School staff perceptions of the nature and consequences of students' use of e-cigarettes

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Abstract

Objective: The aim of this study was to assess the nature and consequences of student vaping in Australian primary and secondary schools by consulting staff working in these settings.

Methods: A national sample of 196 school staff was accessed via a web panel provider and administered an online survey about students' e-cigarette use. Three-quarters of the survey respondents were teachers/teacher aides, with the remainder divided between those in other student-facing roles and office staff.

Results: A majority (78%) of respondents expressed concern about current levels of vaping in schools. Around half reported negative outcomes relating to mental well-being, social/peer interactions, and school performance. Only one-third of respondents reported a vaping policy (35%) or vaping-prevention education (31%) being in place at their schools.

Conclusions: E-cigarette use in schools is an area of concern for school staff, yet relevant policies and education programs appear to be lacking.

Implications for public health: Schools represent a key context for encouraging health promoting behaviours and discouraging harmful behaviours, including vaping. These results highlight the need to monitor and address student e-cigarette use in schools and provide staff with greater support to prevent the negative consequences associated with vaping by children at school and beyond.

Key words: e-cigarettes, vaping, students, schools, teachers

Rates of youth vaping are increasing across the world,[1] including in Australia where there are strict regulations governing the availability of e-cigarettes.[2,3] While there remains a degree of controversy within public health about the extent to which e-cigarettes should be made available to the public to assist smoking cessation efforts,[4] there is general agreement that under-age use of the devices is to be avoided because of the associated adverse health consequences and the potential for children and youth to become addicted to nicotine.[5,6]

Schools are recognised as important venues for vaping prevention interventions because of: (i) the critical role of peer influence in affecting e-cigarette uptake,[7] (ii) the extent to which children and youth have been found to be exposed to students vaping on school premises,[8,9] (iii) the demonstrated association between noticing peers vaping at school and becoming a user[10,11] and (iv) school use being an indicator of greater overall vaping frequency among students.[12] Schools also constitute settings in which children are exposed to education about the harms associated with e-cigarette use and policies that aim to minimise exposure and reinforce messages about the importance of avoiding these products.[8–10] In addition, they provide an opportunity to efficiently reach young people *en masse* in an environment conducive to learning.[8]

To inform the development of effective school-based vaping-prevention interventions, it is important to understand the nature and consequences of students' use of e-cigarettes at school. This includes understanding students' motives for vaping; where and when vaping is occurring on school grounds; and how students' moods, behaviours and school-related performance are being affected.[11–13] Interventions described in the international literature include staff training programs; online resources for students, parents and teachers; student screening programs; sensor-alarm systems in bathrooms; and prohibiting long sleeves to prevent students from exhaling vapour into their sleeves to avoid detection.[14]

To date, most research on student vaping has been conducted in the United States and focused on secondary students, especially those in their senior years.[9,11,15,16] However, rapid increases in e-cigarette use among middle school students (approximately 11-13 years of age) and an identified lower level of awareness of vaping-related harms and stronger usage intentions among this cohort has resulted in calls for more work to focus on younger students.[15–17] Very little is known about the vaping activities of primary school children and this is an area in need of much greater attention in the face of international evidence suggesting increasing prevalence of e-cigarette use among younger children.[18]

The aim of the present study was to extend the limited data available on Australian

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students' vaping behaviours by assessing the nature and consequences of e-cigarette use in primary and secondary schools. Given the lack of prior work with primary school aged children in particular and the ethical and access issues associated with discussing this topic with young children, an exploratory approach was adopted that involved surveying staff working in schools. While one step removed from direct reporting by children and therefore potentially less accurate, this approach had the benefit of collecting data from individuals who have regular contact with large numbers of children and also enabled access to information about the steps being taken by schools to address youth vaping, including on school premises.

Method

The study received approval from the University of New South Wales Human Research Ethics Committee. An online survey was administered to staff working in Australian schools who were members of an ISO-accredited web panel (Pureprofile). The survey was in field from 22 November to 9 December 2021.

