E-cigarettes: A continuing public health challenge in India despite comprehensive bans

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ABSTRACT

India has introduced comprehensive e-cigarette bans focused on protecting youth from vaping-related harm. Despite these bans, educated young people appear to be a relatively high user group, although little is known about their usage patterns. The aims of the present study were to examine educated young adults' e-cigarette-related attitudes and behaviors and their support for various e-cigarette control policies. In total, 840 tertiary-educated young adults completed an online survey. Demographic characteristics, e-cigarette and tobacco use, beliefs about e-cigarettes, exposure to e-cigarette advertising, sources of access to e-cigarettes, numbers of family members and peers who vape, and support for a range of e-cigarette policies were assessed. One-third (33%) reported never having heard of e-cigarettes/vapes, 23% reported ever using e-cigarettes, 70% reported ever using tobacco, and 8% were dual users of both e-cigarettes and tobacco. Only 8% of e-cigarette users reported daily use. Vapers sourced e-cigarettes from retail outlets (vape shops, tobacconists) and their social networks (friends, siblings). Just under two-thirds of those who were aware of e-cigarettes believed them to be harmful and to contain chemicals. Among non-users, 31% were curious about using e-cigarettes and 23% intended to use in the following year, indicating high levels of susceptibility. The results suggest that despite a complete ban, young people are still able to access e-cigarettes in India. Greater education about harms associated with vaping and more intensive monitoring and enforcement could assist in reducing uptake in relatively high-prevalence groups such as educated young adults.

1. Introduction

Around 27 % of the Indian population uses tobacco in some form (World Health Organization, 2017). Due to the size of the population, this makes it one of the largest tobacco markets in the world, second only to China (Dyer, 2019). Tobacco-related harm across the country is substantial (Mohan et al., 2018), and access to cessation assistance is typically limited (Sharan et al., 2020). There has been a surge in smoking among young people, attributed to declining traditional customs and targeted marketing efforts of the tobacco industry (Chhabra et al., 2021; Sidhu et al., 2018).

In addition to concerns about youth tobacco use, youth e-cigarette use is an important health issue. India is one of the few countries that has completely banned the sale of e-cigarettes (Ramakrishnan et al., 2021), the primary stated motivation being the protection of young people from e-cigarette-related harms (Dyer, 2019; Bhave and Chadi, 2021; Jha,

2019). This is especially salient given that India has a young population, with 65 % of people in the country being below the age of 35 years (Kaur and Rinkoo, 2015). Concerns about rapidly increasing youth vaping rates prompted calls for the introduction of regulations prior to e-cigarettes becoming entrenched in the marketplace (Kaur and Rinkoo, 2015).

The ban on the manufacture, importation, transport, sale, advertising, and distribution of e-cigarettes in India was announced in September 2019 (Dyer, 2019). Prior to this time, e-cigarettes were neither officially permitted nor banned (Chakma et al., 2020). The stipulated penalties for breaching the ban are substantial – first offenders are fined up to Rs100 000 ($US1,403) and can be imprisoned for up to a year, and subsequent offences can attract a fine of up to Rs500 000 and three years of imprisonment (Dyer, 2019). Despite these penalties, e-cigarettes are reported to be widely available across a range of sources including tobacconists, general stores, and online providers

(Amalia et al., 2020; Amalia et al., 2020). It thus appears that e-cigarette marketers managed to achieve a foothold in the market that has not been completely redressed by the ban (Chakma et al., 2020).

There has been little empirical research on e-cigarette use in India, especially among young people (Sharan et al., 2020; Bhave and Chadi, 2021). Available evidence indicates that smoking cessation/reduction is an often-cited reason for e-cigarette use in India; vaping is generally perceived to be less harmful than smoking; tobacco, mint, and chocolate flavors are the most preferred; and a large proportion of vapers may have post-school qualifications (Sharan et al., 2020; Srivastava et al., 2018). The latter may be at least partly due to the very low cost of tobacco products in India that makes e-cigarettes comparatively expensive and out of reach for those on lower incomes. For example, a bidi (a cheap, unfiltered type of cigarette) costs approximately one United States (US) cent (Welding et al., 2021), while e-cigarette starter kits are available from around $US25 (https://www.vapehere.in). The higher prevalence of e-cigarette use among those with tertiary qualifications may therefore reflect greater ability to afford the devices and greater exposure through social networks to peers who vape.

