The effect of an educational intervention on high school students' knowledge about vaping-related risks and expressed desire to quit vaping

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ABSTRACT

AIM: Electronic cigarette use (vaping) has increased rapidly among adolescents globally. Most electronic cigarettes (e-cigarettes) contain nicotine, which is addictive and can cause behaviour problems and mood dysregulation. We sought to assess whether an educational intervention increased knowledge about vaping-related health risks and desire to quit among high school students. We assessed whether the effects differed between in-person or online intervention.

METHOD: The analysis included 332 students from four high schools in Ōtautahi Christchurch. Students were randomly assigned to an in-person or online group and completed pre- and post-intervention questionnaires. Risk factors for smoking and vaping were assessed with logistic regression. Schools' socio-economic status was imputed from their Equity Index rank. Intervention effects were assessed with and without demographic covariates using mixed-effect linear regression.

RESULTS: Students attending schools in lower socio-economic areas and those with Māori ethnicity were at greater risk of smoking and vaping. Risk of smoking increased with year level; however, risk of vaping did not.

There was significant improvement in responses to 3 out of 10 knowledge questions, and there was no evidence that post-intervention scores were affected by participant characteristics. The in-person group showed higher percentage improvements than the online group. Expressed desire to quit vaping increased from 61.7% to 68.8%; however, there was significantly greater desire to quit vaping in students from years 9 and 10 than years 11 and 12 (P=0.043).

CONCLUSION: Our educational intervention improved the knowledge of high school students on vaping-related health risks and increased expressed desire to quit vaping.

The use of electronic cigarettes or e-cigarettes, commonly known as vaping, has been rapidly increasing globally over the past decade, particularly among youth and young adults. In this paper, we define youth as people aged younger than 18 years old and young adults as people aged 18–24 years old. Youth vaping is an evolving public health concern in many countries, including Aotearoa New Zealand. Recent data show that in 2023, 16.4% of youth in Aotearoa New Zealand aged 14–15 years old used an e-cigarette in the past month (currently vaped).[1] In other countries in 2022, regular e-cigarette use was 11.8% among 14–17-year-olds in Australia,[2] 9.4% among 11–18-year-old students in the United States (US)[3] and 6.9% among 11–17-year-olds in the United Kingdom (UK).[4]

Although it is illegal in most countries to sell e-cigarettes (typically known as vapes) to people under the age of 18 years,[4,5] this has not stopped youth from vaping. Many youth vape out of curiosity, for fun/enjoyment of flavours and to vape with friends and peers.[4,6,7] The novelty and trendy looks of the thousands of vape devices that are constantly evolving have also made vapes popular among youth.[8]

Published results suggest family and friends are key sources of vape products for youth. In Aotearoa New Zealand, most youth get their vapes from friends/peers (53%) or other social contacts, including family members.[6,7,9] Friends are common sources in Australia (63–70%)[8,10] and the UK (46%).[4] Purchasing from a store is the predominant way of acquiring vapes among youth in the US (78%)[11] and the UK (48%).[4] Borrowing another person's vape is part of most vape users' social experience.[11]

Most vapes contain nicotine, which is highly addictive. Nicotine exposure in adolescence has a range of behavioural effects that can last into adulthood, including increased rewarding effects of abused drugs, deficits in cognitive function,

emotional dysregulation and sleep problems.[12,13] Further, serious lung injury has been reported from specific vaping ingredients, including bronchiolitis obliterans.[14,15] There is also evidence that vapes can deliver a range of potentially harmful chemicals and compounds (including heavy metals)[16] deep into the small airways.

Despite the known and the unknown long-term health risks, e-cigarette companies, many of which are owned or part-owned by tobacco companies,[17] have employed complex targeted marketing tactics to attract youth into vaping.[17,18] Legislation to reduce youth access to vaping products, close loopholes to marketing to youth and regulate the product flavours and nicotine content are key to managing this problem. Alongside these legislative measures, youth need to be adequately informed about vapes and vaping, with a goal to help reduce the misconception that e-cigarettes are harmless, desirable leisure products, and to inform youth about the involvement of the tobacco industry in manipulating the attractiveness of vaping to them. Effective interventions are needed to support students who have not started vaping not to start and students who wish to quit vaping do so. A possible approach is through targeted education; however, there is limited information about this in Aotearoa New Zealand. A 2020 US study (n=235) found a 14% increase in knowledge scores of students about vaping-related health risks after a 50-minute educational presentation.[19]

In this pilot multi-locality randomised interventional study with a pre- and post-intervention comparison group design we evaluated 1) whether a targeted educational intervention increased knowledge of high school students about vaping-related health risks and desire to quit vaping, and 2) whether the effects differed depending on delivery of the intervention (in-person vs online).