Survey instrument

The survey instrument comprised items relating to respondent demographics (sex, role in the school, age of students with whom they work), school characteristics (school type, postcode, number of students enrolled), and respondent perceptions of a wide range of e-cigarette-related factors. The latter included estimations of the current prevalence of vaping in their schools ("What is your impression of how common e-cigarette use is among students at your school?": five response options ranging from 'No students vape' to 'A large number of students vape'); observations of changes in prevalence of vaping and smoking over the previous two years (two questions: "Have you noticed an increase in *e-cigarette/tobacco* use among students at your school over the last two years?": 'Yes', 'No', and 'I don't know' response options); level and nature of concerns about observed changes in vaping prevalence ("How concerned are you about the rise of e-cigarette use among adolescents?": five-point scale 'Very unconcerned' to 'Very concerned'; "What are your biggest concerns with students' use of e-cigarettes?": nine response options[19]); students' motivations for using e-cigarettes ("Why do you think students at your school use e-cigarettes?": 25 response options[20–22]); observed changes in students' moods, behaviours, and school performance (two items: Which of the following *moods/behaviours* have you noticed among students after they vape?: 12 and nine response options, respectively[19]); times ("At your school, at what time of day do students vape?") and locations ("In which areas of your school do students vape?"[12,19,23]) at which students vape at school; methods by which students access e-cigarettes ("Where, or from whom, do you think your students obtain their e-cigarettes/vaping devices?: 16 response options[24]); and the existence and nature of school policies relating to e-cigarettes ("Is vaping prevention a topic taught in your school?" and "Does your school have a vaping policy?": 'Yes', 'No', and 'I don't know' response options). Where available, survey items were sourced from previous questionnaires while others were developed specifically for this study in consultation with experts from a range of government and non-government organisations to ensure the results would be useful for school administrators, policy makers and health advocacy groups.

Sample

In total, 199 responses were received from individuals working in primary, secondary and combined primary/secondary schools throughout Australia. School postcode and student body size were used to identify any instances of multiple respondents from the same school, resulting in data from one respondent being excluded (the second respondent from the school to complete the survey). Two additional exclusions were made due to school characteristics (a distance education school and a specialist learning institution with very small student numbers), yielding a final sample of 196 school staff.

The profile of the sample is shown in Supplementary Table S1. Three-quarters (76%) of the respondents were teachers or teacher aides, with the remainder divided between those in other student-facing roles (e.g. principals, counsellors and librarians) and office/grounds staff. Seventy per cent of respondents were employed at government (public) schools and the remainder at independent (private) schools. Respondents from primary schools constituted 42% of the sample, 37% from secondary schools and 20% from combined primary/secondary schools. To facilitate comparisons between the experiences of those working with younger and older children, respondents were categorised according to whether they taught children of primary or secondary school age. In a small number of cases (n=8) this was not possible due to respondents working with students across both age categories. Geographic distribution of the sample was generally consistent with that of the broader population[25,26]; for example, just over half the sample (57%) was sourced from the two most populous states (New South Wales and Victoria) and around a quarter of respondents (28%) represented schools located outside the metropolitan area.

Results

Across the sample, 61% of respondents reported that at least some of their students use e-cigarettes, ranging from 35% of those working with primary school aged children to 84% of those working with secondary school aged children. Half (51%) reported an increase in e-cigarette use among students in their schools over the past two years, ranging from 27% of respondents working with primary school students to 72% of those working with secondary school students (see Table 1). Just under a quarter (22%) reported an increase in smoking over the same time period (15% primary, 28% secondary). More than three-quarters (78%) of respondents expressed concern (i.e. selected 'Concerned' or 'Very concerned') about increasing e-cigarette use among adolescents (73% primary, 83% secondary), with the largest sources of concern being the effects of chemicals in e-cigarettes (65%), students becoming addicted (59%), and the health effects of vaping (58%). There were few notable differences according to school type (government vs independent schools), the main exception being a larger proportion of staff from independent schools expressing concern about the mislabelling of e-cigarette ingredients (40% vs 27%).

Respondents reported their perceptions of students' motives for using e-cigarettes (Supplementary Table S2). The most commonly cited motives were 'They think they are cool or intriguing' (50%), 'They think they are less harmful than regular cigarettes' (46%), 'Out of curiosity' (44%), and 'A friend uses them' (42%). This ranking was consistent across the results for primary and secondary school respondents and very similar between

government and independent schools. Only small proportions of respondents believed that students use e-cigarettes for cessation-related purposes: 9% thought they used them 'To help them quit smoking regular cigarettes', 8% 'To stop them from going back to smoking regular cigarettes', and 7% 'To try to cut down on the number of cigarettes they smoke'. In almost all cases, these cessation-related motives were reported by staff working with secondary school aged children. The results for the full range of assessed motives are available in Supplementary Table S2.

