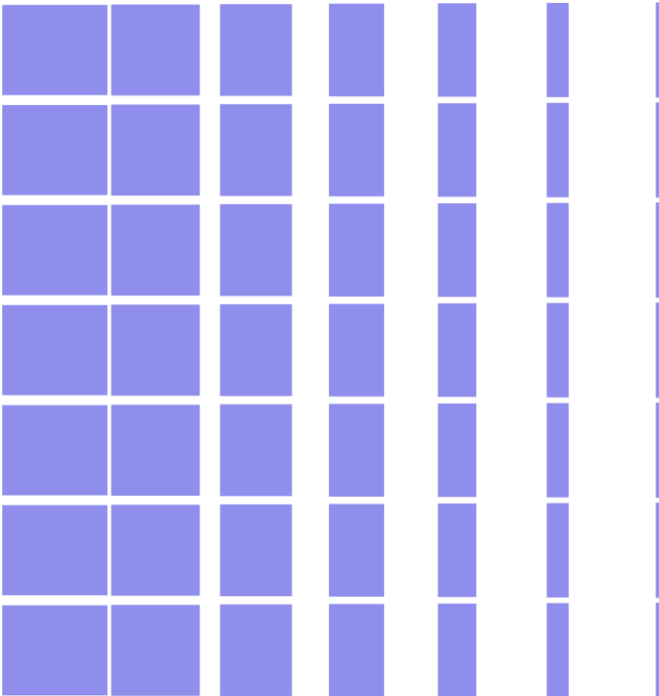
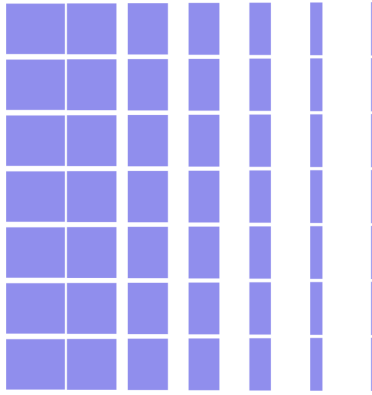


# Evidence review: effective communication to encourage young people to quit vaping or not to start

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Audience Social Marketing is an award-winning behaviour change communications consultancy.

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This independent analysis was commissioned by Audience Social Marketing and carried out by Alma Economics.

The views expressed are those of the authors.

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# Executive summary

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## Vaping prevalence and influences among young people

The prevalence of young people vaping in Britain has increased notably in recent years, raising concerns within the health community and the public. Vapes are likely to be less harmful than tobacco products, but they are definitely not harmless. Evidence suggests that vapes can impact the respiratory system, while nicotine and other substances in vaping products can affect the cognitive performance of adolescents in the short term, and their long-term impacts are not yet known. Factors driving young people's engagement in vaping include peer influence, the power of social media, easy access, product flavours and promotion, perceptions of social acceptability and easy integration into social activity.

## Need for effective prevention and cessation programmes

There is widespread consensus on the need for effective programmes to prevent young people from vaping or encourage cessation grounded in a strong evidence base. Recent research has focused on providing insights to inform the development of campaigns and programmes, particularly on effective communication messages, channels and venues. Alma Economics was commissioned by Audience Social Marketing to conduct a review of existing evidence **to examine effective communication strategies and activities that can encourage young people to quit vaping or refrain from starting.**

## Key findings from the systematic review

We adopted a systematic approach to our literature review, analysing evidence from a final list of 27 papers that met the inclusion criteria set for this study. This summary includes the key findings.

The results have also been translated into a web-based interactive Evidence Map, allowing users to explore studies by population focus and methodology. The Evidence Map can be accessed [here](#).

## Effective communication message characteristics

Our results identified several critical characteristics to consider when developing vaping cessation interventions for young people, including:

- **Theory-driven messages:** Messages being informed by Social Cognitive Theory and Behavioural Theories.
- **Risk beliefs:** Messages on the known harms of vaping to young people's health - based on the most robust scientific evidence currently available.
- **Engaging formats:** Using visuals, interactive elements, and simple language in messages.
- **Tailoring messages:** Adapting the content to the target audience's needs and feedback.

## Effective dissemination venues

In terms of dissemination venues, the **school environment**, given its pivotal role in social interaction and learning, is expected to play a crucial role in engaging young people in vaping cessation and prevention interventions. Additionally, **social media** emerged as a conducive digital environment for young people's opinions and perceptions about vaping.

## Case studies of effective interventions

Three **case studies** were selected and are presented in the report, describing interventions that have been proven to be successful through research. These are:

- **This Is Quitting** – Tailored text message program
- **Click City: Tobacco** – School-based program
- **smokeSCREEN** – Online videogame intervention

## Evidence gaps & future research

Our review also identified gaps in the existing evidence, particularly around the lack of targeted analysis of younger age groups (e.g., 11-13) to identify differences in effective messages and channels.

