

STUDY PROTOCOL

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Exploring youth vaping in New Zealand intermediate and high schools: a mixed-methods study protocol

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Abstract

Background Electronic nicotine delivery systems (ENDS) represent a global growing public-health concern among adolescents. In Aotearoa New Zealand (NZ), daily vaping rates have risen sharply (10.5%) among 15–17-year-olds in 2023/24. This is alarming due to nicotine's addictive nature and its impact on adolescent brain development, mental health, and academic performance. Māori youth and those in socio-economically deprived areas are disproportionately affected, exacerbating existing health-inequities. Legislative frameworks prohibit vaping on school premises, yet ease of access remains a concern. Punitive school responses are increasingly viewed as harmful and ineffective, highlighting an urgent need for evidence-based, health-centred interventions.

Methods This multiphase, mixed-methods study explores vaping within secondary schools on the East Coast, NZ. Phase 1 involves online surveys to collect quantitative data on vaping behaviours, targeting 1375 students to ensure sufficient statistical power. Initial qualitative data will be gathered alongside. Phase 2 employs in-depth interviews and focus groups with students (vapers/non-vapers) and staff to explore perceptions of health risks, access, and effectiveness of school responses. A rapid scoping review (RSR) will synthesise existing research on adolescent vaping in Oceanic countries, identifying behavioural patterns, legislative impacts, and gaps in the evidence base.

Discussion This protocol addresses critical knowledge gaps by integrating quantitative and qualitative findings with a RSR. This study aims to inform the development of culturally appropriate, health-based, vape prevention and cessation strategies. Ultimately, findings may support a paradigm shift away from punitive disciplinary measures towards supportive school-based interventions, that improve public-health outcomes and reduce health inequities.

Keywords Youth-vaping, Health-equity, New Zealand, Schools, Mixed-methods, Public-health

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Background

Electronic nicotine delivery systems (ENDS), commonly known as vapes, have rapidly emerged as a significant global public health challenge, particularly impacting adolescent and young adult populations [1, 2]. While initially positioned as harm reduction tools for adult smokers, their widespread availability, diverse flavours, sleek designs, and often misleading perceptions of safety have contributed to extensive uptake among non-smoking youth [3, 4]. This global phenomenon introduces complex new dimensions to public health strategies traditionally focused on combustible tobacco, demanding adaptive and targeted responses to mitigate associated risks [5].

Aotearoa New Zealand (NZ) presents a particularly compelling case study in this evolving landscape. Historically, NZ has been at the forefront of tobacco control, demonstrating remarkable success in reducing traditional cigarette smoking rates through ambitious initiatives like the Smokefree Aotearoa 2025 goal. Daily smoking prevalence among Year 10 students, for instance, dramatically declined from 16% in 1999 to a mere 1.1% in 2022 [6]. However, this public health triumph has been accompanied by a concerning parallel trend: a rapid escalation in youth vaping prevalence. Daily vaping among Year 10 students, which was relatively low in 2015, surged to 10% by 2022 [6]. This simultaneous decline in smoking and sharp increase in vaping suggests a substitution effect, where success in curbing traditional tobacco use is being significantly compromised by the rapid adoption of a new form of nicotine delivery. This situation highlights a critical policy challenge: while conventional tobacco control measures have proven effective, the regulatory framework and public health messaging surrounding vaping may not be adequately addressing its unique appeal and accessibility to young people [7, 8]. The focus of public health efforts must therefore broaden from solely achieving a ‘smoke-free’ future to ensuring a ‘nicotine-free’ future for youth, acknowledging that for this demographic, vaping often serves not as a cessation aid but as an initiation point for nicotine dependence [9].