Among respondents reporting student e-cigarette use at their schools, various student- and school-level consequences were identified (Table 2). Over half perceived there to have been deterioration in students' mental wellbeing (57%), social/peer interactions (55%) and sporting performance (52%), and just under half (43%) reported negative effects on students' academic performance. These trends were apparent across both primary and secondary school staff, but there was a notable difference between government and independent schools for deterioration in academic performance (49% vs 30%, respectively). Around one-third of respondents had observed adverse changes in students' moods and behaviours resulting from vaping, including increased irritability (38%), greater restlessness (34%), decreased class attendance (34%) and increased tardiness (31%). Government school staff were typically more likely than independent school staff to report these outcomes. More than half of respondents representing primary (56%) and secondary schools (56%) who reported at least some students using e-cigarettes were of the view that student e-cigarette use had caused a shift in school culture. While only 14% of the total sample reported impacts of student e-cigarette use on teaching style, this was more notable among the staff from independent schools (21% vs 11%).

Respondents reporting e-cigarette use at their schools were also asked to nominate the times and locations at which students were most likely to use e-cigarettes on school grounds. The most common times for primary school students were reported to be after school (33%), before school (23%) and lunchtime (18%). By comparison, the top three times for secondary school students were lunchtime (57%), after school (38%) and free periods (36%). The most common locations on school grounds for

Table 1: School representatives' observations and concerns relating to e-cigarette use among students (%).

	Total (n=196)	Age category of children			School type	
		Primary (n=86)	Secondary (n=102)	Combined (n=8)	Government (n=138)	Independent (n=58)
How common is e-cigarette use among students						
No students vape	28	54	7	13	28	28
Very small number of students	27	21	30	38	25	29
Small number of students	15	8	23	0	17	10
Moderate number of students	16	4	28	13	15	19
Large number of students	3	2	3	0	2	3
Don't know	12	12	10	38	12	10
Increase in vaping in last 2 years (Yes)	51	27	72	38	49	53
Increase in smoking in last 2 years (Yes)	22	15	28	13	24	17
Level of concern[a]	78	73	83	50	78	76
Biggest concerns[b]						
Unknown effects of chemicals	65	64	66	75	64	67
Addiction	59	58	59	63	61	53
Health effects	58	55	58	88	49	60
Lack of education about e-cigs	46	48	44	63	44	52
Gateway to other drugs	38	44	33	25	36	41
Illegal	30	28	29	50	28	34
Mislabelling of ingredients	31	33	28	50	27	40
Drug use via devices	21	26	19	13	20	24

Notes:
a: Selected 'Concerned' or 'Very concerned' on a 5-point 'Very unconcerned' to 'Very concerned' scale
b: Multiple responses permitted

Table 2: Observed changes resulting from students' e-cigarette use (%).[a]

	Total	Age category of children			School type	
		Primary	Secondary	Combined	Government	Independent
Altered outcomes[b] (n=143)						
Academic performance	43	41	46	14	49	30
Sporting performance	52	51	54	29	52	51
Social/peer interactions	55	61	55	29	57	51
Mental well-being	57	51	60	43	55	60
Shift in school culture	55	56	56	29	53	58
Affected teaching style	14	10	16	14	11	21
Altered moods[c] (n=140)						
Irritated	38	35	39	33	41	14
Distant	27	25	29	17	32	17
Stressed	23	20	26	0	26	17
Bored	23	13	28	17	24	19
Angry	16	13	18	0	16	14
Altered Behaviours[c] (n=140)						
Restlessness	34	33	36	17	37	29
Decreased class attendance	34	35	34	17	35	31
Tardiness	31	20	38	0	36	21
Frequently leaving during class	29	18	34	17	31	24
Loudness	15	13	17	0	14	17
Greater risk taking	15	23	13	0	15	14

Notes:
a: Asked of those reporting e-cigarette use at their schools
b: Those selecting 'Agree' or 'Strongly Agree' on a 5-point 'Strongly Disagree' to 'Strongly Agree' scale
c: Multiple responses permitted

both primary and secondary students were bathrooms (33% primary, 49% secondary), right outside the school (33% primary, 47% secondary) and on sports fields (25% primary, 38% secondary). Across the time and location variables, higher prevalence rates were typically reported by respondents representing government schools compared to those from independent schools (Supplementary Table S3 provides detailed results).

Among respondents reporting e-cigarette use at their schools, the most commonly cited access sources were friends aged 18+ years (54%), getting someone else to buy them (50%), siblings (39%), buying them on the Internet (36%) and taking them from home without permission (35%). Sixteen per cent of respondents reported that students were given e-cigarettes by their parents/guardians (see Supplementary Table S4). There were some differences by school type, with larger proportions of those working with primary school aged children nominating access via siblings (45% primary vs 39% secondary) and taking from home without permission (45% primary vs 31% secondary). By comparison, secondary school aged children were reported to be more likely than primary school aged children to obtain e-cigarettes by getting someone else to buy for them (52% vs 45%), receiving them from a friend aged 18+ years (55% vs 50%) and via the Internet (38% vs 28%). Staff from government schools more frequently nominated parents as being sources of students' e-cigarettes, either directly or indirectly. Direct parental provision was reported by 21% of government school staff compared to 5% of independent school staff, and taking e-cigarettes from home without permission (i.e. indirect provision) was reported by 41% of government school staff compared to 21% of independent school staff. Results for all assessed categories of sources are provided in Supplementary Table S4.