Furthermore, areas for further research were raised in the studies reviewed, including i) considering the interaction of complex factors that influence young people's behaviour, ii) polytobacco use, iii) focusing on groups under the age of 18 due to their higher engagement with vaping, iv) the urgent need for longitudinal studies, v) the impact of various stylistic approaches, and vi) the consideration of the effect of demographic variables (e.g. sex).

# Introduction

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Although the use of vapes has proven to be a helpful aid for adults trying to quit smoking and is less harmful than traditional cigarettes (NHS 2023), the increase in their use among young people has lately raised serious concerns (Scheffels et al. 2023). A study conducted across Canada, England and the US, revealed a sharp rise in indicators of vaping dependence within just 5 years (from 2017 to 2022), reaching levels that can be compared to smoking dependence among young people (East et al. 2024). In England, almost 1 in 10 of those aged 11-15 are frequently using vapes, while a quarter have tried vaping (NHS England 2024). In addition, there is some evidence that vaping can bring risks to health (Wu et al. 2024). A UK prospective study found that adolescents who vape have a high possibility of engaging in smoking within a two-year follow-up (Coner et al., 2018). Other studies spotlight how the use of nicotine in puberty can negatively affect cognitive abilities, including learning, memory and attention of adolescents, and how vaping can impact the respiratory system (Graham et al. 2024). Nevertheless, the long-term effects of vaping are not known (Graham et al. 2021), emphasising the need for further research in this area.

In this context, Alma Economics was commissioned by Audience Social Marketing to **examine effective communication strategies, interventions, messages and channels that can encourage young people to quit vaping or refrain from starting**. Particularly, the literature review was designed to address the following research questions:

1. Why do young people vape? And what are the key barriers to stopping?
2. What are the characteristics of effective communication messages and communication activities that can be used in vaping cessation or prevention interventions among young people, and what are the effective/trusted communication channels?

For this purpose, we adopted a systematic approach to our literature review, analysing evidence from a final list of 27 papers that met the inclusion criteria set for this study. Our complete methodological design, including information sources, search strategy and inclusion and exclusion criteria, can be found in the Annex at the end of this report.

As part of the data synthesis, we also translated the results of the review to a web-based interactive Evidence Map that will allow users to explore relevant studies by population of interest and methodology. The Evidence Map can be accessed [here](#).

# Discussion of findings

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A total of 27 papers were reviewed for this study. The overarching themes identified represent our structured understanding of the topic and reflect a systematic approach to address the research questions comprehensively while uncovering meaningful insights and patterns emerging from the literature. A breakdown of the findings categories is the following:

- Why do young people vape?
- What does effective communication look like?
- Are there specific channels and venues that can facilitate effective communication?

## Why do young people vape?

To effectively tackle vaping among young people, it is essential to understand what draws young people to vape. Seven of the reviewed papers included information about the factors influencing the use of vapes among young people. These factors, both encouraging vaping and acting as barriers to vape stopping, are discussed below.

**Peer influence** is known to play a significant role. Friends or schoolmates using vapes can increase the possibility of a young person trying or frequently vaping (Alpert, Chen, and Adams 2019; Moore et al. 2016). In their study, Park et al. (2019) found that young people are highly influenced by their peers. Another important influential factor is parental use of tobacco and vapes. Moore et al. (2016) found a strong relationship between parents who smoke or vape and their children's vape use.

Research indicates that **social media platforms**, with their high levels of engagement among young people, provide a conducive environment for the development of positive perceptions about vaping (Hilton et al. 2016; Scheffels et al. 2023). Additionally, social media posts from friends can enhance the perception of vape use as harmless and foster a positive view of vaping, while appealing posts from vaping brands can also have an effect on young people's opinions. (Alpert, Chen, and Adams 2019).

Young people's **perceptions** about vapes play a pivotal role in driving their use. Young people who believe that vaping is less harmful compared to other tobacco products (Berg et al. 2021) and those seeing it as a low-risk form of rebellion may be more motivated to vape (Hilton et al. 2016; Scheffels et al. 2023). However, evidence from the past two years in the UK shows that most young people now believe that vapes are equally or even more harmful than cigarettes, yet still use them (ASH, 2024). Additionally, the wide variety of vape flavours offered increases their attractiveness among young people (Hilton et al. 2016). Unlike traditional cigarette smoking, vapes are often perceived as more socially acceptable and thus can become more easily integrated into young people's social lives. This further contributes to their continued use (Hilton et al. 2016; Scheffels et al. 2023; Stalgaitis, Djakaria, and Jordan 2020). Notably, a prior history of cigarette smoking or use of other combustible products can enable the start of vaping and serve as a barrier to quitting as well (Berg et al. 2021).

**Advertisements** are also shown to influence the perception of vapes by young people. Duke et al. (2016) found that when young people perceived an advertisement as effective<sup>1</sup>, their intention to start vaping was increased, and they had more favourable attitudes towards vaping, even those who had no prior experience with vaping.