The international literature identifies various factors associated with vaping among young people. These include being a current smoker (Ahmad et al., 2022; Chan et al., 2019; Vuolo et al., 2021; Struik et al., 2022), being male (Ahmad et al., 2022; Struik et al., 2022; Omoike and Johnson, 2021; Walker et al., 2020), having access to e-cigarettes via retail outlets (Mantey et al., 2019), being exposed to others' e-cigarette use (Ahmad et al., 2022; Mantey et al., 2021; McDermott et al., 2020), being exposed to e-cigarette advertising (Fadus et al., 2019), and having lower harm perceptions (Jongenelis et al., 2019; Wong et al., 2016). In general, youth have been found to be unlikely to use e-cigarettes primarily for cessation purposes (Fadus et al., 2019). It is largely unknown the extent to which these factors apply to young people in in low- and middle-income countries, including India.

To address the lack of e-cigarette research in the Indian context and among the key group of educated young people in particular, the aims of the present study were to (i) examine e-cigarette-related attitudes and usage patterns in this group and (ii) assess their support for a range of e-cigarette policies. The results can inform future health promotion interventions designed to reduce use and associated harms among members of this relatively high-use population group. The focus on those with higher education attainment reflects the clustering of e-cigarette use among this cohort and hence their importance as an intervention target group (Sharan et al., 2020; Srivastava et al., 2018).

2. Materials and methods

As part of an international study (Pettigrew et al., 2022), an ISO-accredited web panel provider (Pureprofile) was commissioned to administer a national online survey on e-cigarette-related attitudes, intentions, and behaviors among young people aged 15–30 years. Pureprofile uses a wide range of recruitment strategies to form its panel, including online and mass media advertising, mall intercept interviews, and word-of-mouth referrals. Panel members receive modest payments for completing surveys (typically around $US4). Quotas were applied to achieve a sample characterized by an approximately even male/female split and approximately even distribution by year group. The present study reports the results from data collected in India from the sub-sample of 18–30 year old respondents with a tertiary qualification (post-school certificate, diploma, or university degree) (n = 840).

The survey contained items related to respondent demographics (sex, age, education, and income), product use (e-cigarettes and tobacco products), beliefs about e-cigarettes (Gaiha et al., 2021; Jongenelis et al., 2019), motivations for vaping (Australian Institute of Health and Welfare, 2019; Berg, 2016; Centers for Disease Control and Prevention, 2020), numbers of friends and family members who vape (Jongenelis et al., 2019), and exposure to e-cigarette advertising (Centers for Disease Control and Prevention, 2020). To equivalize across substances, the e-cigarette and tobacco use items asked respondents to report if they 'Never used', 'Previously used', or 'Currently use' e-cigarettes and a wide range of tobacco products (e.g., cigarettes, cigars, chewing tobacco, pipes, water pipes, snuff, and snus). The 'previously used' item asked respondents to consider usage in the context of 'even just once or twice'. Those who reported being past or current e-cigarette users were asked to report how e-cigarettes were obtained (Health, 2017) and where they were used (new question developed for this survey). Those who reported never using e-cigarettes were asked about their curiosity about e-cigarettes and future usage intentions (Centers for Disease Control and Prevention, 2020; Jongenelis et al., 2019).

Respondents also indicated the extent to which they agreed with a series of e-cigarette control policies consistent with those recommended by the World Health Organization (World Health Organization, 2020; World Health Organization, 2021) and addressed in previous research (Jongenelis et al., 2019; Klein et al., 2020). These policies related to preventing the use of e-cigarettes by minors, regulating product characteristics (e.g., nicotine content and flavors), mandating the display of warnings on products, restricting advertising, preventing the use of unproven health claims, and adopting the restrictions recommended for tobacco products (e.g., smoke-free laws for indoor venues, restrictions on availability).