All respondents were asked about the e-cigarette-related policies and procedures in place at their schools (see Table 3). Only 35% reported the existence of a vaping policy and 31% reported vaping prevention education being provided to students. These proportions varied substantially by school type, with nearly half of respondents from secondary (48%) and independent schools (43%) reporting an existing vaping policy, compared to 22% of respondents representing primary schools and 32% from government schools, respectively. Similarly, vaping prevention education was reported by 43% of independent school respondents compared to 27% of government school respondents. Just one-quarter (24%) of respondents felt that existing policies at their schools were effective in reducing e-cigarette use by students, although satisfaction was somewhat higher among those from independent schools (34% vs 19% of government school respondents).

Strong support was expressed for greater efforts to involve parents in initiatives to reduce students' use of e-cigarettes (73%) and the provision of at-school counselling and support services for students with vaping-related problems (70%) (see Table 3). There was also support among at least half the sample for suspending students caught using, selling, or in possession of e-cigarettes (58%); increasing supervision in vaping hot spots on school grounds (51%); allocating greater resources to student education (51%); and providing more resources for disciplinary action (51%). There were substantially higher levels of support from respondents working with secondary school aged students for most assessed initiatives and somewhat higher levels of support among respondents from independent schools.

Discussion

Consistent with research in other jurisdictions,[13–15] many of the survey respondents reported an increase in e-cigarette use at their schools in the previous two years and most reported being concerned about current levels of student vaping. These outcomes were particularly notable among those working with secondary school students, where almost three-quarters reported an increase in numbers of students vaping and one-third estimated that moderate to large proportions

Table 3: School vaping policies (%).

	Total (n=196)	Age category of children			School type	
		Primary (n=86)	Secondary (n=102)	Combined (n=8)	Government (n=138)	Independent (n=58)
Smoking prevention taught (Yes)	55	52	58	50	52	62
Vaping prevention taught (Yes)	31	31	33	13	27	43
Vaping policy in place (Yes)	35	22	48	13	32	43
Perceptions of school approaches to vaping[a]						
Parents should be more involved in initiatives to curb e-cigarette use among students	73	64	81	75	73	74
Schools should offer at-school counselling and support services to students who have vaping-related problems	70	61	78	75	70	72
Students who are caught using, selling, or in possession of e-cigarettes should be suspended	58	55	62	50	57	62
My school should increase supervision in areas in the school where vaping is commonly practiced by students	51	38	64	38	51	53
Greater amounts of resources (e.g. funding, support staff) need to be allocated to education efforts on vaping for students at my school	51	45	56	50	49	55
Greater amounts of resources (e.g. funding, support staff, etc.) are needed in disciplinary efforts to curb vaping in my school	51	40	61	50	48	59
My school has provided sufficient education to school staff about e-cigarette use among students	32	29	34	25	32	31
My school has equipped me properly to manage students who vape at school	32	26	37	25	31	33
My school has implemented effective health education efforts for students in regards to e-cigarettes	31	27	34	38	27	41
Students engage well with e-cigarette health education at my school	27	28	25	38	22	36
Existing e-cigarette polices at my school are effective in reducing e-cigarette use among students	24	23	24	25	19	34

Notes:

a: Those selecting 'Agree' or 'Strongly Agree' on a 5-point 'Strongly Disagree' to 'Strongly Agree' scale

of the student body vape. While the estimates from those working with primary school children were much smaller, it is concerning that more than a quarter of those working with this age group had observed increases in student vaping over the previous two years. This points to the potential value of routinely collecting e-cigarette use data from primary school students to complement current data collection activities in secondary schools (i.e. the periodic Australian Secondary Students' Alcohol and Drug Survey[2]).

Overall, the results of this study indicate the need for effective vaping policies in Australian schools. Around two-thirds of respondents were not aware of such a policy existing in their schools, highlighting the need to review this situation and address omissions. Similar observations have been made about the inadequate coverage of vaping prevention in school policies internationally.[8,9,13] When developing such policies, schools would benefit from a detailed understanding of why, where and when students vape and how they are sourcing the products. The results of the present study provide initial insights into these issues in the Australian context as outlined below.

