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Original Research Article

An exploratory evaluation of vaping-related education in high school curriculum

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Abstract

Electronic cigarettes were promoted as safer alternatives to tobacco smoking and has now become a serious addiction among adolescents. The vaping epidemic can be controlled by using effective school based educational strategies like an inclusive curriculum .We set out to explore the current literature sources of information on anti-vaping curriculum and its characteristics among high school curricula .Through an exploratory study, we identified 19 papers which highlighted the lack of evidence base for the content, duration and focus of such curriculum .We propose future research to explore specific aspects of vaping curriculum though high-quality studies.

Keywords: Vaping, anti-vaping, high school, middle school, curriculum.

INTRODUCTION

E-cigarettes are electronic devices that deliver a combination of flavoured liquified nicotine and other substances through an inhaled aerosolised device (Centers for Disease Control and Prevention, 2019). Vaping has been promoted as an alternative to smoking in recent decades. In 2020, approximately thirty-five million people were estimated to have been vaping (WHO, 2019). Although adolescent smoking is on the decline, studies have shown teen vaping is on the rise (Besaratinia and Tommasi, 2019). Several studies have described the harmful effects of vaping, including long-term damage to the lungs (Hamberger and Halpern-Felsher, 2020; Fedt et al., 2020). E-cigarette use among youngsters continues to rise, and 1 in 3 high school students use them (Creamer, 2020). The increase in vaping behaviour may also be due to increased vaping products in the market, providing a more comprehensive range of choices (Kaplan, 2019) and advertising.

In August 2016, The US Surgeon General imposed a public ban on e-cigarettes following the evidence of the harmful effects of vaping (Marynak et al., 2017). In May 2016, both the EU and the UK published regulations to curtail the selling and marketing of e-cigarettes (Rooke et al., 2013; European commission, 2014). The WHO highlighted the health risk of vaping and e-cigarette use (World Health Organization, 2021). The key factors influencing the rise in vaping behaviour are peer pressure, lack of knowledge regarding the effects of vaping, the wider availability of these products and lack of regulation in some countries. One of the key strategies to combat this behaviour includes education amongst teenagers regarding harmful effects.

From a global perspective, some countries have included anti-vaping educational content in their middle and high school curricula (Adam et al., 2019). There seems to be a wide variation in the availability and provision of vaping related education. Our study explores current literature to understand the characteristics of anti-vaping curricula among school students.

Table 1. Inclusion and Exclusion criteria.

Inclusion criteria
Studies in the English language
Studies from January 2015 to June 2022.
Studies involving teenagers and adolescents
Exclusion criteria
University students
Non-English studies

Table 2. Themes and Subthemes identified.

Demographics	**Type of study/Country of origin/Year of study**
Theme 1: Demographics	Level of students, i.e., high school /middle school
	Age group or grade of studies population
Theme 2: features of resources)	Teaching aimed at Teachers or students or school Nurse
	Duration of teaching
	Who delivered the teaching?
Theme 3: Type of teaching methods used	lectures/online resources/ posters
	Was social media used?

METHODS

A comprehensive search of academic and grey literature sources was undertaken on google scholar through Harzing Publish or perish (Version 7.29/ Tarma software research limited) using keywords to include information related to vaping in the school curriculum. Additional resources were sought through cited literature from these papers. The keywords used in the search engines included "vaping." "anti-vaping ", "teen"," adolescent , "e-cigarette", and "school curriculum" "middle school" "high school ". A total of 998 articles were perused in this review, and eventually, 19 were chosen to be used in this review. The PRISMA chart shows the process (Figure 1). The inclusion and exclusion criteria are detailed in Table 1.

Studies were analysed using thematic analysis qualitative approach. Key themes were identified within each paper. We collected data on an excel (Microsoft version 2016) to review the conclusion and findings from each paper and collated additional information type of study or intervention, country of origin and year of study.(Table 2)

RESULTS

A total of 998 studies were selected, and seventy-seven papers were filtered following inclusion-exclusion criteria and excluding non-English studies. After reviewing the full articles, nineteen studies were included in the final analysis (See PRISMA chart Figure 1). Studies have revealed resources detailing the harmful effects of vaping that could decrease the prevalence of vaping among teens.