The study received approval from the University of New South Wales Human Research Ethics Committee (approval number HC210752) and all conditions were met, including in regard to participants' safety and privacy. Respondents could elect to complete the survey in either Hindi or English. The survey was in field during November-December 2021.

2.1. Analyses

Descriptive analyses were conducted for the included variables, and Chi square (for data expressed as proportions) and *t*-test (for data expressed as means) analyses were performed to detect any significant differences between males and females and younger and older respondents. Due to the large number of comparisons, a significance threshold of $p < .001$ was applied.

A multivariable logistic regression model was run to identify factors associated with current/previous e-cigarette use. Included variables were respondent age, sex, income, and tobacco use; perceived harmfulness and addictiveness; exposure to e-cigarette advertising; and numbers of family members and friends who use e-cigarettes. The advertising exposure variable was calculated as exposure to at least one of the three assessed forms of e-cigarette advertising (Internet, television/cinema/streaming services, supermarkets/petrol stations). The significance threshold for the regression analysis was set at $p < .05$.

3. Results

The sample profile is shown in Table 1. As per the specified quotas, the sample was approximately evenly split between males and females and there were roughly comparable numbers for each age year. Income was assigned as a natural fallout variable, resulting in a skewed profile with two-thirds of the sample in the high-income category, one-fifth in the low-income category, and very few respondents in the middle-income category. This distribution likely reflects the tendency for those with tertiary qualifications to be in higher-paid occupations and those undertaking higher education to be less likely than other population groups to be in full employment. The sample was spread across the 36 states/territories of India, with 70 % located in North India, broadly consistent with national distribution.

Table 1 shows the reported prevalence of current and previous use of e-cigarettes and tobacco products. Of the 840 respondents, 23 % were either a current vaper or previous vaper ('even once or twice), 70 % a current or previous tobacco user ('even once or twice'), and 8 % a current dual user of both e-cigarettes and tobacco products. One-third of the sample (33 %) reported that they had never heard of e-cigarettes or

Table 1
Sample profile by e-cigarette and tobacco use.

	Total (n = 840)		Previous vaper (n = 114, 14 %)		Current vaper (n = 75, 9 %)		Previous tobacco user^ (n = 332, 40 %)		Current tobacco user^ (n = 256, 30 %)		Current dual user# (n = 66, 8 %)	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												
Female	432	51	40	35	32	43	151	45	98	28	27	51
Male	408	49	74	65	43	57	181	55	158	62	39	59
Age												
18–24	396	47	50	44	19	25	145	44	102	40	14	21
25–30	444	53	64	56	56	75	187	56	154	60	52	79
Mean (SD)	24.71 (3.66)		24.88 (3.55)		26.24 (3.07)		24.83 (3.50)		25.24 (5.52)		26.64 (2.94)	
Education												
Certificate/Diploma	131	16	11	10	3	4	40	12	28	11	3	5
University	709	84	103	90	72	96	292	88	228	89	63	95
Income												
Low	178	21	19	17	9	12	53	16	34	13	8	12
Middle	54	6	7	6	3	4	20	6	15	6	3	5
High	557	66	81	71	63	84	252	76	200	78	55	83
Missing	54	6	7	6	0	0	7	2	7	3	0	0

^ Includes any form of tobacco (e.g., cigarettes, chewing tobacco, snuss).
# Currently using e-cigarettes and at least one type of tobacco product.

vaping.

Among those previously or currently using e-cigarettes (n = 189), only 8 % (2 % of the total sample) reported daily use and 65 % (15 % of the total sample) reported using e-cigarettes that contained nicotine (see Table 2). The most common methods of obtaining e-cigarettes were via a friend (57 %), retail outlet (vape shop 46 %, tobacconist 32 %), or sibling (17 %). There were no significant differences by sex or age group on these variables and only a small number of differences by tobacco use status. Never smokers were less likely to use nicotine e-cigarettes than current smokers, and both never smokers and past smokers were less likely than current smokers to source their e-cigarettes from a tobacconist (see Table 2).