Data from the New Zealand Health Survey show persistently higher vaping rates in Māori and Pacific peoples;[20] hence, we sought to include a range of ethnicities and schools with diverse deprivation indices in the study and assessed how these demographics impacted our results.

Methods

Participants

This study was approved by the Human Ethics Committee (Health) of the University of Otago (H22/080) and all guidelines of the Māori Health Advancement programme were followed.[21] The study was conducted with students in years 9–12 (89% aged 13–15 years) at high schools in Ōtautahi Christchurch, Aotearoa New Zealand. The inclusion criteria included: current enrolment in a participating school, being physically present on the day of the intervention and providing a valid consent or assent to participate. Our target was to recruit 120–160 students in each group.

We contacted all 23 high schools in Ōtautahi Christchurch through the Canterbury West Coast Secondary Principals' Association (CWCSPA) to assess interest in the study. There was a very low response (one school expressed interest to participate), which continued despite a further follow-up through CWCSPA. We decided then to directly approach schools that we had connections with (through research or personal links) and that had a spread of decile levels and a mix of private/public and single sex/co-educational schools. Our final sample was a convenience sample of four high schools in Ōtautahi Christchurch. We engaged with each school to cause minimal disruption and tailor the student selection method to each school. The final decision on the number of students and classes or year levels that participated in the study was made by the individual schools. However, these were entire classes/year levels; for example, all students in year 9 (one or more streams) at school A.

Procedures

Block randomisation was used to assign students to one of two intervention groups. In schools where uneven numbers of classes/year levels of students were available, students were invited to sit in one classroom and class teacher(s) grouped them into two equal-sized groups that were randomly assigned to in-person or online intervention. In schools where an even number of classes participated, the research team randomly assigned whole classes to one of the two study groups.

Participants were assigned a participant number encoding the school, the year-level and the individual. Participants in the in-person group wrote the participant number on pre- and post-intervention questionnaires to allow for matching of responses, while participants in the online group used the numbers to access the study on Qualtrics.

In-person group

Participants were allowed 10–15 minutes to independently complete a pre-intervention survey, which was collected immediately before the intervention. The intervention included a 10–15-minute interactive discussion about vapes

and why youth vape, nicotine addiction, vape clouds (the aerosol or mist that is exhaled when vaping) and potential harms of vaping and the role of the tobacco industry in e-cigarettes. The discussions were facilitated by research assistants recruited from students at two local universities, a majority of whom were studying a health science course. Training was provided before research assistants visited schools.

During the intervention, students were encouraged to make informed decisions based on available evidence, and general quit vaping advice was provided. After the intervention, students were allowed 10 minutes to complete the post-intervention survey—less time was allocated for this task because demographic questions were removed.

Online group

Participants completed the entire study (pre- and post-intervention surveys and the intervention) online at a single sitting. Once participants opened the Qualtrics survey web page and consented to participate by ticking "Yes" in response to "Would you like to participate in this research?", they were prompted to enter their participant number before proceeding to complete a pre-intervention survey, watch a 5-minute educational video (intervention—included all information discussed in the in-person group) and complete a post-intervention survey. Participants were not allowed to go back and change their previous answers.

Measures

Demographic information included participant's age, gender and ethnicity using validated question items.[7] Street name and suburb were optional, and many students did not provide this information.

The questionnaires used validated items[22,23] to measure knowledge on the risks associated with vaping, and desire to quit vaping before and after the intervention. The questionnaires included items that assessed prevalence and patterns of vaping and smoking, reasons for vaping, perception of harmfulness of e-cigarettes compared with tobacco cigarettes and intentions to quit vaping. "Current vaping" was defined as vaping at least monthly, and "regular vaping" was defined as vaping at least weekly. We used "skip logic" to direct participants to relevant questions; for example, intention to quit was only asked of participants who vaped.

We assessed responses to 10 knowledge questions (six "true/false" and four "agree/disagree") and one additional "agree/disagree" question. The true/false questions included: "Some vapes are safe for youth"; "Most vapes contain nicotine"; "Nicotine is an addictive drug"; "Nicotine harms brain development"; "Vapes create a harmless water vapour" and "The tobacco industry is in the vape game".