Current landscape of youth vaping in NZ schools

Recent epidemiological data highlights the alarming scale of youth vaping in NZ. The NZ Health Survey (NZHS) indicates that daily vaping prevalence among 15–17-year-olds peaked at 15.4% (95%CI: 10.3–21.9) in 2022/23, with a subsequent, though not statistically significant, decline to 10.5% (95%CI: 7.1–14.9) in 2023/24 [10]. For the broader 15–24-year-old age group, daily vaping stood at 21.3% (95%CI: 18.0–24.8.0.8) in 2023/24 [10]. Complementary data from the Action for Smokefree 2025, ASH Year 10 Snapshot Survey (covering 14–15-year-olds) reported that 10% of Year 10 students vaped daily and 18% were regular vapers in 2022 [6]. An earlier 2021 survey further indicated that 26% of secondary students reported vaping in the past week, with nearly 20% engaging in daily or several-times-a-day vaping, predominantly with high nicotine doses [11]. While the slight, non-statistically significant decline in daily vaping among 15–17-year-olds in the most recent survey might appear encouraging, the overall trajectory since 2017/18 remains one of substantial increase, and NZ’s youth vaping rates continue to be among the highest globally [10]. This suggests that existing interventions, while perhaps having some impact, are insufficient to decisively reverse the epidemic. The perceived “decline” should not foster complacency. Instead, the persistent and potent underlying drivers of youth vaping highlight the need for more targeted public health efforts.

The burden of youth vaping is not evenly distributed across the population, revealing significant health inequities. These disparities emerge at a young age, as demonstrated in a 2025 cross-sectional study of adolescents aged 14 and under. This research found that 36.6% of Māori and 24.0% of Pacific youth had ever vaped, compared to 17.1% of NZ Europeans. The study highlighted that girls were more likely to have ever-vaped than boys, with stark differences among ethnic groups; the rate of ever-vaping for Māori girls was 41.9% and for Pacific girls was 26.5%, both significantly higher than the 17.1% for NZ European girls [12].

This pattern of inequity is consistent with findings in slightly older age groups (see Table 1). Māori youth are

Table 1 Daily vaping prevalence among New Zealand youth by age and ethnicity (2021/22–2023/24)

Category	2021/22% (95% CI)	2022/23% (95% CI)	2023/24% (95% CI)
Age group (years)			
15–17	8.3 (3.8–15.5)	15.4 (10.3–21.9)	10.5 (7.1–14.9)
18–24	23.0 (16.3–31.0)	25.2 (19.3–31.9)	26.5 (22.2–31.1)
15–24 combined	18.8 (13.7–24.9)	22.1 (17.9–26.7)	21.3 (18.0–24.8)
Ethnic group (total)			
Māori	17.8 (14.1–22.0)	23.5 (19.8–27.4)	28.8 (25.6–32.1)
Pacific	16.1 (9.6–24.6)	18.7 (13.8–24.5)	21.5 (17.5–25.9)

Adapted from Ministry of Health [10]

disproportionately affected with Year 10 studies showing vaping to be more prevalent in Māori and Pacific students than European [13, 14]. The 2022 Year 10 Snapshot survey found daily vaping among Māori Year 10 students at 21.7%, with Māori girls exhibiting the highest rates at 25% [6]. This rate was more than double that observed in the general cohort of Year 10 students [15]. Furthermore, vaping prevalence is strongly correlated with neighbourhood deprivation. As shown in Table 2, daily vaping rates in the most deprived quintile (Quintile 5) reached 19.0% in 2023/24, significantly higher than the 4.8% observed in the least deprived areas (Quintile 1) [10]. This trend was also observed in the 2021 Asthma and Respiratory Foundation NZ (ARFNZ) survey, where vaping prevalence was higher in low-decile schools [16]. These disparities, where higher vaping rates are concentrated among Māori youth and those from socio-economically disadvantaged backgrounds, point to a critical intersection of ethnicity and socio-economic status [16]. This pattern suggests that the factors driving vaping uptake are not uniform but are amplified within already vulnerable communities, potentially due to targeted marketing, greater accessibility in specific areas, or a lack of culturally appropriate prevention and cessation resources. Consequently, a generic, one-size-fits-all approach to youth vaping prevention and intervention is likely to exacerbate existing health inequities [11, 17]. Research and policy must explicitly address these disparities, developing culturally responsive strategies and ensuring equitable access to support services, particularly for Māori and low socio-economic status youth. This also highlights the need to investigate the specific social and environmental determinants that contribute to higher uptake in these groups, as this study proposes to do.

NZ's legislative framework, notably the Smokefree Environments and Regulated Products (Vaping) Amendment Act 2020, prohibits vaping within school premises and mandates prominent signage to that effect [18, 19]. Schools are also legally required to take all reasonably practicable steps to ensure a 100% smokefree and vape free environment, which includes educating students about the harms of vaping and the illegality of sales to individuals under 18 years of age [19]. Despite these regulations, ease of access remains a significant concern.