The most commonly reported reason for using e-cigarettes was 'A friend used them'. This was nominated as a motivation for use by 66 %

of past/current e-cigarette users, ranging from 80 % of past tobacco users to 61 % of current tobacco users. Around one-third of past/current e-cigarette users reported vaping for each of the following cessation-related reasons: 'To help quit regular cigarettes' (38 %), 'To try to cut down on the number of cigarettes I smoke' (33 %), and/or 'To stop me going back to regular cigarettes' (30 %). Respondents could select multiple response options; dummy coding revealed that 58 % of respondents nominated at least one of these three cessation-related motivations. Past smokers (20 %) were significantly less likely than current smokers (46 %) to report using e-cigarettes 'To help quit regular cigarettes'. Around one-third of all vapers reported using e-cigarettes because they considered them to be 'less harmful than regular cigarettes' (33 %) and/or 'Out of curiosity' (31 %). 'Appealing flavors' was nominated as a vaping motivation by 28 % of past/current e-cigarette users.

Table 2
E-cigarette-related behaviors and motivations among ever users# (%) (n = 189).

	Total	Gender Females	Males	Age (years) 18–24	25–30	Tobacco use status Never	Past	Current
	n = 189	n = 72	n = 117	n = 69	n = 120	n = 16	n = 41	n = 132
Current daily use of e-cigs (Yes)	8	7	9	7	9	0	2	11
Vaped nicotine e-cigs (Yes)	65	68	63	63	65	31**	58	70
Motivations for use^								
A friend used them	66	54	74	77	64	69	80	61
To help quit regular cigarettes	38	40	37	30	40	n/a	20**	46
I think they are less harmful than regular cigarettes	33	31	34	27	34	19	22	38
To try to cut down on the number of cigarettes I smoke	33	29	35	23	35	n/a	12**	42
Out of curiosity	31	35	30	27	32	13	34	33
To stop me going back to regular cigarettes	30	31	30	27	30	n/a	22	33
Appealing flavors	28	24	30	23	28	19	20	31
How obtained								
Friend over 18	57	51	60	67	55	50	58	56
Vape shop	46	40	49	47	45	38	34	50
Tobacconist	32	29	33	13	35	6**	20**	39
Brother/sister	17	22	14	10	19	19	20	17
Where most used^								
At parties	46	43	47	43	46	25	37	51
At home, but only if outside	39	39	39	47	38	44	34	40
At home, both inside and outside	36	40	33	30	37	13	32	40
At restaurants/cafes	33	35	32	30	34	19	24	38
At my workplace	30	26	32	23	31	13	20	35
Most used flavors^								
Mint	62	54	68	53	64	63	63	62
Fruit	51	53	50	63	48	38	56	51
Menthol	49	46	50	43	50	25	51	51
Tobacco	41	33	46	30	43	13**	22**	51
Candy/chocolate/dessert	39	42	38	47	38	19	39	42

Past and current users; ^ Multiple response options could be selected; ** Different to 'Current tobacco user' at $p < .001$.

There were no significant differences in motivation outcomes by sex or age.

Parties were the most popular e-cigarette use context among those reporting past or current vaping (46 %), followed by at home (outside only 39 %, inside and outside 36 %), at restaurants/cafes (33 %), and workplaces (30 %) (see Table 2). Almost two-thirds of respondents who had vaped (62 %) selected mint as a favorite flavor, and around half selected fruit (51 %) and menthol (49 %). Other popular flavors were tobacco (41 %), candy/chocolate/desserts (39 %), and coffee (20 %). There were no significant differences in preferences for locations and flavors by sex or age and only one difference by tobacco status group – smokers were significantly more likely than never or past smokers to prefer tobacco-flavored e-cigarettes (see Table 2).