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<sup>1</sup> The respondents were asked to rate each one of four ads according to whether it was worth remembering, attention-grabbing, powerful, informative, meaningful and convincing, on a 5-point scale (Duke et al. 2016)

## What does effective communication look like?

The literature review identified specific characteristics of effective communication messages, with 12 of the reviewed papers discussing this element of the communications mix.

Recent research has been focused on the characteristics of effective communication messages that can be used in interventions, campaigns and programmes that aim to support vaping cessation or prevention of its initiation among young people. The effectiveness of the messages can be determined by the shifting of perceptions of vaping harms and addiction, the reduction of the behavioural predictors such as intentions and willingness to vape or finally, the reduction in the actual behavioural activity of vaping.

Messages that use principles from theories with predominant social cognitive elements have shown promising outcomes.

### Social Cognitive Theory

**Social Cognitive Theory (SCT)** was developed by the psychologist Albert Bandura, and it explains how people can learn and maintain behaviours through the dynamic interaction of three key factors: **personal, behavioural and environmental**. At the heart of SCT is the concept of **self-efficacy**, which is a person's belief in their ability to succeed at a specific task (Bandura A., 2013). For example, when someone feels confident about their ability to reduce vaping, they are more likely to try and stay committed to the effort. Another important factor is **outcome expectations**, when people base their acts on the results they expect from a certain behaviour. For instance, someone might continue a healthy behaviour like quitting vaping if they believe that this will improve their health or quality of life. At the same time, **environmental factors**, such as support from friends, family, professionals and the community, can play a crucial role in shaping behaviours (Bandura A., 2013).

A central idea of SCT is **observational learning**, which explains how people can learn by observing others' behaviours, especially peers and role models. This process can boost self-efficacy by showing that success is achievable, especially when the observer identifies with the role model or sees them as relatable (Bandura A., 2013). By focusing on the interaction of these three factors, personal, behavioural and environmental, SCT provides a powerful tool for health promotion by boosting confidence, learning skills and creating supportive surroundings.

Berg et al. (2021) suggested that messages grounded in **SCT** may be effective as various aspects of vaping align with SCT constructs. More specifically, factors such as the available social support, anticipated outcomes (in this case, benefits from quitting vaping and barriers to doing so), self-efficacy and confidence in one's ability to quit vaping may influence willingness to stop the behaviour.

### Risk beliefs

The **perception** of vapes as relatively harmless in some young people can increase the likelihood of them starting to vape. As Bandura has indicated, if we don't know how our everyday habits are potentially detrimental to our health - then it's unlikely we'll stop (Bandura A., 2013). Andrews et al. (2024) emphasise the important role of addressing **risk beliefs** related to health consequences and addiction and targeting etiological mechanisms – the underlying factors that influence vaping – when designing cessation programmes targeted at young people. The findings of their study assessing the effectiveness of *Click City: Tobacco* among 5th-grade students (10-11 years of age) reveal that effective ways to reduce the willingness of young people to engage in vaping or smoking included intervention activities based on the perceptions of vaping (social images), the influences of others, as well as risk perceptions about health consequences and addiction. The intervention was found to work especially well on students who were identified to be at higher risk of vaping or smoking (defined by previous tobacco use, current family tobacco use, and high tendency to seek new, exciting, risky behaviours).



## Gain-based vs loss-based messages

The **framing** of a message, **gain-based or loss-based**<sup>2</sup>, can significantly influence its effectiveness. Kong et al. (2016) examined students' preferences for gain as opposed to loss-framed messages in the context of vaping cessation campaign messages. Their findings revealed that for themes associated with health risks (e.g. being exposed to unknown threats), the potential of addiction, increased chance of gateway effect (e.g. that the use of one substance will increase the likelihood of using more harmful substances) and the social stigma of being labelled as a smoker, students favoured messages that emphasised the related costs of using vapes. However, when it came to financial considerations, students preferred messages showing how they would benefit from quitting or never starting (e.g. they will save money). However, Wu et al. (2024) found some conflicting results considering loss versus gain-framed messages' effectiveness, indicating that more research should be done in this area encompassing the interplay of other message characteristics.

### FDA's The Real Cost Campaign example

**Fear tactics** have been used by interventions trying to influence people's behaviour, usually to quit smoking. However, interventions have to be carefully designed when incorporating such tactics, as research targeted at vaping has shown that using exaggerated fear messaging in isolation may not work as expected. Xuan & Choi (2021) analysed the content of the FDA's *The Real Cost Campaign*, designed to educate young people about the risks of vaping. The campaign relied heavily on fear-based appeals. For example, posters featured phrases like, "*If you don't think vaping is addictive, it might have already altered your brain*". Another part of the campaign aimed at portraying vaping as an epidemic among teens (*Vaping Is An Epidemic | The Real Cost*, 2018), used unrealistic imagery and videos depicting teens with worm-like creatures crawling on their faces and invading their bodies. These fear-based messages were presented without subsequent content offering actionable advice or encouraging positive behavioural changes to reduce vaping, a factor that, according to the authors, may have affected the perceived credibility of the source.