Table 2 Daily vaping prevalence among New Zealand youth (15–24 years) by neighbourhood deprivation quintile (2023/24)

Neighbourhood Deprivation Quintile	Daily Vaping % (95% CI)
Quintile 1 (Least Deprived)	4.8 (2.9–7.5)
Quintile 2	8.6 (5.8–12.1)
Quintile 3	11.2 (8.1–15.0)
Quintile 4	14.1 (10.6–18.2)
Quintile 5 (Most Deprived)	19.0 (15.4–23.0)

Adapted from Ministry of Health [10]

Many young people reportedly obtain vapes from dairies, or through informal channels such as peer sales and the use of proxies [20]. This suggests that while formal regulations exist, their enforcement and the adaptability of youth access networks pose substantial challenges. In response to the growing concerns, many schools have adopted “zero-tolerance” approaches, leading to punitive measures such as suspensions for students caught vaping. However, these disciplinary actions have been criticized as potentially ineffective, unjust, and even harmful, as they may lead to further exclusion rather than constructive support for students, many of whom may be experiencing nicotine addiction [11, 21].

Health and developmental impacts on adolescents

The widespread use of e-cigarettes among youth is particularly concerning due to the unique vulnerabilities of the adolescent brain to nicotine. Most e-cigarettes contain nicotine, a highly addictive substance [22, 23]. The human brain continues to develop until approximately age 25, and exposure to nicotine during adolescence can significantly harm this ongoing development, particularly impacting areas responsible for attention, learning, mood regulation, and impulse control [22, 24]. Adolescents are inherently more susceptible to addiction than adults, a phenomenon attributed to their rapidly developing neural pathways and a potentially greater neurochemical reward response to nicotine use. Young people can exhibit signs of nicotine addiction remarkably quickly, sometimes even before regular or daily use is established [22, 24]. Nicotine addiction can lead to significant psychological distress, including symptoms such as irritability, anxiety, depression, difficulty concentrating, and sleep disturbances. These withdrawal symptoms can disrupt a student's learning and academic performance, and the financial burden of maintaining a vaping habit can also have negative consequences [25].

In addition to nicotine's neurodevelopmental effects, e-cigarette aerosol contains a range of harmful and potentially harmful substances. These include known cancer-causing chemicals, heavy metals such as nickel, tin, and lead, and tiny particulate matter that can be inhaled deeply into the lungs [26, 27]. Additionally, volatile organic compounds and flavourings like diacetyl, a chemical linked to severe lung disease, are commonly found in e-liquids [28]. Short-term health consequences of vaping can manifest as breathing difficulties and persistent coughing [29]. In the longer term, e-cigarette use has been associated with an increased risk of heart disease and various cancers [27, 30, 31]. In addition, evolving research points to the harmful effects of vaping on oral health, the cardiovascular and respiratory systems [2, 32–34].

The impact of vaping extends beyond physical health, profoundly affecting the psychological and social well-being of adolescents [35, 36]. Interventions focused solely on the physical act of vaping may be insufficient. A comprehensive approach must address the underlying mental health vulnerabilities that drive youth to vape, while simultaneously providing robust support for managing nicotine withdrawal and breaking the addiction cycle necessitating integrating mental health support within school-based vaping cessation programmes. Thus, research protocols and subsequent interventions must consider these multifaceted dimensions of harm, aiming to mitigate the wide-ranging consequences of vaping and not just the physical ones.

Identified research gaps and rationale for the study

Youth vaping initiation and persistence in NZ are shaped by a complex intersection of social dynamics, product characteristics, policy limitations, and school environments. The appeal of flavoured e-liquids, sleek device designs, and misconceptions around the relative safety of vaping compared to smoking further drive uptake among adolescents [37]. Peer influence remains a dominant factor, with initiation often occurring in social contexts where vaping is normalised, particularly through friends, siblings, and informal peer networks within schools [38, 39]. These networks also facilitate ongoing use via peer-to-peer sales and social media-driven proxy purchasing, enabling access despite age restrictions [40]. While legislation prohibits sales to individuals under 18, studies demonstrate that enforcement is inconsistent, and youth continue to obtain products from dairies, older acquaintances, and unregulated online platforms [20, 40].

The school setting plays a dual role as both a site of exposure and intervention. While NZ schools are mandated to maintain vape-free environments, implementation of these policies varies. Many institutions adopt punitive, zero-tolerance approaches such as suspensions, which have been critiqued as counterproductive, especially for students struggling with nicotine addiction. These disciplinary actions often alienate students and may reinforce stigma or disengagement from school-based support systems. Emerging evidence advocates for pro-equity restorative and health-oriented disciplinary practices that address addiction through education, counselling, and peer support [21, 41, 42].