The four agree/disagree knowledge questions included: "Vaping can cause lung damage"; "Vaping is addictive"; "Vaping will harm a person's health over time" and "Vaping can help people who smoke quit". The additional agree/disagree question was "Vaping makes one more socially acceptable to their friends".

Statistical analysis

Data have been aggregated across schools to ensure confidentiality of students and schools. Previously published[24,25] risk factors for smoking and vaping (male sex, Māori identification, year level and school Equity Index) were assessed with logistic regression. Schools' socio-economic status was imputed with the rank of their Equity Index.[26] Intervention effects were assessed with and without demographic covariates using mixed-effect linear regression of pre- and post-intervention scores with a random effect for participant.

There was no evidence that knowledge differed systematically between schools (maximum intra-class correlation coefficient [ICC] 0.041), so effects of schools as clusters were ignored. Multiple comparisons were accounted for by the Bonferroni method and differences in numbers of students planning to quit were tested with the mid-P exact test, and where 0 responses were recorded, the small sample correction was used. All analysis was performed using R version 4.2.1 (Vienna, Austria), with models fitted and assessed using the lme4, lmerTest and performance packages.

Results

The analysis included 332 students from four schools. About 89% of participants were aged 13–15 years; 82% identified as New Zealand European and 52% were female, **Table 1**. Slightly more students participated online (56%) than in person. Overall, more students reported ever vaping than ever smoking (42.5% vs 19.6%). Current and daily vaping (15.1% vs 6.6%) was higher than current and daily smoking (3.3% vs 6.6%). The rates of ever smoking in the four schools were 2.3%, 12.8%, 18.6% and 26.8% by increasing level of deprivation, indicating that on this gradient, the

Table 1: Demographic characteristics of study participants (n=332), ever smoking and vaping.

		Total		Ever smoked		Ever vaped	
		Row totals	% of Total N	n	% of Row total	n	% of Row total
Total	N	332	100.0	65	19.6	141	42.5
Year level	Year 9	132	39.8	20	15.2	52	39.4
	Year 10	115	34.6	21	18.3	48	41.7
	Year 11	64	19.3	15	23.4	28	43.8
	Year 12	21	6.3	9	42.9	13	61.9
Age *years*	13	83	25.0	9	10.8	28	33.7
	14	117	35.2	19	16.2	47	40.2
	15	96	28.9	26	27.1	47	49.0
	16+	36	10.8	11	30.6	19	52.8
Gender	Male	131	39.5	22	16.8	53	40.5
	Female	172	51.8	36	20.9	74	43.0
	Other/not stated	29	8.7	19	65.5	14	48.3
Ethnicity *prioritised*†	Māori	64	19.3	20	31.3	39	60.9
	Pacific peoples	14	4.2	8	57.1	11	78.6
	NZ European	272	81.9	55	20.2	118	43.4
Format	Online	186	56.0	43	23.1	84	45.2
	Paper	146	44.0	22	15.1	57	39.0
School	S1	43	13.0	1	2.3	10	23.3
	S2	39	11.7	5	12.8	13	33.3
	S3	153	46.1	41	26.8	68	44.4
	S4	97	29.2	18	18.6	50	51.5

†Multiple responses were allowed, hence percentages add up to more than 100%.

schools cover a broad socio-demographic range.

Regression models containing all predictors for ever smoking and ever vaping were significant (**Table 2**). The effect of student's year level was significant for ever smoking (p=0.0101), while school's Equity Index was significant for both ever smoking (p=0.0021) and ever vaping (p=0.0091). Māori had higher odds for ever smoking (p=0.0152) and ever vaping (p=0.0011) than non-Māori. Gender did not significantly predict ever smoking or ever vaping.

Overall, the baseline scores on the knowledge questions were high (over 75% on 8/10 questions). There was an improvement in responses for 7/10 knowledge questions after the intervention, of which 3 were statistically significant (**Table 3**) after adjusting for demographics. There was no evidence that socio-demographic variables (not

Table 2: Socio-demographic risk factors for ever smoking and ever vaping.