In terms of 'why' students vape, the main motives reported by school staff representing both primary and secondary schools were that students perceive e-cigarettes to be cool/intriguing and less harmful than regular cigarettes and they are curious about them. Few respondents perceived smoking cessation to be a relevant motivation. This finding points to the importance of educating students about vaping-related harms, including the addiction outcomes associated with nicotine e-cigarettes. Education programs for students and teachers are being developed around the world, with evaluations indicating they can produce meaningful results and are therefore a worthwhile investment of resources.[16,27] The survey respondents noted the importance of including parents in vaping-prevention initiatives, which is aligned with previous work finding that (i) youth can perceive favourable parental attitudes to vaping (hence parents are likely to need additional information about vaping-related harms) and (ii) school staff believe parents to be vital participants in effective vaping interventions.[13,15,18] A further consideration is whether e-cigarette interventions are delivered stand-alone or combined with content relating to other substances. Aside from the similarities with smoking,[14] there appears to be an association between vaping and alcohol use among adolescents,[28,29] indicating that there may be benefits from addressing these issues simultaneously.

While education can address knowledge deficits, it will likely need to be supplemented with strategies that reduce perceived 'coolness'. The latter could include reducing students' exposure to e-cigarettes on school grounds through effective monitoring of student vaping behaviours and active enforcement of school vaping policies. Such efforts are complicated by the industry facilitating 'stealth vaping' through product innovations that make it easier to conceal vaping activity.[30,31] However, many of the school staff responding to the present survey were able to nominate relevant locations and times for student vaping, indicating that strategies can be put in place to address these instances. Reports of vaping in bathrooms, car parks and outside on school grounds are consistent with previous studies conducted in other countries[11,23] and these appear to constitute important locations for monitoring activities. If school staff are noticing vaping in these areas, then it is highly likely that other students are also observing this activity, potentially adding to their curiosity and intentions to use.

Consistent with the results of the most recent Australian Secondary Students' Alcohol and Drug Survey conducted in 2017,[2] the most commonly cited sources for students obtaining e-cigarettes were friends and family members. Of particular note was the reporting by those working with primary school aged children and those from government schools that students were bringing e-cigarettes from home without their parents' knowledge. This reinforces the importance of including parents in vaping-prevention interventions to work towards closing this access opportunity and encouraging parents to exert influence over family members who are providing e-cigarettes to their younger siblings. Any such interventions will need to address the dual issue of (i) providing parents with information and motivation to communicate with their children about vaping-related harms and (ii) encouraging parents who vape to ensure their e-cigarettes are not accessible by their children. Importantly, the onus should not be placed on individual schools to develop and deliver such interventions – a comprehensive approach is required that involves policy makers, public health agencies and health practitioners.[14] Further research is required to assess optimal methods of delivering such interventions.

The primary limitations of this study were the use of a non-probability web panel and a modest sample size (although it is larger than several other international studies examining school staff members' views on students' e-cigarette use[13,18,19,23]). The results are therefore tentative and additional research using alternative data collection methods and larger samples would be beneficial to assess the situation in a wider range of schools. A further limitation is the reliance on staff members' perceptions of students' motivations and behaviours. While suboptimal, this approach was especially useful for obtaining insights into the situation in primary schools given the ethical complications associated with questioning young children about substance use. Finally, no attempt was made to differentiate between nicotine and non-nicotine e-cigarettes. This decision was taken in consideration of previous Australian research demonstrating that e-cigarette products are often labelled incorrectly and therefore many users do not know whether their e-cigarettes contain nicotine.[32] This situation prevents school staff from knowing with any certainty the content of e-cigarettes used by students.

In conclusion, the results of this study indicate that many Australian school students can readily access e-cigarettes and that vaping behaviours in schools are becoming more prevalent, including in primary schools. These outcomes are noteworthy given the legislation in place in Australia to restrict access to e-cigarettes, especially among children. Respondents were able to nominate a wide range of sources from which children are accessing e-cigarettes and to describe adverse physical, cognitive, affective and behavioural outcomes resulting from children vaping at school. A first step is for all schools to have effective vaping policies and education programs in place, which in turn will require adequate resourcing. While the responsibility for these actions falls on schools, communities and governments should also acknowledge the growing vaping problem among children and take steps to avoid further exacerbation of this trend.

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Supporting Information

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

Supplementary Table 1: Sample profile (n=196).

Supplementary Table 2: Perceived motivations for students' use of e-cigarettes (%).

Supplementary Table 3: Most common times and locations for e-cigarette use at school (%).

Supplementary Table 4: Students' sources for obtaining e-cigarettes (%).