Of the 19 studies (See Table 3), 16 of them were based in the United States of America and three of from Canada. The predominant type of study was interventional study. The papers included in this review were three theses, four project reports, and two poster presentations. The educational interventions were mainly delivered by teachers (10 studies), peers in three studies, and school nurses in one study. Three of the studies were based on resources created by designated agencies like CDC, and in 1 study, healthcare professionals, had delivered content. Almost all of these were aimed at high school students. Eleven of the studies were aimed at sixth graders and one study at ninth-grade students, and three of the studies towards middle-grade students.

Only five studies incorporated classroom model. With regards to the method of delivery, interactive face-to-face sessions were delivered in seven out of the 19 cases, poster and paper-based resources in 6 of 19 cases, audio-visual presentations in nine out of 19 cases and six studies, there were multi-modal education approach.

Six of the studies included in this review utilized a toolkit. The review showed that the vaping-related educational programmes ranged from 1-hour sessions to multiple interventions delivered over a 12-month programme. Some AV presentations and interactional sessions were in 30 minutes blocks over the year. It does appear that the overall duration of these interventions was widely distributed. Most were non-curricular programmes than

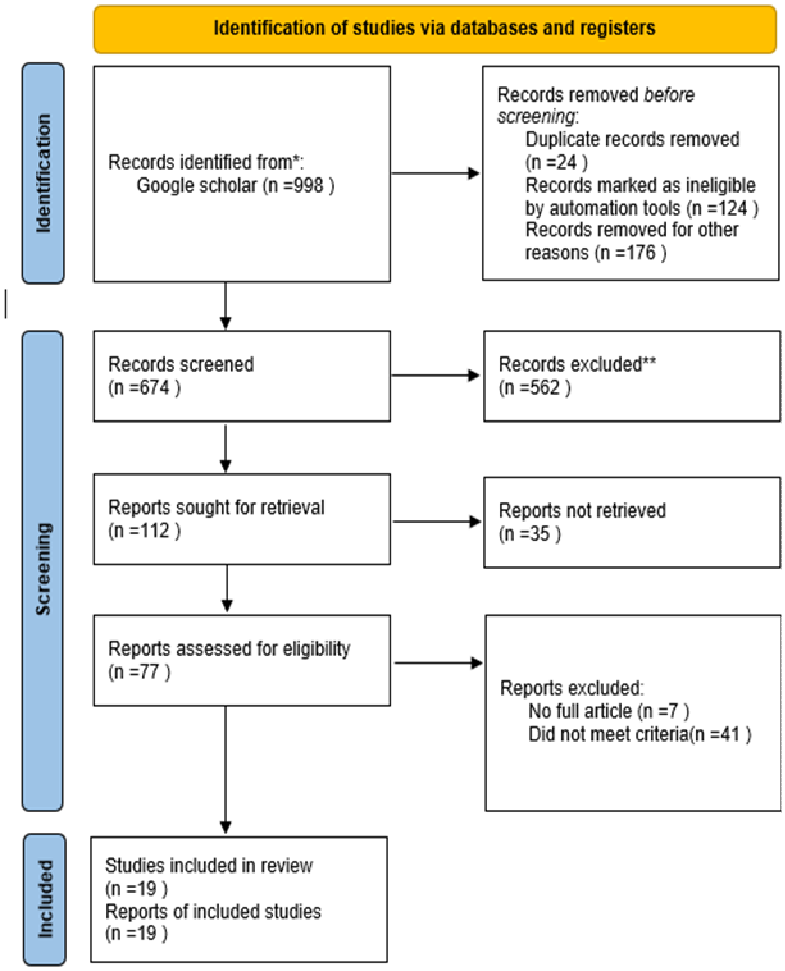

Figure 1. PRISMA Chart.

Table 3. Studies included in the review.

