Introduction

Over the past decade, vaping has surged in popularity, particularly among teenagers and young adults, driven by marketing that promotes it as a safer alternative to smoking. However, mounting evidence reveals significant health risks associated with vaping, including respiratory illnesses, cardiovascular issues, and nicotine addiction. This growing public health concern is exacerbated by the accessibility of flavoured e-cigarettes and gaps in regulatory control, which have contributed to an alarming rise in adolescent usage. With these risks threatening both individual health and societal well-being, it is clear that urgent attention is needed to address the complexities of this evolving issue.

Background

Efforts to combat vaping, particularly among adolescents, have been underway for several years and encompass regulatory actions, public health campaigns, academic research, and social interventions. These measures aim to reduce the use of e-cigarettes and related health risks, but gaps still need to be addressed in terms of long-term impact and comprehensive solutions. Below is a more detailed review of what has been done and what remains to be addressed.

What Has Been Done?

1. Regulatory Measures

Regulatory bodies around the world have taken significant steps to limit the availability and appeal of e-cigarettes, particularly to young people. In the United States, the Food and Drug Administration (FDA) has worked to curb the sale of flavoured e-cigarettes that attract youth. In 2020, the FDA enacted an enforcement policy that banned the sale of flavoured cartridge-based e-cigarettes, including those in fruit, mint, and candy flavours, due to their popularity among minors (FDA, 2020). This regulation also extended to online retailers, where a large portion of youth access vaping products.

The Centers for Disease Control and Prevention (CDC) and other health authorities have repeatedly warned against the dangers of vaping, particularly the risk of E-cigarette or Vaping Product Use-Associated Lung Injury (EVALI). In response to the rising cases of EVALI, linked to vaping products containing THC or Vitamin E acetate, the CDC issued a national advisory and called for tighter controls on the sale of such products (CDC, 2020).

In Australia, the government has implemented prescription-only access to nicotine-containing e-cigarettes, effectively limiting the unregulated sale of vaping products. The Australian government hopes this approach will reduce the prevalence of vaping among adolescents while still allowing adults the option of using e-cigarettes as a smoking cessation aid (Australian Government Department of Health, 2021). Despite this, teens in New South Wales continue to readily access and use disposable vaping products, many of which are illegal and flavoured, containing nicotine.

Effectiveness: While regulations on flavoured e-cigarettes and prescription-based systems have helped limit access to certain products, enforcement still needs to be consistent. Although there has been a decline in youth vaping in some regions, illegal online sales, loopholes in regulation, and continued marketing strategies targeting young users continue to undermine these efforts (FDA, 2020). Moreover, e-cigarettes remain widely available in some countries with looser regulations, making it difficult to curb usage fully.

2. Public Health Campaigns

Public health organizations, including the World Health Organization (WHO) and the CDC, have launched targeted campaigns to increase public awareness of the risks of vaping. The CDC's “The Harmful Effects of Vaping” campaign aims to educate the public on the health risks of e-cigarettes, focusing on respiratory injuries, addiction, and the long-term health impacts of nicotine use (CDC, 2020). Similarly, the American Lung Association has conducted campaigns against the use of e-cigarettes, emphasizing that vaping can cause lung damage, nicotine addiction, and potential heart disease (American Lung Association, 2020).

Effectiveness: These campaigns have successfully raised awareness about vaping's risks, particularly lung injuries associated with the EVALI outbreak. However, they have not been as

effective in preventing the rising trend of adolescent vaping. Studies have shown that many young people continue to view vaping as a safer alternative to smoking, and many are unaware of its potential harms until health issues arise (National Institute on Drug Abuse, 2020). In a study from New South Wales, over 700 teens were surveyed, and it was found that 32% had tried vaping, with 54% of those having never previously smoked (Freeman, Watts, & Egger, 2022). Moreover, over half of these teens were using disposable vapes, with 86% reporting these as the device of choice.

These disposable vapes are particularly appealing due to their simplicity—no refilling is required—and their wide availability. They are also inexpensive, costing as little as $5 online or between $20-$30 in retail stores. The flavour options available range from fruity to candy-like tastes, making them highly attractive to teens, with “flavourings and taste” being rated as the most important characteristic by surveyed users. Notably, disposable vapes often contain very high concentrations of nicotine, even in products marketed as "nicotine-free." This is because the use of nicotine salts allows manufacturers to increase nicotine levels without causing throat irritation, leading to even higher addiction potential (Freeman, Watts, & Egger, 2022).

A significant concern raised by the survey was that while 53% of teens who had ever vaped reported using a product containing nicotine, many were unaware of whether they had used a nicotine product at all, with 27% unsure. All vaping products, regardless of nicotine content, are illegal to sell to individuals under 18 in Australia. However, teens continue to access these products illegally through online markets and retail outlets.

3. Research and Data Collection

Research on vaping’s health effects has contributed to the broader understanding of the risks posed by e-cigarette use. Research has demonstrated that vaping leads to an increased risk of lung injury, cardiovascular disease, and nicotine addiction. One of the most significant findings has been the emergence of EVALI, a condition that primarily affects young users of e-cigarettes with THC (Gotts et al., 2019). The New England Journal of Medicine published findings linking Vitamin E acetate, an additive found in illicit THC vapes, to the development of EVALI, which resulted in numerous hospitalizations and deaths (Gotts et al., 2019).