Excluding those who had never heard of e-cigarettes/vaping, just under a half (42 %) of respondents reported having at least one family member and two-thirds (63 %) reported having at least one friend who used e-cigarettes (see Table 3). Never tobacco users were significantly more likely than past and current tobacco users to have no friends (62 % vs 29 % and 11 %, respectively) and no family members (85 % vs 54 % and 28 %, respectively) who vape. Around one-third recalled 'sometimes' or 'often' seeing advertising for e-cigarettes on television, at the cinema, or on streaming services (38 %); at supermarkets/petrol stations (37 %); or on the Internet (31 %) (see Table 3). Never tobacco users were significantly less likely to report exposure to e-cigarette advertising on each of the three assessed media/locations compared to current tobacco users.

Table 4 shows results for e-cigarette beliefs. Just under two-thirds of those who had heard of e-cigarettes believed they are 'bad for health' (61 %), addictive (63 %), and contain chemicals (62 %). Correspondingly, just over one-third (38 %) believed that e-cigarette vapor is harmless water vapor. Around half believed the use of e-cigarettes can help people quit using tobacco cigarettes (52 %) and that e-cigarettes contain nicotine (51 %). There were no significant differences in beliefs by respondent attribute, with the exception of never tobacco users (44 %) being significantly less likely than current users (65 %) to believe e-cigarettes can assist people to quit smoking.

Among respondents who had never used e-cigarettes, 31 % described themselves as being curious about vaping, 27 % said they would probably/definitely use an e-cigarette if offered one by a friend, and 23 % reported an intention to use e-cigarettes in the following year. There were no significant differences in these variables by sex or age. Never tobacco users were significantly less likely than past or current tobacco users to report curiosity and use intentions in relation to e-cigarettes (Table 4).

The results of the multivariable logistical regression model are shown in Table 5. The largest odds ratios were found for past (OR 4.20, $p < .001$) and current (OR 2.58, $p < .001$) tobacco use. Male sex (OR 1.77, $p = .024$), number of family members who vape (OR 1.66, $p < .001$), and number of friends who vape (OR 1.52, $p < .001$) were also positively associated with ever e-cigarette use. Perceived harmfulness (OR 0.56, $p = .030$) and perceived addictiveness (OR 0.64, $p = .035$) were negatively associated with ever use.

In regards to respondents' support for the 14 assessed e-cigarette policies, all policies scored '3' or higher on the 5-point agreement scale and 10 received majority support with more than 50 % of respondents selecting 'Agree' or 'Strongly agree' on the five-point agreement scale (see Table 6). The policies receiving the highest levels of support were those relating to preventing access by those under 18 years of age (69 %); placing health warnings on e-cigarette packaging (68 %); ensuring packaging is child-safe (64 %); and prohibiting e-cigarette advertising featuring celebrities, cartoons, or other endorsements (63 %). The policies that failed to achieve majority support related to banning flavors that are likely to appeal to young people (50 %), allowing e-cigarettes to be only made available on prescription (45 %), banning all flavors (43 %), and prohibiting e-cigarettes that do not contain nicotine (38 %). The remaining policies received moderate levels of support.

4. Discussion

Despite the current ban on e-cigarettes in India and the penalties in place to prevent e-cigarette availability, around one in ten of the young adults who participated in this survey reported being a current vaper and a further 14 % reported having used e-cigarettes in the past. This mirrors the situation in other countries where similar bans have been unable to prevent access to and use of e-cigarettes (McCausland et al., 2021). However, only 2 % of the total sample reported being daily users, likely illustrating the important role of legislation in discouraging use.

Respondents' accounts of where they access e-cigarettes and are exposed to e-cigarette advertising suggest that despite the existence of bans on sales and promotion and substantial potential penalties, e-cigarettes are readily available in India and promoted in ways that can reach young people. This is consistent with the findings of the limited previous research conducted in India (Chakma et al., 2020; Amalia et al., 2020; Amalia et al., 2020), and indicates that increased monitoring for activities of e-cigarette producers, manufacturers, importers,

Table 3
Environmental influences by sex, age, and tobacco use status^ (%).