		Univariate			Multiple		
Ever smoking*		**OR**	**(95% CI)**	**P-value**	**OR**	**(95% CI)**	**P-value**
Male		0.74	(0.41, 1.30)	0.2984	0.60	(0.33, 1.08)	0.2984
Māori		2.25	(1.20, 4.15)	0.0122	1.87	(0.97, 3.56)	**0.0152**
Year level		1.48	(1.11, 1.98)	0.0072	1.33	(0.95, 1.90)	**0.0101**
Equity Index	S2	6.18	(0.94, 121.36)	0.0004	10.60	(1.52, 213.27)	**0.0021**
	S3	15.38	(3.18, 276.92)		15.32	(3.04, 279.47)	
	S4	9.57	(1.87, 175.14)		12.13	(2.28, 224.80)	
		Univariate			**Multiple**		
Ever vaping†		**OR**	**(95% CI)**	**P**	**OR**	**(95% CI)**	**P**
Male		0.87	(0.56, 1.36)	0.5490	0.76	(0.47, 1.23)	0.5490
Māori		2.54	(1.46, 4.49)	0.0009	2.16	(1.22, 3.88)	**0.0011**
Year level		1.21	(0.96, 1.54)	0.1140	1.32	(0.98, 1.80)	0.1610
Equity Index	S2	1.65	(0.63, 4.45)	0.0081	2.56	(0.90, 7.44)	**0.0091**
	S3	2.64	(1.25, 6.00)		2.43	(1.09, 5.76)	
	S4	3.51	(1.60, 8.24)		4.17	(1.79, 10.32)	

*****Odds ratios and 95% confidence intervals from logistic regression on ever smoked with P-values by ANOVA for individual risk factors (univariate) and a multiple regression model. Schools ranked by increasing level of need for support.
†Odds ratios and 95% confidence intervals from logistic regression on ever vaped with P-values by ANOVA for individual risk factors (univariate) and a multiple regression model. Schools ranked by increasing level of need for support.

shown) had a significant effect on the responses. More students agreed pre-intervention (42.77%) than post-intervention (37.65%) that vaping made one more socially acceptable, but the difference was not statistically significant (p=0.443).

More participants who vaped than participants who did not vape thought some vapes were safe for youth and that they created a harmless water vapour and could help smokers quit (**Table 4**).

The in-person (paper) mode of intervention (**Table 5**) showed higher percentage improvements for most questions, whereas a number of the items in the online delivery got worse (negative values for improvement).

Desire to quit vaping

Students who reported vaping regularly were asked whether they planned to quit vaping and there was a notable increase in the proportion of students who expressed a desire to quit from 61.7% pre-intervention to 68.8% post-intervention. Post-intervention, 26/33 year 9 and 10 students planned to quit compared to 7/15 year 11 and 12 students (OR=4.24, P=0.043). The numbers are small but there is a suggestion that students in early high school are more likely to express a desire to quit than older students.

Comparing knowledge between those with and without a desire to quit post-intervention, the only nominally significant difference post-intervention was that those with a desire to quit all agreed that "Vaping will harm a person's health over time." (OR=4.35, 95% CI: 0.539, 150.008; P=0.0343).

Discussion

Vaping has become a growing and serious problem for young people in Aotearoa New Zealand, at a time when smoking rates in high

Table 3: Responses to knowledge questions, before and after the intervention.

	Correct answer (true/agree responses), %			
	Before	**After**	**OR, 95% CI**	**P-value**
No vapes are safe for youth*	80.72	87.95	2.29 (1.33, 3.95)	**0.003**
Most vapes contain nicotine	93.67	92.17	0.73 (0.37, 1.47)	0.383
Nicotine is an addictive drug	95.78	93.67	0.57 (0.26, 1.28)	0.173
Nicotine harms brain development	90.06	91.57	1.30 (0.69, 2.45)	0.423
Vapes do not create a harmless water vapour*	72.59	79.52	1.89 (1.18, 3.05)	**0.009**
The tobacco industry is in the vape game	75.90	90.66	3.83 (2.27, 6.48)	**<0.001**
Vaping can cause lung damage	85.84	87.65	1.26 (0.73, 2.18)	0.453
Vaping is addictive	92.77	91.27	0.79 (0.43, 1.45)	0.699
Vaping will harm a person's health over time	88.25	89.46	1.18 (0.67, 2.08)	0.540
Vaping can help people who smoke quit	53.31	54.82	1.12 (0.74, 1.72)	0.294

*Statement re-written in negative form to match direction of other statements. Odds ratios (95% Confidence Interval) and P-value (ANOVA) for intervention (after) from mixed-effects regression adjusted for mode, gender, Māori ethnicity, school and year level. Bold P-values less than 0.05 after Bonferroni correction for multiple testing.