Instead, Xuan and Choi advocate for strategies that include fostering social skills, educating young people on the effects of vaping and enhancing their media literacy to help them recognise how the vaping industry targets young audiences.

Nevertheless, the authors describe the potential for effectiveness in the FDA's *The Real Cost Campaign's* selected combination of communication platforms and channels (social media, school posters and a videogame). Additionally, they mention that the campaign also incorporated **humorous appeals** to inform and warn about vaping harms (mainly displayed in school washrooms), which may have led to positive behavioural change as the combination of fear and humour in messages is found to possibly lead to higher risk perceptions.

Overall, the FDA's campaign utilised a variety of messaging styles and dissemination methods, and evidence suggests that it has been widely perceived as effective by young people (Rohde et al. 2019). Additionally, the findings from the experiment of Noar et al. (2020) showed that the FDA's *Real Cost Campaign* prevention ads were effective as compared to control ads in increasing participants' awareness of the risk of vaping and reducing their willingness to smoke. These results were also consistent with the participant's perceptions of the ad's effectiveness.

In summary, using fear-driven messaging in interventions is not an indicator of complete

<sup>2</sup> Gain-framed messages highlight what someone would gain if they do or do not engage in a certain behaviour, while loss-framed messages emphasise the costs of that behaviour. The framing of the message is based on Prospect Theory, which suggests that gain-framed messages are more likely to be effective in preventing behaviours with predictable, definite outcomes, while loss-framed messages are more effective for preventing behaviours with uncertain results (Kong et al. 2016).

ineffectiveness. It is important that such interventions are thoughtfully planned, as fear messaging in isolation may not always work as expected unless it is part of a broader, well-rounded approach. For future research, it would be valuable to assess how the combination of different styles and methods contributes to the overall effectiveness of such interventions.

## Warning messages

Another study (Kalaji et al., 2022) examined the use of **warning messages** in reducing behavioural change predictors (such as risk beliefs about vaping, cognitive elaboration of harms and willingness to vape). In this study, the participants were viewing ads containing different warning messages. More specifically, the FDA's warning about potential addiction ("WARNING: This product contains nicotine. Nicotine is an addictive chemical.", p.4) was compared against a warning that focused specifically on vaping health harms related to young people ("WARNING: This product is especially harmful to youth and young adults. It may cause mood disorders and damage to parts of the brain that control attention and learning.", p.4). The study also included a control condition that didn't contain a warning. The results were encouraging, showing that both the conditions of the FDA warning and the warning specifically targeting young people decreased the positive link with vape use while increasing the negative association with vaping behaviour. Nevertheless, findings indicated that the warning focused on young people's health harms was the most effective in reducing positive associations with vaping and encouraging young people to rethink the habit.

## Message presentation

Beyond the content itself, the way a message is presented plays a crucial role in its effectiveness. As noted earlier, young people tend to favour uncomplicated messages. **Incorporating visuals, interactive elements – such as quizzes with instant feedback – or even simple text-based formats** to educate about the harms of vapes has proven effective in enhancing communication impact (Lazard 2021; Wu et al. 2024). Xuan and Choi also recommend adopting clearer, **more straightforward messaging**. It is important to mention that simple and straightforward language use without puns and metaphors is preferred by adolescents themselves, along with bright colours for message display (England et al. 2021). The findings Graham et al. (2024) further support the value of interactivity in augmenting message effectiveness. Additionally, they highlight that tailoring messages customised to the specific target population characteristics can enhance the impact of programmes designed to support vaping cessation.

## Tailored messages

While certain characteristics can enhance the effectiveness of a message when designing an intervention, it is essential to recognise that the same message may not have an equal impact on young people with different characteristics (e.g. ever-users – never users) (Park et al. 2019), and therefore, it is important to know your target audience. Hence **tailoring messages** to the distinct characteristics and attributes of the target audience can lead to higher engagement and message reach (Graham et al. 2024; Wu et al. 2024). In another example, Stalgaitis et al. (2020) sought to identify adolescent groups most at risk of vaping, offering clear guidance for developing targeted health messages and media strategies. Their findings indicated that adolescents in the Hip Hop<sup>3</sup> and Popular<sup>4</sup> peer crowds were at higher risk of frequent vaping. These same groups also valued traits such as being fashionable and sociable. According to the authors, to create effective communication messaging that resonates with these groups, the content of interventions should challenge the

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<sup>3</sup> The "Hip Hop" peer crowd is established in the literature according to Stalgaitis et al. (2020) as "confident, value overcoming struggles and proving themselves" (p.2).