	Total	Sex Females	Male	Age (years) 18–24	25–30	Tobacco use status Never	Past	Current
	n = 564	n = 281	n = 283	n = 253	n = 311	n = 254	n = 103	n = 207
No. family members using e-cigs								
0	58	60	56	62	54	83*·***	54**	28
1	24	19	30	27	22	10*·***	25	41
2	11	12	10	6***	16	2*·***	12	23
3	3	5	1	2	5	1	7	5
4+	3	3	3	3	3	3	2	4
No. close friends using e-cigs								
0	37	40	34	42	33	62*·***	29**	11
1	20	21	19	22	19	15	28	23
2	21	22	20	21	22	14**	23	29
3	8	7	8	6	9	4	10	12
4+	14	9	18	9	17	6**	11	25
Exposure to advertising#								
TV, cinema, streaming services	38	40	35	39	37	28**	35	51
Supermarket/petrol station	37	37	37	31	42	28**	31	52
Internet	31	34	30	26	36	22**	29	44

^ Analyses excluded those reporting never having previously heard of e-cigarettes/vaping.
# Percent selecting 'Sometimes' or 'Often' on 4-point scale: 'Never', 'Rarely', 'Sometimes', and 'Often'.
* Different to 'Past tobacco user' at $p < .001$; ** Different to 'Current tobacco user' at $p < .001$; *** Different to 25–30 years at $p < .001$.

Table 4
E-cigarette-related beliefs and intentions (%).

	Total	Sex		Age (years)		Tobacco use status		
		Females	Males	18–24	25–30	Never	Past	Current
*Perceived e-cig characteristics^*	n = 564	n = 281	n = 283	n = 253	n = 311	n = 254	n = 103	n = 207
E-cigs are addictive	63	67	59	62	64	70	62	56
E-cigs contain chemicals	62	68	57	60	64	63	64	62
E-cigs are bad for your health	61	61	61	57	65	65	62	57
E-cigs help people quit cigarettes	52	55	49	47	57	44**	49	65
E-cigs contain nicotine	51	54	47	48	53	48	54	51
E-cigs can explode and cause injury	43	48	39	40	46	48	36	42
E-cig vapor is harmless water vapor	38	40	36	37	42	35	32	45
Never-users~	n = 651	n = 327	n = 324	n = 360	n = 291	n = 438	n = 89	n = 124
Curious to use (probably/definitely)	31	32	31	31	32	18*,**	57	61
Use if close friend offered (probably/ definitely)	27	27	27	24	30	13*,**	48	62
Intend to use in next year	23	23	22	22	23	10*,**	40	58

^ Selected 'Agree' or 'Strongly agree' on 5-point scale: 'Strongly disagree' to 'Strongly agree'; excludes those reporting never having previous heard of e-cigarettes/vaping.

~ Selected 'Probably' or 'Definitely'; excludes past/current users.

* Different to 'Past tobacco user' at $p < .001$; ** Different to 'Current tobacco user' at $p < .001$.

Table 5
Logistic regression results: Factors associated with ever/current e-cigarette use (n = 536^).

	Odds ratio	95 % CI	Standard error	P value
Sex				
Female	Reference	Reference	Reference	Reference
Male	1.77	1.07–2.91	0.45	0.024
Age	1.05	0.98–1.13	0.04	0.125
Income	0.77	0.55–1.07	0.13	0.123
Current tobacco use	2.58	1.56–4.30	0.67	<0.001
Past tobacco use	4.20	2.47–7.16	1.14	<0.001
Perceived harmfulness	0.56	0.34–0.94	0.15	0.030
Perceived addictiveness	0.64	0.43–0.97	0.13	0.035
Number of family member users	1.66	1.29–2.14	0.21	<0.001
Number of friend users	1.52	1.25–1.86	0.15	<0.001
Exposure to e-cigarette advertising	1.59	0.95–2.66	0.42	0.080