Despite rising prevalence and growing public concern, significant knowledge gaps remain. Epidemiological surveys have mapped prevalence and demographic trends but offer limited insight into the lived experiences, perceptions, and motivations of adolescent vapers, especially Māori and Pasifika youth, who are disproportionately affected [6]. Few studies have centred youth voices through in-depth qualitative or mixed-methods

approaches, risking the development of poorly targeted interventions and policies that may inadvertently reinforce inequities [43]. Additionally, the efficacy of current policy measures and school-level responses is insufficiently understood. Retail restrictions and educational campaigns have had limited success in deterring youth access and uptake. Regional disparities in school responses highlight the need for a more contextually and culturally appropriate strategy [11, 44]. Research is urgently needed to evaluate the comparative effectiveness of punitive versus health-based school responses, and to identify youth-informed, equity-oriented cessation supports.

This study proposes to contribute to addressing these gaps by centring youth voices and examining the social and structural contexts of vaping in NZ schools. A deeper understanding of the psychosocial and environmental factors influencing youth vaping is essential to designing effective, inclusive, and sustainable public health interventions.

Methods/Design

Research aims and objectives

This study aims to explore the complex and evolving issue of youth vaping among intermediate and high school students on the East Coast of the North Island of NZ. By employing a mixed-methods approach and drawing on both mainstream and Indigenous research methodologies [45] the research seeks to provide a deeper understanding of the motivations, social influences, and structural factors that contribute to vaping behaviours among adolescents [46–48].

The specific objectives are:

1. To determine the prevalence, patterns, and psychosocial predictors of vaping among students in the participating schools.
2. To explore the lived experiences of students (vapers and non-vapers) and student-facing staff regarding the drivers of vaping, perceived risks, and barriers to cessation.
3. To evaluate the perceived effectiveness of current school-based policies and support systems from the perspectives of students and staff.
4. To assess students' health literacy around vaping and how this varies by ethnicity, gender, vaping status, and geographic location.
5. To conduct a comparative analysis of youth vaping knowledge, attitudes, and behaviours between two distinct regions on the East Coast (Hawke's Bay and Bay of Plenty).
6. To synthesise the existing literature on adolescent vaping in Oceania to identify regional trends, policy impacts, and research gaps.

The following overarching research question guides this study: Why do students vape? The subsidiary question is: How does youth vaping compare between two regions on the East Coast of the North Island of NZ?

Study design and setting

This two-phase study will be carried out across intermediate and high schools on the East Coast of NZ. In both phases of the research, cultural responsiveness will be ensured through collaboration with Māori and Pacific advisors, and using Indigenous research methods that honour community values, knowledge systems, and decision-making processes [49–52].

The study adopts a convergent parallel design, where quantitative and qualitative data are collected concurrently in Phases 1 and 2, analysed separately, and then integrated to provide a comprehensive understanding of the research problem [53]. A core justification for the mixed-methods design is its capacity to address the complexity of youth vaping in a way that a single method cannot [53]. The quantitative survey will provide a broad overview of prevalence and identify statistical predictors of vaping behaviour, answering the ‘what’ and ‘who’ questions. The qualitative component is essential for delving into the ‘why’ and ‘how’, exploring the nuanced social contexts, personal motivations, and lived experiences that underpin the quantitative findings. This integration enables stronger inferences and the ability to explain complex behavioural phenomena [54–56].

The qualitative component will use an inductive thematic analysis approach to allow for an in-depth examination of vaping in relation to adolescent identity formation, social competence, and the influence of technology and social media [57, 58]. The ever-changing subjective norms surrounding adolescent vaping necessitate this qualitative inductive approach [54, 59, 60]. While previous studies have examined barriers and enablers, and burden of vaping [11, 20, 61], this study will specifically investigate the motivators for sustained use and quitting in the context of new legislation.

Theoretical framework

This study is guided by a dual theoretical framework to ensure a comprehensive analysis of both the individual-level predictors and the socio-contextual drivers of youth vaping.