<sup>4</sup> The "Popular" peer crowd is established in the literature according to Stalgaitis et al. (2020) as "extroverted, value socializing and excitement" (p.2).

connection between vaping and social status or trendiness while encouraging young people to reconsider vaping as an integral part of their social activity. However, differences between the Hip Hop and Popular groups were observed, suggesting that distinct health messaging is needed for each group.

## Are there specific channels and venues that can facilitate effective communication?

The effectiveness of communication on vaping undoubtedly lies in how messages are designed, as analysed above, but equally depends on where and how these messages are disseminated. Seven of the studies reviewed offered valuable information on the latter, which is discussed below.

Research has, perhaps unsurprisingly, highlighted **social media platforms** as an effective means for communications and campaigns targeting young people, given their widespread use by the target audience and their influence on young people's opinions and perceptions about vaping (Alpert, Chen, and Adams 2019).

However, **school** is a key venue for interaction for young people and thus can, and should, play a crucial role in vaping cessation and prevention interventions. East et al. (2024) state that interventions based in schools are more likely to be noticed by young people and, therefore, increase their potential effectiveness, provided they are carefully designed.

However, not all school programmes are effective in preventing vaping initiation. Researchers acknowledge there is a high need for evidence-based, evaluated programmes to effectively tackle vaping cessation in schools (Williams et al. 2022). The frequency of the programmes should also be taken into consideration due to the urgency of vaping as an issue. For example, existing evidence suggests that there might be a need to intervene more than once a year during the school curriculum (Williams et al. 2022).

Xuan and Choi (2021), when evaluating the effectiveness of fear tactics used in *The Real Cost Campaign* by the FDA, identified that specific venues within schools could further increase engagement. More specifically, this campaign used school toilets, known as one of the key locations where adolescents vape, as a venue to display posters. This targeted location possibly increased the traction of the posters, hence also the effectiveness of their messages.

Berg et al. (2021) propose that utilising technology-based tools, like smartphones, can significantly enhance young people's engagement in cessation interventions and campaigns. In particular, gamification has emerged as an effective engagement technique, promoting knowledge acquisition and supporting skills development. A related example is *smokeSCREEN*, a videogame intervention which demonstrated encouraging results, showing a positive effect on young participants' beliefs and knowledge towards tobacco use as well as vapes. Furthermore, the videogame was highly embraced by teenagers, reflecting a high level of engagement (Hieftje et al. 2021). More details on *smokeSCREEN* can be found later in the report.

## How can young people's involvement shape campaign development on effectiveness?

Informing vaping cessation strategies through advice and opinions from young people has shown promising results in terms of potential message reach and programme effectiveness. Of the reviewed papers, two addressed the involvement of young people in campaign development and effectiveness.

In a study dedicated to the design and evaluation of a campaign to prevent young people from vaping, adolescents were asked to share their opinions on how to improve the messaging. The results revealed a significant difference in the preferences of young people compared to adults,

particularly regarding the context and style of message presentation. For example, adolescents totally dismissed the two campaign content ideas most popular among adults. These included visuals discouraging teens from being "dummies" or "guinea pigs" of the tobacco industry. This finding is crucial, highlighting the importance of involving young people in the development process of campaigns. Their input is vital to ensure that interventions targeted at them are relevant and engaging, increasing the overall likelihood of the campaign's effectiveness and high reach (England et al. 2021).

In another study that measured the effectiveness of a 5th-grade (ages 10-11 years of age) vaping and smoking cessation programme, delivered in the US (*Click City: Tobacco*, further discussed in the next chapter as a case study), students were asked to provide feedback for the development and refinement of the programme's activities, through focus and user groups. This programme, encompassing students' views on what content would be effective, was found to be successful in terms of decreasing students' willingness to use vapes (Andrews et al. 2024).

## Case studies of effective interventions

The following three case studies highlight effective vaping prevention and cessation programmes targeting young people. These were chosen for their unique insights into various message content styles and dissemination methods based on good-quality evidence. Notably, two of the programmes are based on Social Cognitive Theory, while all three are grounded in Behavioural Theory.

### This Is Quitting

**Description:** *This is Quitting* is an interactive, automated text message programme, especially targeted at vaping cessation among those aged 13-24 years, primarily delivered in the US. It is informed by evidence-based smoking cessation research and is conceptually grounded in Social Cognitive Theory constructs and Behaviour Change Theory (Berg et al. 2021; Graham et al. 2024). The programme has been operated by the Truth Initiative since January 2019. Further information can be accessed at: <https://truthinitiative.org/this-is-quitting-resources>

**How it works:** To start receiving messages and support from the programme, adolescents and young adults should text a word to a given number (Truth Initiative, 2024). The content of the messages is tailored to the user's first input, e.g. their age, enrolment or quit date, and vape brand. If the user has not set a quitting date, then they receive messages targeted at building skills and confidence. In the case that the user has set a quit date, then they receive messages (6 weeks before and 8 weeks after) informing them about the risks of vaping, the benefits of quitting and supporting activities to build coping skills and self-confidence. A number of the messages the users receive are written by other users to encompass the influence of their surrounding environment (e.g. friends, family or peers) and enhance peer support (Berg et al. 2021). All enrolled users are offered mental health support, breathing techniques and information about the Crisis Text Line.