^ Analyses exclude respondents who reported never having previously heard of e-cigarettes/vaping.

transporters, retailers, distributors, and advertisers is required for the bans to have their full intended effect. The need for efforts to stem availability is also apparent in (i) the range of locations in which respondents appear able to vape without consequence and (ii) one-third of non-user respondents being curious to use e-cigarettes and around a quarter expressing the intention to vape in the following year and/or use e-cigarettes if a close friend offered them. The latter is of particular concern given many respondents reported that at least one of their close friends uses e-cigarettes and previous research highlighting the important role of friends in providing e-cigarette access to young people (Baker et al., 2019).

The results relating to respondents' beliefs about e-cigarettes highlight the need to improve knowledge of the potential harms of vaping, especially in terms of the harms associated with non-nicotine e-cigarettes. Among those who were aware of e-cigarettes, only 61 % believed e-cigarettes to be harmful and only 62 % understood that they contain chemicals. This was reflected in especially low levels of support for policies relating to banning non-nicotine e-cigarettes and flavors. Sub-optimal awareness of the potential harms of e-cigarettes could be partly due to the products being marketed as 'health cigarettes' in the early days of their introduction in India (Kaur and Rinkoo, 2015). Effective education campaigns appear to be needed to address insufficient understanding of the potential adverse health outcomes associated with e-cigarettes, both with and without nicotine.

The regression results provide further insights into factors that could

Table 6
Support for e-cigarette policies (%) (n = 840).

	Agree^	IDK	M (SD)
There should be laws to prevent people under the age of 18 from buying and using e-cigarettes	69	8	3.86 (1.27)
E-cigarette devices, e-liquids, and their packaging should have clearly visible health warning messages	68	9	3.86 (1.20)
E-cigarette packaging should be child-safe	64	11	3.73 (1.24)
Advertisements with celebrities, cartoons, or other endorsements should be prohibited	63	11	3.58 (1.19)
E-cigarette devices and liquids should be prohibited unless they have been proven to be safe and efficacious for smoking cessation	60	11	3.65 (1.18)
E-cigarettes that contain nicotine should be prohibited	60	11	3.70 (1.22)
Advertising that is misleading, such as claiming e-cigarettes to be 'safe' or 'harmless', should be prohibited	58	11	3.60 (1.21)
Nicotine concentration or volume in e-liquids should be at low levels that prevent users becoming more addicted	57	12	3.60 (1.20)
E-cigarette advertising and promotion that may encourage use by young people should be prohibited	55	11	3.54 (1.21)
E-cigarettes should be subject to the same regulations as tobacco cigarettes	53	10	3.45 (1.26)
Flavors that may appeal to young people and contribute to addiction (e.g. confectionary, dessert, cannabis, soft drink, energy drink, fruit, mint) should be prohibited	50	10	3.40 (1.21)
E-cigarettes should be treated as if they are prescription medicines – i.e., only sold with a prescription in pharmacies	45	11	3.21 (1.25)
All e-cigarette flavors, including menthol, should be prohibited	43	11	3.22 (1.23)
E-cigarettes that do not contain nicotine should be prohibited	38	13	3.00 (1.23)
Average	60	11	3.53 (1.22)

^ Selected 'Agree or Strongly agree' on a 5-point 'Strongly disagree' to 'Strongly agree' scale.

IDK = selected 'I don't know' response; Means calculated including all responses except 'I don't know'.