1. The Theory of Planned Behaviour (TPB): The TPB posits that behavioural intention is the most direct predictor of behaviour, and that this intention is determined by three core constructs: attitudes toward the behaviour, subjective norms (perceived social pressure), and perceived behavioural control (self-efficacy) [62–64]. The TPB provides a robust

framework for the quantitative phase of this study and has been used in other vaping studies [65–67]. The survey instrument will include validated scales to measure these constructs, and logistic regression will be used to model how they predict students’ intention to vape.

2. Social Identity Theory: While TPB effectively models predictors of intention, it is less equipped to explain the social origins of those predictors. Social Identity Theory posits that individuals derive a sense of self from their affiliation with social groups and are motivated to engage in behaviours that affirm their group identity, and previous studies have shown that youth vaping is a deeply social activity, often central to peer group dynamics [68]. Therefore, Social Identity Theory will provide the guiding lens for the qualitative analysis. Focus groups and interviews will explore how identifying as a ‘vaper’ (or a ‘non-vaper’) shapes social interactions, influences perceptions of risk, and constructs the very ‘subjective norms’ that TPB measures.

By using this dual framework, the study can achieve a powerful integration of findings, using qualitative insights into identity to explain the quantitative patterns of behaviour.

Indigenous considerations

This study will employ Indigenous and ethnic research methods (e.g., traditional methods of data collection, like sharing circles) [69] to understand decision-making around youth-vaping in NZ. These research techniques are described as methods that fully engage participants and incorporate experiential knowledge which align with qualitative research [70, 71]. This method of data collection will also be respectful of, and include cultural protocols, values, and beliefs that are important to the specific communities [72, 73]. In this regard, the research protocol will be co-developed and implemented in consultation with our groups Māori and Pacific advisors.

In recognition of the disproportionate impact of vaping on Māori youth and the principles of Te Tiriti o Waitangi (a founding document of NZ), this study is informed by the Kaupapa Māori research paradigm [74]. This is not merely an ethical consideration but a commitment to methodological rigour. Kaupapa Māori research is conducted by Māori, with Māori, and for Māori, and is grounded in Māori worldview (te ao Māori) and customs (tikanga). Its purpose is to ensure research is empowering, culturally affirming, and contributes to Māori self-determination (tino rangatiratanga). This approach is essential for building the trust required to generate valid and meaningful data with Māori participants, who will be engaged as partners in the research process.

The following principles, adapted from leading Kaupapa Māori scholars, will be operationalised throughout the study:

- **Whanaungatanga (Relationship Building):** The research process will begin with meaningful engagement and hui (meetings) with Māori advisors, school leaders, and community representatives. The research team, which includes a Māori researcher, will prioritise building respectful and reciprocal relationships with participants before any data is collected.
- **Manaakitanga (Reciprocity and Care):** The principle of mutual respect and hospitality will be enacted through mihimihi (introductions), the provision of koha (gifts) for participants' time and expertise, the sharing of kai (food) at focus groups to foster a welcoming environment, and a commitment to disseminate findings back to the participating communities in accessible formats prior to academic publication.
- **Mana (Dignity and Respect):** The mana of all participants will be upheld by ensuring they have full control over their narratives and data. This includes informed consent, guaranteed confidentiality, and approaching youth and staff as the experts of their own lived experiences.
- **Titiro, whakarongo, kōrero (Look, listen, then speak):** This will be the guiding ethos for all qualitative data collection. Researchers will prioritise deep listening to understand the priorities, realities, and perspectives of the participants, allowing themes to emerge organically from their stories.

The use of culturally resonant data collection methods, such as sharing circles (te whai wāhi), will be offered as an alternative to standard focus groups to create a safe and collaborative space for Māori and Pasifika participants to share their experiences.

School inclusion

Schools on the East Coast of NZ will be invited to participate (Hawke's Bay Region and Bay of Plenty) via phone calls, followed by emails with flyers designed to provide information about the study processes. Schools will be selected to include a range of NZ School Equity Indices (EQI). The EQI replaced the decile system in 2023 to estimate the extent of socio-economic barriers youth face in achieving their education [75, 76]. The EQI assigns schools a number between 344 and 569, with the higher numbers indicating greater socio-economic barriers [76, 77]. This selection process will ensure the inclusion of schools across differing levels of equity/deprivation in the research.