**Figure 1.**  
Flyer from This Is Quitting, derived from:  
<https://truthinitiative.org/this-is-quitting-resources>

**Evaluation and effectiveness:** Between January 2019 and May 2024, nearly three-quarters of a million young people had enrolled in the United States, reflecting the programme's high reach (Graham et al. 2024). According to Berg et al. (2021), an observation evaluation and a two-arm Randomised Control Trial, which included a control group, showed promising results in terms of the programme's effectiveness. The observational evaluation specifically revealed that more than half (61%) of the enrolled young adults indicated having reduced or stopped vaping. Additionally, two separate Randomised Control Trials found that the young people assigned to the *This is Quitting* programme were a third more likely to quit vaping in a 7-month time period compared to those in the control group for both age groups 13-17 (Graham et al. 2024) and 18-24 (Graham et al. 2021).



## Click City: Tobacco

**Description:** *Click City: Tobacco* is a school-based online prevention programme for 5<sup>th</sup> and 6<sup>th</sup>-grade students (age range: 10-12 years old), initially targeted at traditional cigarette smoking and later updated to include vaping. It was developed by Oregon Research Institute and is delivered across the US. This programme is grounded in behaviour change theory as it targets behavioural intentions and willingness to smoke and vape. The activities of *Click City* were developed to target etiological mechanisms (e.g. underlying factors) of tobacco use, such as social images, subjective norms and perceived threats of health harms and addiction. The programme can be accessed from: <https://influenzsin.com/click-city-tobacco/>

**How it works:** The programme offers educational content related to the risks and health consequences of smoking and vaping, with the aim of raising awareness and helping students resist social influences to engage in such behaviours. The content is available via an online platform in which the users can log in and explore eight science-based lessons consisting of two or three activities each. The initiative utilises a variety of science-based content, practical learning and fun activities to encourage student engagement. Some of the activities include observing scientific experiments, watching videos (e.g. summarising key aspects of the programme), and playing interactive games as well as board games.

**Evaluation and effectiveness:** Andrews et al. (2024) conducted a Randomised Pragmatic Effectiveness Trial to evaluate the updated 5<sup>th</sup> grade version of *Click City: Tobacco*, in school settings and with the help of school personnel. More specifically, they measured outcomes such as behavioural intention and willingness to smoke and vape, and etiological mechanisms influencing behaviour. Their results suggested the overall effectiveness of the intervention, as intentions and willingness to smoke and vape decreased. Nevertheless, the effect size<sup>5</sup> was small, indicating, according to the authors, that intentions and willingness might have been low from the beginning. Additionally, the underlying factors (etiological mechanisms) influencing both smoking and vaping shifted in the desired direction, showing moderate to large effect sizes. Risk perceptions of health consequences and addiction also increased in moderate to large effect sizes.

The authors concluded that key factors influencing the programme's effective implementation in a school setting include its online delivery, the high engagement of students and the easy adoption by the school personnel. It is noteworthy that the study did not find notable differences regarding gender, ethnicity, residence and family use, indicating that the intervention could be effective with a broad audience.



**Figure 2.** Collage of Click City: Tobacco's content, derived from: <https://influenzsin.com/click-city-tobacco/>

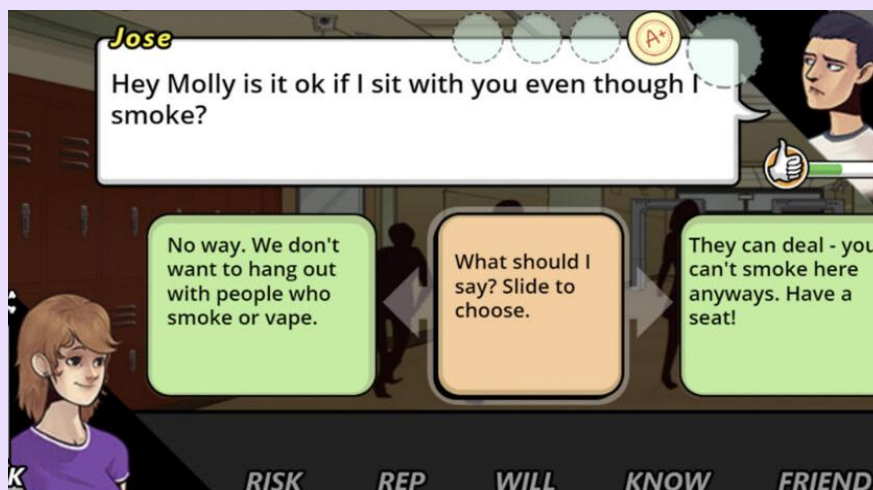
<sup>5</sup> Effect size can be measured by Cohen's *d*. The value of *d* indicates the magnitude of a difference between two groups or conditions, expressed in terms of standard deviation units. A *d*=0.2 indicates a small effect size, a *d*=0.5 indicates a medium effect size, and a *d*=0.8 indicates a large effect size between two groups. In this specific case, the intervention reduced intentions to vape by *d*=0.11 and willingness by *d*=0.11. Etiological mechanisms have shifted in the desired direction in moderate to large effect sizes; specifically, social images of vapers changed by *d*=0.49, normative social images of vapers – perceptions of what is typical or acceptable – by *d*=0.34 and friends' approval of vaping by *d*=0.18. Risk perceptions of health consequences of both vaping and smoking were increased in moderate to large effect sizes by *d*=0.20-0.56 and respectively for addiction by *d*=0.30-0.47 (Andrews et al. 2024).