Table 4: Responses to knowledge questions by vaping status: before and after the intervention.

	Participants who vaped		Participants who did not vape	
	Response before (%)	**Response after (%)**	**Response before (%)**	**Response after (%)**
No vapes are safe for youth*	69.4	84.4	85.3	94.1
Most vapes contain nicotine	96.0	95.6	95.6	97.8
Nicotine is an addictive drug	98.0	100.0	97.4	98.5
Nicotine harms brain development	87.0	88.9	94.5	98.1
Vapes do not create a harmless water vapour*	61.2	73.3	76.8	86.5
The tobacco industry is in the vape game	87.5	93.2	77.9	97.0
Vaping can cause lung damage	86.0	88.9	87.6	96.2
Vaping is addictive	94.0	100.0	95.2	98.8
Vaping will harm a person's health over time	80.0	97.8	91.6	97.3
Vaping can help smokers quit	68.0	79.1	52.6	57.0

*Statement re-written in negative form to match direction of other statements.

Table 5: Responses to the knowledge questions submitted online and in-person (on paper).

	Percentage improvement in correct answer (%)			
	Online	**Paper**	**OR**	**P-value**
No vapes are safe for youth*	3.23	12.33	3.61 (1.15, 11.33)	0.028
Most vapes contain nicotine	-4.84	2.74	5.15 (1.09, 24.46)	0.039
Nicotine is an addictive drug	-6.99	4.11	35.07 (3.86, 319.00)	**0.002**
Nicotine harms brain development	-4.30	8.90	24.02 (3.89, 148.24)	**0.001**
Vapes do not create a harmless water vapour*	2.69	12.33	2.86 (1.06, 7.68)	0.037
The tobacco industry is in the vape game	9.68	21.23	6.00 (1.79, 20.06)	**0.004**
Vaping can cause lung damage	-0.54	4.79	2.13 (0.68, 6.66)	0.193
Vaping is addictive	-4.30	2.05	2.77 (0.78, 9.88)	0.116
Vaping will harm a person's health over time	-3.23	6.85	4.71 (1.34, 16.47)	0.015
Vaping can help people who smoke quit	-6.45	11.64	4.35 (1.75, 10.83)	**0.002**

*Statement re-written in negative form to match direction of other statements. Odds ratios (95% Confidence Interval) and P-value (ANOVA) for intervention (after) from mixed-effects regression adjusted for mode, gender, Māori ethnicity, school and year level. Bold P-values less than 0.05 after Bonferroni correction for multiple testing.

school students are very low. The current intervention resulted in an overall improvement in student knowledge in 7/10 knowledge questions (statistically significant in three questions) and increased expressed desire to quit vaping overall and within 30 days. The improvement was not affected by the student's socio-demographic characteristics. All nominally significant results were improved post-intervention and by the in-person mode. Further research is necessary to determine why this is and if a modified online intervention can be as effective as the in-person intervention. It is possible that the increased time spent on considering the issues in the in-person mode resulted in more change, or that the students perceived an in-person approach to be more authentic. The three questions that showed a significant improvement were all short "true or false" facts addressed by the intervention.

A striking feature of the data is the high level of knowledge of rangatahi (young people) before the intervention, with all questions except for "Vapes do not create a harmless water vapour" and "Vaping can help smokers quit" having over 75% correct response rates. However, there were some notable inconsistencies, in particular among rangatahi who vaped, where about 30% thought vaping was safe for youth, while 40% thought that vaping created a harmless water vapour. Such variation in knowledge suggests that there is indeed a place for ongoing interventions, particularly in trusted and safe environments.

The majority of the students (56%) who had been introduced to nicotine through nicotine-containing vapes had never smoked; thus, vapes were the first gateway to nicotine for over half of the participants. Consistent with previous studies in Aotearoa New Zealand[24,25] and beyond,[10] the rates of smoking and vaping increased with age and year level, with year 12 students at 2.8 times the risk of smoking compared to year 9 students, and 16-year-olds at 2.6 times the risk of smoking compared to 13-year-olds. Likewise, year 12 students were at 1.6 times the risk of vaping compared to year 9 students; however, this was not statistically significant. Our study found over twice the risk of vaping, similar to the increased risk of smoking, for Māori rangatahi, consistent with other sequelae of colonisation that impact health and are addressed by prioritising higher risk. Similarly, students reporting Pacific ethnicity were at even greater risk of vaping (OR 3.60, CI

1.06–16.47, P=0.005) after adjusting for gender, year level and deprivation, suggesting that prioritising this community would also be beneficial.