Participant Information/inclusion and exclusion criteria

The eligible participants will be students aged 10 to 18 years old currently attending intermediate and secondary schools. Ethnicities will include NZ's Europeans, indigenous Māori, Pacific, and Middle Eastern, Latin American, and African students (MELAA) [78]. Student-facing staff who include teachers, teaching assistants, principals, school nurses, school councillors, administrators or any other staff who connect with students will also be included in this research. Students and staff speaking English or Māori will be included. We will provide a description of the demographic composition of all participants.

The lead researcher is a member of the Stop Adolescents Vaping E-cigarettes (S.A.V.E), a community group with direct contact with schools of interest in Hawke's Bay. This community S.A.V.E group includes school health nurses, principals (from the Secondary Principals Association of NZ), police, and secondary student youth representatives and the Public Health Team (from the Hawkes Bay Hospital).

Ethics and informed consent

The study has been approved by Eastern Institute of Technology Research Ethics Approvals Committee (REAC Reference number EA02180123). All data will be stored on encrypted drives. Privacy and confidentiality will be ensured through de-identification, secure data storage, and private interview settings. In accordance with New Zealand research guidelines, obligations to Te Tiriti o Waitangi will be observed.

Participant information statements will be distributed electronically to parents/guardians. Schools will utilise a passive (opt-out) parental consent process. Students will be required to provide active written consent prior to participation. School staff will be reimbursed for their time (koha), or the school will be reimbursed for relief teacher costs.

Procedures

The study is composed of three overarching stages. This is illustrated in the flow diagram (as shown in Fig. 1 below), followed by a more detailed description of the activities that will be undertaken.

Research activity A) understanding student vaping: a three-phase process

- Phase 1: Quantitative and Initial Qualitative Data Collection.

This phase will gather quantitative and qualitative data about vaping prevalence and habits of adolescents through online surveys (see Supplementary Information, Appendix 1). It is intended that this phase will create a socio-demographic picture of adolescent vapers