be the focus of efforts to reduce e-cigarette use among educated young people in India. Consistent with previous international research, of the assessed variables being a past or current tobacco user was most strongly associated with e-cigarette ever use (Ahmad et al., 2022; Chan et al., 2019; Vuolo et al., 2021). However, while almost half of current tobacco

users (46 %) reported using e-cigarettes to help them quit smoking, only 20 % of past users reported having used them for this purpose. Although dual use of tobacco and e-cigarettes among young people can reflect cessation intentions, there is some evidence that dual use can result in higher sensitivity to smoking cues, resulting in greater smoking urges and behavior, creating a barrier to quitting (King et al., 2021). The results of the present study indicate the need for affordable, evidence-based tobacco-cessation aids to be made more available to tobacco users to facilitate successful quit attempts. Male sex was another important predictor of e-cigarette use, which is also consistent with previous international research (Ahmad et al., 2022; Omoike and Johnson, 2021; Walker et al., 2020), and mirrors trends for other substances such as alcohol and cannabis (Fairman et al., 2019; Wilsnack et al., 2018). Tobacco users and males thus appear to be important target groups for interventions designed to encourage compliance with India's e-cigarette ban.

The identified association between e-cigarette use and having friends and family members who vape, along with more than two-thirds of vapers citing having friends who vape as a motivation for using e-cigarettes, reflects the emphasis in social learning theory on individuals mimicking the behaviors of those in their social environments (Rocheleau et al., 2020). This highlights the importance of preventing further take-up of e-cigarettes to minimize non-users' exposure to peers' vaping behaviors. Key elements of strategies designed to reduce exposure to peer vaping are likely to include implementing and enforcing bans on vaping in public places (such bans are not currently in place, likely due to the overall ban on sales) and identifying and addressing instances of e-cigarette advertising. In terms of the latter, the majority support found for policies involving bans on advertising indicates this would be an acceptable approach among members of this population group.

Finally, the identified negative associations between e-cigarette use and perceived harmfulness and addictiveness identified in the regression results suggest that education campaigns focusing on health outcomes of vaping may provide young adults with new information that can inform their use decisions (Rohde et al., 20222022; Villanti et al., 2021). This is likely to have the added benefit of increasing support for more active monitoring and enforcement of the existing bans (Diepeveen et al., 2013).

4.1. Limitations and future research directions

Participant recruitment for this study was undertaken via the use of a web panel provider, which limits the generalizability of the results. The use of age and sex quotas is likely to have ameliorated this issue to some extent, but the results can only be considered tentative. In addition, as the focus was on young adults with some level of tertiary education, the findings cannot be regarded as indicative of the e-cigarette-related beliefs and behaviors of other population groups or the Indian population in general. Further work is needed to obtain more comprehensive and robust prevalence and attitudinal data within this cohort and the broader population. Similarly, the cross-sectional nature of the study design means the regression results can only be interpreted as providing insights into associations between e-cigarette use and a range of variables; longitudinal research is required to enable assessment of causation. Finally, the use of survey items referring to 'even once or twice' usage of e-cigarettes and tobacco products yielded a fairly blunt analysis that did not examine differences according to intensity of use. This represents an important area of future research in the Indian context.

4.2. Conclusion

This study adds to the limited body of research examining e-cigarette-related attitudes and behaviors in low- and middle-income countries. India appears to be in the enviable position of having low rates of vaping due to the introduction of comprehensive bans on the supply and promotion of e-cigarettes. The finding that 33 % of this sample did not appear to be familiar with e-cigarettes is a credit to India's vaping prevention efforts to date. However, results also indicate that (i) e-cigarettes are available and being promoted despite the bans, (ii) a sizable minority of educated young adults who have never vaped are vulnerable to future e-cigarette use, and (iii) exposure to vaping within family and peer groups could be a conduit via which vaping rates increase over time. More intensive monitoring and enforcement of existing regulations could assist in preventing greater uptake in the future.

CRediT authorship contribution statement

Simone Pettigrew: Conceptualization, Methodology, Funding acquisition, Project administration, Writing – original draft. **Joseph Alvin Santos:** Formal analysis, Writing – review & editing. **Mia Miller:** Formal analysis. **Thout Sudhir Raj:** Methodology, Writing – review & editing. **Min Jun:** Methodology, Funding acquisition, Writing – review & editing. **Georgia Morelli:** Investigation. **Alexandra Jones:** Funding acquisition, Writing – review & editing.

Declaration of Competing 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.

Data availability

Data will be made available on reasonable request.

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