Author	Title	Year	Country
J Donlen et al	Youth-led anti-vaping initiative to educate peers on the dangers of e-cigarettes	2018	USA
P Wang	Increasing Awareness of Health Risks Associated with Vaping in Youths	2019	USA
JJP Young	School-based interventions to increase electronic cigarette awareness among adolescents	2019	USA
K Ticconi et al	Vaping Learning Service Project at North Rose-Wolcott	2019	USA
M Moqbil	A big problem from a small device: A call for vaping education in Capital District schools	2020	USA
SH Kelder et al	A middle school program to prevent e-cigarette use: a pilot study of "CATCH my breath."	2020	USA
KA Baker et al	Combatting Teen Vaping in School Settings	2020	USA
PC Palmedo et al	Developing a peer-driven anti-vaping curriculum for high school and middle school students	2020	USA
N Peiper, et al	Differential patterns of e-cigarette and tobacco marketing exposures among youth: Associations with substance use and tobacco prevention strategies	2020	USA
Meinders et al	Vaping Education in the Adolescent Population	2020	USA
A Lazaro et al	A novel approach to training educators to conduct school-based adolescent e-cigarette education and prevention: Using the Tobacco Prevention Toolkit	2021	USA

Table 3. Continue

CJ Berg et al	A synthesis of the literature to inform vaping cessation interventions for young adults	2021	USA
H Dai et al	School Personnel's Responses to School-based Vaping Prevention Program: A Qualitative Study	2021	USA
SM Gaiha et al	School-based e-cigarette education in Alabama: Impact on knowledge of e-cigarettes, perceptions, and intent to try	2021	USA
GC Williams et al	Evaluating the impact of school e-cigarette prevention and cessation programs on e-cigarette initiation among a sample of Canadian secondary school	2022	Canada
A Hollis et al	A Vaping Risks Education Program for School Students: Evaluation of the SOLVE Mystery Toolkit	2022	Canada
NL Asdigian et al	Reducing Youth Vaping: A Pilot Test of the Peer-Led “Youth Engaged Strategies for Changing Adolescent Norms!”(YES-CAN!) Program	2022	USA
J Liu et al	School-based programs to prevent adolescent e-cigarette use: A report card	2022	USA
KA Baker et al	Vaping Prevention in a Middle School Population Using CATCH My Breath	2022	USA

curriculum-integrated resources. It was interesting to note that almost all of the studies included in the analysis were done in North America.

DISCUSSION

Although there have been literature reviews on vaping prevention programmes, there have been no specific reviews on Vaping-related curricula for high school students. This exploratory study has evaluated current literature on vaping education for high school students focusing on specific aspects of the curriculum. To our knowledge, we have not identified a similar review to ours . This qualitative review hopes to explore critical findings like who delivered the vaping education, which targets the age group, duration of the intervention, method of delivery, medium of delivery, use of tool kits etc.

We employed the thematic analysis method to synthesise evidence leading to 3 key themes and seven subthemes. The included papers were analysed under these themes. Although content analysis could have been a suitable data analysis method. Nevertheless, we felt using thematic analysis was ideal as not many quantitative studies and the quantitative data were assessed qualitatively in our review.

We found three literature reviews involving vaping (Berg et al., 2021; Liu et al., 2022 and Damilola et al., 2021). Berg et al. paper showed that in addition to crucial recommendations, educating adolescents about vaping and managing mixed substance use vaping is challenging. Jessica Liu's paper identifies similar themes to ours and concludes that specific programmes focussing on e-cigarette and vaping prevention is vital to stop this epidemic. However, further evidence-based resources are required, including toolkits and teaching methods. In their review, Damilola et al. (2021) pronounce three critical recommendations for improved education on vaping for students and for the FDA and Federal government to tighten marketing sales and advertising of e-cigarettes.

Donlen et al. study (2018), 'Youth-led anti-vaping initiative to educate peers on the dangers of e-cigarettes ', concludes that School-based interventions could be best delivered by school health nurses and high school teachers through a year-long programme through multi-modal educational intervention. In Wang's (2019) paper, the authors created a factsheet for providing information to youth and their parents regarding E-cigarettes and their effects on health along with prevention strategies - The factsheet received positive feedback from teachers. Young's study (2019), 'School-based interventions to increase electronic cigarette awareness among adolescents', suggest that high school students may have already developed their perceptions about e-cigarettes from peers or social media. However, it has been recognised that the current curriculum does not cover this within the school, and the pilot involves a year-long school-based curriculum program. Ticconi et al. (2019). Talk about information sharing regarding vaping to parents through flyers, report cards and newsletters. The paper further highlights the significance of parental knowledge about the harmful effects of vaping.