## smokeSCREEN

**Description:** *smokeScreen* is a web-based vaping and smoking prevention video game intervention designed for those aged 10 to 16 years. It was developed by play2PREVENT Lab at the Yale Centre for Health and Learning Games of Yale University, and it is delivered in the US. It is grounded in Social Cognitive Theory and the Theory of Planned Behaviour<sup>6</sup>, addressing various challenges that young people face regarding engagement with tobacco products, focusing on cigarettes, vapes and flavoured tobacco products (Hieftje et al. 2021). The video game can be accessed at: <https://playbl.com/our-games/smokescreen/>

**How it works:** The videogame attempts to enhance young people's knowledge about tobacco products and foster skills development (e.g. resistance to peer influence) through two mini-games (“Know Sense” and “Refusal Power”). *SmokeSCREEN* includes 10 game levels and can be completed within 1-2 hours in multiple sessions.

**Evaluation and effectiveness:** Hieftje et al. (2021) used a real-world, quasi-experimental study to evaluate the effectiveness of *smokeSCREEN*. Their results highlight the promising effects of an interactive video game-based intervention in changing the beliefs and knowledge of young people. For example, 8.4% of the participants responded “Yes” to vapes being harmful to health after exposure to the game, while before playing the game, they had answered “No”. The intervention was also shown to measurably increase knowledge of the addictive potential of vaping. Research findings suggest that should beliefs and knowledge shift, then there is a higher chance of behavioural change (e.g. reducing smoking and vaping). It is worth mentioning that the intervention was found to have had a more significant impact on an older age group of young people. This could be explained by the fact that older participants have more relevant knowledge and can more effectively relate to the content. Finally, the high level of engagement and positive feedback from participants regarding the gameplay experience is important when considering alternative interventions to traditional school-based campaigns. This suggests that such interactive methods could offer more effective and engaging solutions for promoting behaviour change.



**Figure 3.** Sample frame of *smokeSCREEN* videogame derived from: <https://playbl.com/our-games/smokescreen/>

<sup>6</sup> The Theory of Planned Behaviour is a psychological theory explaining human behaviour based on three core factors: attitudes, subjective norms - which describe the perceived social influence - and perceived control over behaviour (Ajzen I., 2011).

# Evidence gaps & areas for further research

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## Evidence gaps resulting from the review of the literature

There was no consistency of evidence identified about what works in targeting specific younger age groups. The majority of the studies concerned broader age groups (e.g. 13-17 or 18-25), except for the study by Andrews et al. (2024) that focused on young people aged 10-11, and the study by Conner et al. (2021), that focused on the 13-14 age range.

Notably, we identified contradictory findings about whether messages targeting risk beliefs (e.g. people perceiving vapes as less harmful) of vaping are more effective in those who are younger or older. For example, while Hieftje et al. (2021) found that cessation messages targeting risk beliefs can be more effective in older age ranges of young people as they are more informed about vapes than their younger peers, Andrews et al. (2024) showed the effectiveness of an intervention targeting the perceived risk of vaping in ages 10-11.

Further research is required to determine which messages are most effective for specific age groups, enhancing the prevention strategies to reduce vaping initiation among adolescents.

## Areas for further research as identified in the evidence reviewed

There is a recognised need within the research community to enhance the evidence-base for informing effective intervention programmes aiming at vaping cessation and prevention among young people. To achieve this, additional research is necessary to address the multifaceted nature of young people's engagement with vapes. Key areas of further research that were identified in the studies reviewed are presented below.

Future research should consider the complex interconnected factors that contribute to young people engaging in vaping, such as social influences, perceptions about vapes, the pervasive impact of social media, etc. (Alpert, Chen, and Adams 2019; Berg et al. 2021; O'Connor et al., n.d.; Scheffels et al. 2023). Furthermore, attention has also been directed toward taking into account polytobacco use (i.e. the consumption of more than one tobacco product) when informing the development of interventions (Berg et al. 2021; Blackwell et al. 2023; Graham et al. 2024).