In this study, one in three students perceived vaping to make one more socially acceptable to their friends, which may illustrate the powerful influence peers can have on adolescents.[27,28] In a 2018 study, Wallace and Roche found students who reported having one or more friends who vaped perceived vaping as having a positive social impact.[28] We hypothesise that improved knowledge and support for vaping cessation could reduce pressure on students to vape. Our results suggest that incorporating formal vaping education into school curricula[29] using validated teaching tools could empower students to make better decisions.

Our study was met with a lot of interest by students, many of whom expressed a desire to quit vaping and asked for help. Our data suggests that the desire to quit is significantly stronger in years 9 and 10 than later years; thus, we recommend that interventions are timed early in the high school journey. While the evidence that greater knowledge in those desiring to quit did not survive correction for multiple comparisons, all those who wanted to quit agreed that vaping caused long term harm, significantly higher than those who did not want to quit. Currently in Aotearoa New Zealand there are few, if any, specific resources available to help students quit vaping, other than smoking cessation services based at general practices (GPs) and other specialist smoking cessation services. It is not known to what extent tobacco cessation services (including Quitline) will assist vaping cessation, but the common addictive ingredient of nicotine suggests that similar approaches might be helpful. However, what works for adults may not necessarily work for adolescents and young people, so targeting vaping cessation supports for young people is important. We hope that in addition to helping develop tools to educate youth about vaping, this study will stimulate debate about youth vaping and elicit support for young people wanting to quit vaping. This is vital to prevent a new epidemic of nicotine addiction.

Policy implications

There is no question that legislation of access, marketing and product use is of the first importance in reducing youth vaping. Alongside this, youth need to be informed of the misconception that vaping is a harmless, desirable behaviour. Vapes were first developed to help people who smoke quit, but instead of their availability being targeted to people who smoke, they have been made available to the general public and marketed as risk-free leisure products. Furthermore, using strategies well-known to the tobacco industry, flavours, colours and designs directed to attract youth have been introduced.[30]

Future studies could investigate if linking tobacco companies to vaping using statements such as “The tobacco industry wants you to vape” and using short fact-based statements, for example, “No vapes are safe for youth”, or “Vape clouds are harmful to health” might help students be wary of vapes. Secondly, policy and guidelines on the use of nicotine replacement therapy (NRT) should be updated to support youth wishing to use NRT to quit vaping. Thirdly, additional research is needed to assess the effectiveness of class-based educational interventions on reducing e-cigarette use among high school students.

Strengths and limitations

Strengths include the use of largely validated question items to assess the demographic characteristics of study participants[7] and measure knowledge about vaping and desire to quit vaping.[22,23] This gives us the confidence to compare our findings with studies that have used similar questions. Secondly, participants were drawn from schools that represented the broader socio-economic spectrum of schools in Ōtautahi Christchurch, making the results potentially generalisable to high school students in Ōtautahi Christchurch. Thirdly, the majority of participants were in year 9 or 10 and aged 15 years or younger, which is an important age group for uptake of vaping.

The main limitation of this study is that the findings in a convenience sample may not be fully generalisable to students in Ōtautahi Christchurch or Aotearoa New Zealand. Many schools did not participate or express an interest in participating when approached, and it is unclear what the reasons for non-participation were, but disruptions caused by COVID-19 cannot be ruled out. Secondly, the effects of the intervention were assessed immediately when knowledge retention would be expected to be high. We preferred a follow-up assessment, but this would have required additional time commitment from students at a time when they were already time constrained. Thirdly, while the study succeeded in engaging Māori and Pacific youth, numbers were limited and none of the authors have Māori whakapapa (ancestry). Any intervention targeting these communities would

benefit from culturally appropriate input at an early stage.

Conclusion

The intervention was successful in improving the knowledge of high school students on vaping-related health risks. Desire to quit was significantly more prevalent in year 9 and 10 students, suggesting these students are priority targets for interventions. Future studies should assess the effectiveness of this intervention in other settings and improve on it where necessary.

COMPETING INTERESTS
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