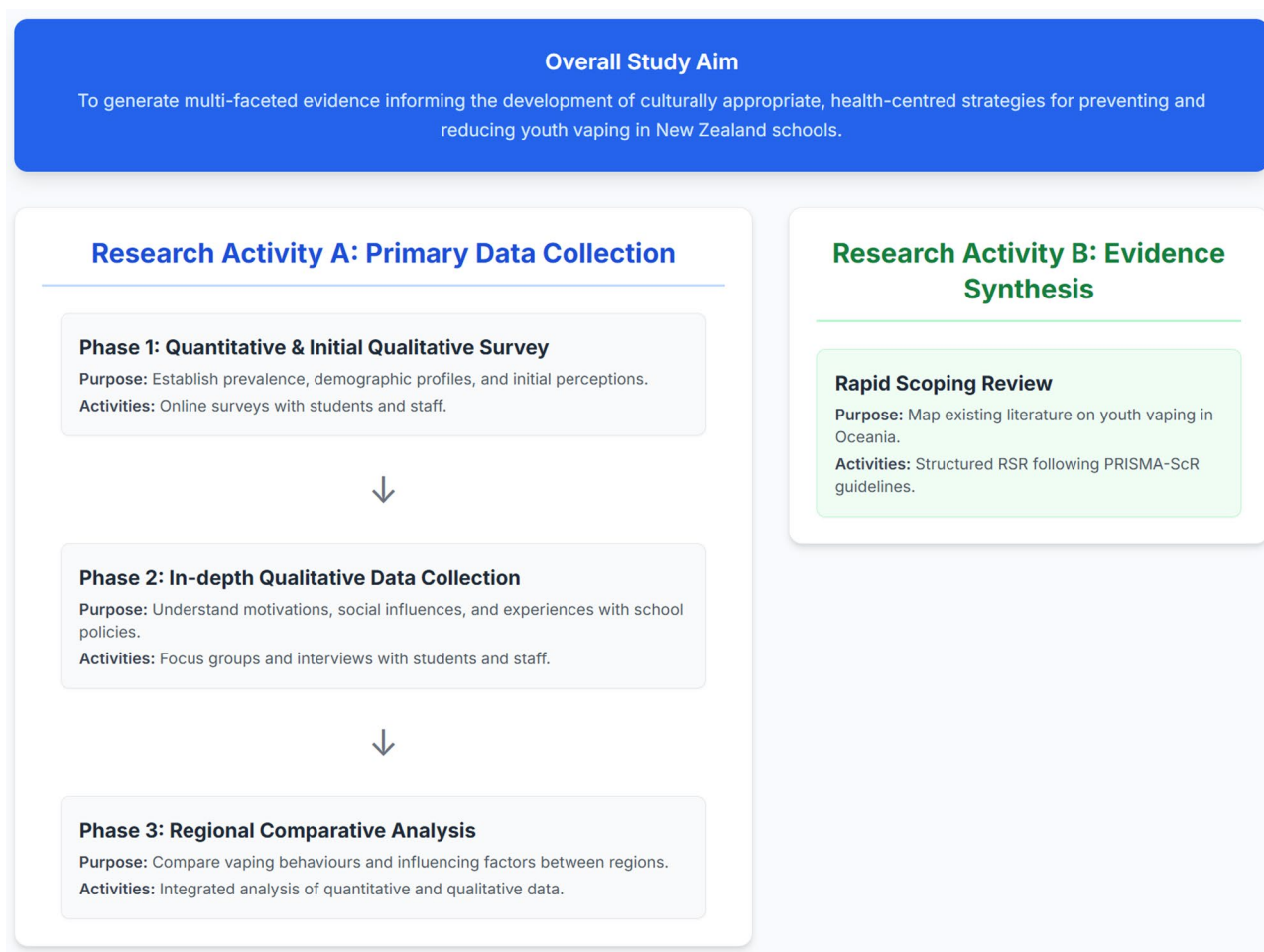


Fig. 1 Flow diagram of the overall study. Note: the rapid scoping review is beyond the scope of the current study protocol

(e-cigarette users) in participating schools. We will also gather quantitative data on vaping prevalence, patterns, to measure the constructs of the Theory of Planned Behaviour as well as an overview of their vaping perceptions and practices through survey open responses. The survey's open-ended questions will allow students (and staff) to elaborate on their answers in a private and honest manner. This will provide initial qualitative insights into their practices and perceptions of vaping.

- Phase 2: In-depth Qualitative Data Collection.

This phase will involve in-depth, researcher-led semi-structured interviews among consenting adolescents. We will carry out focus group discussions to gather qualitative data on adolescent perceptions, practices, intentions to quit, and factors influencing and enabling vaping and quitting. Students will be purposefully selected according to their ages (intermediate school, junior high school and senior high school) and vaping status as indicated in the online surveys from Phase 1. These students will include

vapers (everyday, at least once a week/regular, social context only) and non-vapers (tried but quit, never tried).

Focus group interviews/sharing circles/one-on-one interviews (depending on participant preference) will be conducted among 6–8 intermediate and secondary schools, who will be invited to participate in the study. Each focus group will comprise of 6–10 students as determined ideal for study objectives. Interviews will be recorded, transcribed verbatim, and analysed using the methods of thematic analysis with the aim of identifying participants' perceptions, experiences and impacts of youth vaping. Audio recorders, and computer audio software with transcription functions and encryption will be used to collect data. Audio recordings and online video conferencing recordings will be transcribed, collated and validated by at least two researchers.

Inductive thematic analysis will be used to generate themes which capture the factors influencing adolescent e-cigarette use and vaping, as well as the motivators of vaping reduction and cessation. Thematic analysis will allow relevant themes and subthemes to be identified in

line with the research question and objectives, which will then be used as units of analysis.

School staff will also be interviewed using focus groups or individual (according to their preference). Parallel data collection and thematic analysis of both the survey open responses in Phase 1 and interviews in Phase 2 will be carried out. Data from two phases will be combined for robustness of data, and for the purpose of data triangulation, which supports validity [79]. To develop a bottom-up ‘lived’ understanding of adolescents’ perceptions, attitudes, and vaping practices, a rigorous and iterative qualitative process will be undertaken. This process also seeks to identify themes related to the factors and enablers of adolescent vaping, as well as the motivators for cessation. The analysis will involve systematic data familiarisation, initial and secondary coding, category development, thematic extraction, thematic review and definition, and the final analysis and presentation of results [79–81]. To ensure that themes are justified and reliable, the process of coding and thematic extraction will be checked by at least two researchers.

- Phase 3: Regional Comparison.

Once all data is collected from students in the Hawkes Bay and Bay of Plenty, we will investigate regional differences in youth vaping habits and behaviours between the cohort of schools. Factors to be compared across these regions include vaping status (regular, occasional, quit, tried and never vapers); vaping prevalence of ethnicities; motivators for vaping; motivators for vaping cessation/reduction; motivators for never vaping; and impacts of any legislation changes on vaping. This study will determine if any regional differences are present and, if so, discuss any potential causes for these differences.