Regarding age groups, future research should place more emphasis on targeting adolescents under the age of 18, as this cohort shows the highest prevalence of vape use. Understanding their behaviours and the factors influencing this trend is crucial for developing more targeted prevention strategies (Graham et al. 2021; Park et al. 2019; Rohde et al. 2019).

Additionally, there is widespread consensus in the scientific community about the need for longitudinal studies that follow participants in the longer term. These studies are essential for gaining deeper insights into the long-term effects of interventions (Andrews et al. 2024; Duke et al. 2016; Noar et al. 2020; Rath et al. 2021; Rohde et al. 2019; Williams et al. 2022).

Finally, other suggestions for further studies include exploring the impact of various content approaches, such as the use of text-based content versus image-driven materials, on the effectiveness of vaping-related messages (Kong et al. 2016). Future research should also consider demographic variables such as gender, which may influence how young people perceive and respond to different communication messages (Kong et al. 2016).



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# Annex: Methodological design

This section sets out the methodology followed to retrieve evidence included in the literature review. It outlines the information sources, our search strategy to explore evidence relevant to the research questions, the inclusion and exclusion criteria reflecting the research questions, and our data management process.

## Information sources

We mainly retrieved evidence from academic literature. For this purpose, we focused on the following databases: JSTOR, Science Direct, SAGE, SpringerLink, and Google Scholar.

## Search strategy

We designed the search strategy to ensure it was targeted at answering the assigned research questions. Table 1 illustrates the keywords used to identify relevant sources of evidence.

Search terms were combined into search strings using Boolean operators (AND/OR/NOT) and other database-specific search operators. Using these strings, we arrived at a long list of studies, which was screened to see if they met the inclusion criteria.

**Table 1. Search keywords**

KEYWORDS	
<b>KEYWORD 1</b>	vap*, e-cigarette
<b>Main subject</b>	
<b>KEYWORD 2</b>	Young, youth, student, child*
<b>Population of interest</b>	
<b>KEYWORD 3</b>	Campaign, communication, program*, intervention, cessation, stop, prevent*
<b>Source</b>	

**Note:** The asterisk (\*) is used to enable broad searches by filling in variable parts of a word, allowing matches for any combination of characters that follow the specified starting portion of them.

## Inclusion and exclusion criteria

We used the following inclusion and exclusion criteria to decide if the materials identified from our search were suitable for answering the research questions. The criteria used to move from a long list towards a short list of studies that were included in our technical review are listed in Table 2 below. Our initial search results contained 182 papers, which we screened (based on their relevance to the research questions and whether they broadly covered the inclusion criteria) to compile a high-level list with the most relevant pieces. The long list contained 93 papers. After reading the abstracts and screening the papers, we concluded with 27 papers that met all the inclusion criteria. Papers in the short list of evidence were read in full and analysed.

**Table 2: Inclusion and Exclusion Criteria**

Theme	Inclusion Criteria	Exclusion Criteria
Population characteristics	Children and Young People 10-18. Important evidence from ages 18-24 will also be considered.	Outside the 10-24 range.
Country	England, the rest of the UK, and comparable countries (USA, Canada).  Australia, New Zealand, and comparable EU and EEA countries will also be considered.	Non-comparable countries in Africa, Asia, and South America.
Methods	Randomised Control Trials on campaigns.  Quantitative analysis and evaluation of relevant campaigns, programmes and interventions.  Evidence reviews and meta-analyses.  Qualitative studies, including focus groups, interviews, and questionnaires with young people, students, school teachers, parents, policymakers, or any other stakeholder.	Quantitative research on causal effects but not describing the campaign or intervention programme itself.  Non-evaluated evidence studies.
Impacts and outcomes	Any impact related to quitting vaping or not having the intention to start it, including identifying trusted communication channels for this purpose.  Understanding young people's vaping behaviour(s).	No adequate evidence for impacts or outcomes. No evidence/discussion for effective communication channels.  No evidence or information about the vaping behaviour(s) of young people.
Date of research	Published between 2014-2024.	Published earlier than 2014.
Language	English	Any other language
Type of studies	Peer-reviewed journal articles, non-peer-reviewed academic outputs, government-commissioned research, publications by research organisations, evidence by providers of campaigns /interventions including examples from previous campaigns, and government publications.	Newspaper articles, editorials/ opinion pieces, and magazine articles.  Theses and dissertations.  Books or other work of equivalent length.

## Data Management

To capture the key information of each study included in the shortlist, we developed a Research Extraction Sheet (RES) that included the following details for each study:

- Title
- Authors
- Type of publication
- Publication date
- Source
- Country/Region of focus
- Abstract
- Methodology (e.g. survey, interviews, RCT)
- Population of interest (e.g. young adults, children, parents, teachers)

The RES was used to develop the Evidence Map.



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