1.71)	1.17 (0.91, 1.50)
p-value		0.340	0.450
Language			
English only	199/570 (35%)	ref.	ref.
Another language only	8/30 (27%)	0.76 (0.42, 1.40)	0.96 (0.55, 1.67)
English and another language	26/121 (21%)	0.62 (0.43, 0.88)	0.90 (0.69, 1.18)
p-value		0.023	0.750
Smoke status			
Never-smoker	65/534 (12%)	ref.	ref.
Ever-smoker	168/187 (90%)	7.38 (5.85, 9.32)	7.01 (5.51, 8.92)
p-value		<0.001	<0.001
Lifetime smoke quantity			
Never-smoker	65/534 (12%)	ref.	ref.
A few puffs	101/120 (84%)	6.91 (5.43, 8.80)	6.72 (5.26, 8.59)
More than a few puffs but <10 cigarettes	30/30 (100%)	8.22 (6.54, 10.32)	7.61 (5.90, 9.83)
10 to <100 cigarettes	21/21 (100%)	8.22 (6.54, 10.32)	7.72 (5.93, 10.04)
100+ cigarettes	16/16 (100%)	8.22 (6.54, 10.32)	7.52 (5.79, 9.76)
p-value		<0.001	<0.001

Note:

^ Adjusted effect estimates for gender, age, Aboriginal or Torres Strait Islander, remoteness, language and smoke status were obtained from model containing all of these variables. Adjusted effect estimates for lifetime smoke quantity were obtained from model containing gender, age, Aboriginal or Torres Strait Islander, remoteness, language and lifetime smoke quantity.

Ever-vaping is defined as ever having a few puffs or more of vapes.

Potential limitations

First, while every effort was made to recruit participants that represented the demographic characteristics of New South Wales young people aged 14–17, our study was not designed to measure the prevalence of vaping among this population. However, random sampling is not required for reliable adjusted effects estimates based on internal comparisons within study populations.[24] Second, to ensure that we didn't recruit participants guessing their way through the survey on a topic they knew nothing about, participants were only included if they answered "Yes" to the screening question "Have you ever seen or heard of vapes or e-cigarettes?". While this screening requirement may have introduced some bias into our never-vaper results, we anticipate that very few young people have never seen or heard of vapes or e-cigarettes given the widespread use of vaping among young people.[13] Third, our study also highlights the need for Aboriginal and Torres Strait Islander-specific research, led by Aboriginal and Torres Strait Islander research partners, to assess vaping product use among Indigenous young people.

Policy and research implications

Assessing whether the October 2021 prescription-only scheduling change impacts young people's access to and preference for nicotine vaping products is a crucial next step. Removing non-nicotine vaping products from the market and prohibiting their sale,

particularly as product content is unregulated and they have no proven therapeutic value, would help control commercial access. While education approaches are often a default first action to address health behaviours, unless supportive policy action underpins an approach to reducing youth vaping, health education is unlikely to have any measurable impact. Increasing our understanding of any key differences between young vapers and non-vapers and what risk factors lead to regular, long-term vaping is required to assist with the implementation of effective interventions. Recognising the complex relationship between vaping and smoking among young people is essential, and comprehensive tobacco control, including policy, education, monitoring, and enforcement, must remain a public health priority.

Table 4: Relative risk of ever-smoking (vs never smoking) among the 721 teenage study participants.

Characteristic	Ever smoking n/N (%)	RR for ever-smoking (vs never-smoking) Unadjusted RR	Adjusted RR^
Total:	187/721 (26%)		
Gender			
Male	104/359 (29%)	ref.	ref.
Female	82/359 (23%)	0.79 (0.61, 1.01)	0.78 (0.66, 0.93)
Non-binary and other	1/3 (33%)	1.15 (0.23, 5.75)	1.04 (0.75, 1.44)
p-value		0.169	0.014
Age (years)			
14	22/142 (15%)	ref.	ref.
15	46/176 (26%)	1.69 (1.07, 2.67)	1.18 (0.83, 1.68)
16	63/217 (29%)	1.87 (1.21, 2.90)	1.31 (0.95, 1.79)
17	56/186 (30%)	1.94 (1.25, 3.02)	1.08 (0.80, 1.47)
p-value		0.023	0.218
Aboriginal or Torres Strait Islander			
No	165/681 (24%)	ref.	ref.
Yes	21/38 (55%)	2.28 (1.66, 3.13)	0.99 (0.78, 1.25)
Prefer not to say	1/2 (50%)	2.06 (0.51, 8.31)	0.77 (0.55, 1.07)
p-value		<0.001	0.262
Remoteness			
Metro	159/637 (25%)	ref.	ref.
Non-metro	28/84 (33%)	1.34 (0.96, 1.86)	1.31 (0.98, 1.74)
p-value		0.087	0.071
SES of residence area			
1 - Lowest SES	24/92 (26%)	ref.	ref.
2	35/113 (31%)	1.19 (0.76, 1.85)	0.99 (0.75, 1.32)
3	23/97 (24%)	0.91 (0.55, 1.49)	0.94 (0.64, 1.37)
4	28/127 (22%)	0.85 (0.53, 1.36)	0.95 (0.67, 1.33)
5 - Highest SES	77/292 (26%)	1.01 (0.68, 1.50)	0.89 (0.67, 1.19)
p-value		0.593	0.919
Language			
English only	165/570 (29%)	ref.	ref.
Another language only	6/30 (20%)	0.69 (0.33, 1.43)	0.89 (0.45, 1.76)
English and another language	16/121 (13%)	0.46 (0.28, 0.73)	0.70 (0.50, 0.96)
p-value		0.004	0.089
Vape status			
Never-vaper	19/488 (4%)	ref.	ref.
Ever-vaper	168/233 (72%)	18.52 (11.83, 28.99)	17.96 (11.47, 28.12)
p-value		<0.001	<0.001
Lifetime vape quantity			
Never-vaper	19/488 (4%)	ref.	ref.
A few puffs	71/109 (65%)	16.73 (10.54, 26.56)	16.74 (10.59, 26.48)
More than a few puffs but <10 occasions	38/47 (81%)	20.77 (13.08, 32.98)	19.93 (12.39, 32.05)
10 to <100 occasions	27/38 (71%)	18.25 (11.23, 29.66)	17.37 (10.66, 28.31)
100+ occasions	32/39 (82%)	21.07 (13.24, 33.55)	20.81 (13.03, 33.23)
p-value		<0.001	<0.001

Note:

^ Adjusted effect estimates for gender, age, Aboriginal or Torres Strait Islander, remoteness, language and vape were obtained from model containing all of these variables. Adjusted effect estimates for lifetime vape quantity were obtained from model containing gender, age, Aboriginal or Torres Strait Islander, remoteness, language and lifetime vape quantity.

Ever-smoking is defined as ever having a few puffs or more of cigarettes.

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Ethics approval

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Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary File 1: Cancer Council NSW E-cigarette use among young people in NSW Survey Questionnaire Wave 1 (14-17 year olds).

Supplementary File 2: Table: Reported importance of vaping characteristics among ever-vapers; Table: How young people obtained the vape they last used (for those who did not purchase it); Table: How young people bought the vape they last used (for those who reported purchasing it). Table: Reported ease of access to vaping products (ever-vapers only)