The overall project will also involve a rapid scoping review (RSR), with the aim of aligning the outcomes with the responses from surveys and focus groups. In brief, the RSR will be undertaken to systematically map the existing peer-reviewed literature on adolescent vaping in Oceanic Countries (16, as listed by the United Nations). We will investigate the prevalence, behavioural patterns, legislations, preferences, and influencing factors of adolescent vaping. This review will also identify authors’ recommendations for future research. However, the RSR is beyond the remit of the current protocol.

Statistical analysis and power calculations

Numerical data will be assessed for normality using the D’Agostino and Pearson test. Parametric data will be analysed using t-tests or one-way ANOVA, while non-parametric data will be analysed using Mann-Whitney U or Kruskal-Wallis tests. Post-hoc tests (Tukey’s or Dunn’s) will be applied where appropriate. Effect sizes (d or η^2) and correlations (Pearson

or Spearman) will be calculated. Nominal data will be analysed using chi-square or Fisher’s exact test.

Logistic regression will be used to predict vaping status based on variables from the survey. To ensure model stability, a minimum of 5 cases per predictor variable is required. To determine the required sample size, the formula $n = 100 + 50i$ was used, where i is the number of independent variables in the final model [82]. Estimating a maximum of 20 potential independent variables yields a minimum required sample size of 1100. A preliminary pilot test of the questionnaire, conducted with a single class of 31 students, was used to estimate a potential partial-response rate, which was found to be 12.9%. To account for this and ensure adequate power, the target sample size was increased by 25% to a final target of 1375.

Multicollinearity will be assessed using the Variance Inflation Factor.

Statistical analyses will be performed using JASP [83], while graphs will be generated using Prism [84].

Discussion

This study protocol outlines a comprehensive, theory-driven, culturally responsive, mixed-methods approach to address critical knowledge gaps surrounding youth vaping in NZ intermediate and high schools. By integrating quantitative prevalence data with in-depth qualitative insights into student and staff experiences, alongside a rapid scoping review of literature, this research aims to provide a robust and unique understanding of the factors influencing vaping initiation, continuation, and cessation.

The potential implications of this study are significant for public health policy and practice in Aotearoa NZ. The findings are expected to generate evidence-based recommendations that can inform the development of more effective, culturally appropriate, and health-centred prevention and cessation strategies tailored for adolescents. Specifically, by exploring the perspectives of students and staff, this research will contribute to understanding why current policies and school-based interventions may be falling short, particularly concerning ease of access and the efficacy of punitive approaches [85]. The use of a Kaupapa Māori paradigm is a core strength, ensuring the research process is not only ethical but also methodologically rigorous for generating meaningful insights with and for Māori, who are disproportionately impacted [74]. By highlighting the complex interplay of social, environmental, and individual factors, including the disproportionate impact on Māori youth and those from deprived communities, the study aims to support a paradigm shift towards supportive, addiction-focused interventions within educational settings. Ultimately, this research will contribute to safeguarding the health and well-being of young New Zealanders, fostering a ‘nicotine-free’ future, and addressing existing health inequities.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-025-25454-6>.

Supplementary Material 1.

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Authors' contributions

The study was conceived by AJD, JLP, MHK, CGD, and RHF. AJD secured the funding, is the Principal Investigator, and drafted the initial manuscript. JLP and MHK contributed to the development of the data collection instruments and the refinement of the study design. CGD and RHF provided critical review and intellectual input, especially regarding statistical analysis and indigenous perspectives, respectively. All authors (AJD, JLP, MHK, CGD, and RHF) contributed to the development and finalisation of this study protocol manuscript, and all authors read and approved the final submission.

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Data availability

The datasets generated and/or analysed during the current study will be stored in encrypted drives and software applications and will be available from the corresponding author on reasonable request, pending ethical approval and adherence to privacy and confidentiality protocols.

Declarations

Ethics approval and consent to participate

The study has been appraised and approved by the Research Ethics Approvals Committee (REAC) with Reference number EA02180123. All participants will be required to provide informed active consent and parental consent to participate. The study will be performed in accordance with the Declaration of Helsinki.

Consent for publication

This manuscript does not contain any individual person's data.

Competing interests

The authors declare no competing interests.

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