Moqbil's (2020) study surveyed high school students on various aspects of vaping and concluded that 1 in 5 was unsure of the harmful effects, highlighting the need for formal education. Kelder et al. (2020) paper showed a significant reduction in e-cigarette usage among schools with intervention in the "CATCH my breath" programme compared to the students from the school where no intervention was unavailable. The "CATCH my breath" programme comprises six teacher-delivered activities, four through classroom-based sessions lasting approximately half an hour. After that, trained peer

educators are involved in group discussion activities. Baker et al. study (2020) revealed that online and web-based resources from reputed agencies like CDC, like "Know the Risks: A Youth Guide to E-Cigarettes", improved student knowledge and subsequently enhanced access to school health Nurse effective strategy to reduce vaping prevalence.

Palmedo et al. (2020) proposed that a peer-driven curriculum may have an equal impact on both cohorts of peers. The programme was designed for High school students to deliver vaping education to their middle school peers. The study by Peiper et al. (2020) informed an essential relationship between e-cigarette and tobacco advertising, and early intervention strategies could help reduce vaping behaviour by including this in the anti-vaping curriculum.

In their study, Meinders et al. (2020) demonstrate the need for stricter cigarette and tobacco marketing regulations and multi-level early adolescent education on tobacco prevention messages from marketing processes. Lazaro's paper (2021) discusses the importance of experiential training and its role in improving knowledge of both electronic and standard tobacco products, impacting student knowledge of vaping risks through an intervention curriculum.

Berg et al. (2021) paper, 'A synthesis of the literature to inform vaping cessation interventions for young adults, provides a comprehensive review of the current intervention strategies highlighting technology-based processes like text messaging and one-on-one counselling. The review did not identify any specific curricular changes to include anti-vaping education. In their study, Dai et al. (2021) showed that Vaping prevention education was part of the substance abuse prevention program (e.g., tobacco) and delivered through sporadic lectures. Multiple themes were derived from this focus group-based study. A school-based teaching session improved knowledge about vaping and e-cigarettes and reduced high school students' drive to trial vaping. Anti-vaping curriculum must be introduced in middle school rather than at the high school level (Gaiha et al., 2021). Williams et al. (2022) showed from their study that almost 1 in 4 schools had commenced an e-cigarette prevention programme and did not see any impact on vaping initiation. The study further suggested the need for evidence-based guidelines and toolkits for schools to help prevent adolescent vaping.

Hollis et al. study (2022) titled 'Vaping Risks Education Program for School Students: Evaluation of the SOLVE Mystery Toolkit' concluded that students from all grades in the study felt that they learnt the risks of vaping using the toolkit.NL Asdigian et al. (2022) study showed that a peer-led peer centred approach to vaping prevention has proved to be a sustainable health promotion model and can be readily integrated into the middle and high school curriculum. Liu et al. (2022) have shown that targeted marketing, mixing flavours, and high nicotine content make addiction easy for high school students. Worsening rates of adolescent vaping use mean e-cigarette prevention programs are vital for prevention. Baker et al. (2022) have shown that CATCH My Breath is a valuable school-based resource to educate middle school students in sixth, seventh and eighth grade about the harms of vaping. However, they also have suggested that further research is required to ascertain the impact of such interventions on e-cigarette use intervention's impact on e-cigarette attitudes and the measurement of susceptibility in teens.

Our review is probably one of the first in current literature exploring vaping-related education in adolescents with reference to content and mode of delivery, student grade taught etc. One of the main weaknesses was that we could not include non-English studies leading to a predominance of studies from North America. We could not obtain full articles about seven papers.

CONCLUSION

In conclusion, school-based interventions are effective in reducing vaping behaviour. Current literature exploring anti-vaping curriculum resources, is not extensive. There is no evidence base information on the concepts like the target year grades or age groups to be educated, the best teaching resource and the ideal duration of such curriculum. Future research should look at practical ways to provide anti-vaping interventions to high school students.

Suggestions

We suggest future research should aim to develop the evidence base for vaping-related educational interventions on the following aspects: ideal grade to teach or the best year to introduce anti vaping curriculum; best teaching methods to provide information and ideal duration of such curriculum through further high-quality studies .

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