Studies also highlight that e-cigarettes still deliver harmful chemicals like formaldehyde and acrolein, which can damage lung tissue (Tobacco Control, 2020). Furthermore, there is growing evidence that the nicotine content in e-cigarettes can lead to addiction, particularly among adolescents, who are more susceptible to the neurotoxic effects of nicotine (Siegel et al., 2011).

Effectiveness: This research has been invaluable in shaping regulatory policies and public health warnings. However, gaps remain in understanding the full range of long-term effects of vaping. While short-term health issues, such as respiratory distress and nicotine addiction, are well-documented, the chronic health impacts of vaping over years or decades are still not fully understood (Gotts et al., 2019).

Open Problems and What Remains to Be Done

Long-Term Health Effects

While significant progress has been made in identifying the short-term risks of vaping, the long-term health effects of e-cigarette use remain unclear. Few longitudinal studies exist, and current research has primarily focused on immediate concerns such as addiction and lung injuries. It is unknown whether prolonged vaping leads to chronic conditions such as emphysema, bronchitis, or even cancer (Gotts et al., 2019).

What Remains to Be Done: Long-term epidemiological studies are necessary to understand the full scope of vaping's effects on health, particularly in users who have been vaping for several years. This research is essential for making informed public health decisions and regulations.

Youth Prevention

Despite regulatory actions, youth vaping continues to rise. The use of e-cigarettes among adolescents has become widespread, fueled by flavoured products and marketing strategies that target young people. Surveys show that more than one-quarter of high school seniors in the U.S. have reported using e-cigarettes in the past month, and flavoured e-liquids are a major factor in

this trend (National Institute on Drug Abuse, 2020). The appeal of vaping is reinforced by social factors, peer pressure, and the cultural normalization of the behaviour, often aided by influencer marketing on social media. In addition, a study from New South Wales found that many teens are accessing illegal and flavoured vaping products easily, further complicating prevention efforts (Freeman, Watts, & Egger, 2022).

What Remains to Be Done: More targeted interventions are needed to reduce adolescent vaping, focusing on social and cultural factors. This could involve stronger regulations on advertising and flavourings, more effective educational campaigns, and increased social stigma associated with vaping. Additionally, increasing enforcement of existing regulations on youth access to e-cigarettes and cracking down on illegal online sales are critical to addressing this issue.

E-Cigarettes as Smoking Cessation Tools

Some research suggests that e-cigarettes can be a tool for smoking cessation, helping smokers reduce or quit traditional tobacco use. However, the phenomenon of dual-use—where users continue smoking traditional cigarettes while vaping—has raised concerns. Evidence is conflicting about whether e-cigarettes are a safe alternative to smoking or if they might serve as a gateway to continued nicotine addiction (Siegel et al., 2011).

What Remains to Be Done: More robust, large-scale studies are needed to clarify whether e-cigarettes can be a viable smoking cessation tool. These studies should examine the long-term effects of transitioning from traditional smoking to vaping and explore whether e-cigarettes help users quit or lead to dual-use behaviours that still expose individuals to significant health risks.

Enforcement of Regulations

While efforts have been made to limit the availability of e-cigarettes to minors, enforcement continues to be an issue. Online sales of vaping products often circumvent age restrictions, and loopholes in some regions have allowed the continued sale of e-cigarettes in flavours that appeal to youth.

What Remains to Be Done: Stricter enforcement of regulations, particularly in online markets, is crucial. More resources should be allocated to monitoring sales and preventing the illegal distribution of vaping products. Enhanced training for retailers on how to identify and prevent sales to minors is also essential.

Details:

Game Title: ***"Mystery of the Strange Disease"***

Objective:

Create an ultra-simple, 2D narrative exploration game centred around a single room. Players gather three clues and uncover a shocking truth in 10–15 minutes of gameplay.

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1. Game Overview

- Setting: One 2D room (a hospital lab).
- Gameplay: Players move, interact with 3 objects, and piece together a mystery with minimal puzzles.
- Game Length: 10–15 minutes.
- Platform: PC, with only keyboard controls (WASD/arrow keys for movement, spacebar for interactions).

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2. Core Gameplay

1. Exploration:
    - Players control a character in a static top-down room with 3 interactive objects (e.g., a clipboard, an X-ray screen, and a vape device).
2. Clue Interaction:
    - Interacting with each object shows a static image (e.g., X-ray) or text description.
    - Clues describe symptoms that seem disconnected at first.

3. Mini-Puzzle (Optional):
    - Drag and drop: Match clues to symptom descriptions in a simple, clickable UI.
    - Or skip the puzzle entirely and progress based on clue discovery.
4. The Reveal:
    - After all objects are interacted with, the game triggers a brief text-based cutscene summarizing the findings:
      "These symptoms aren't random. They're effects of vaping."

3. Narrative Flow

- Opening Text:
  "You're a health investigator sent to analyze strange cases at a hospital. Can you figure out what's causing the symptoms?"
- Clues (Examples):
    1. X-ray: "The lungs appear damaged with black spots typically seen in chemical exposure."
    2. Clipboard: "Symptoms: Shortness of breath, chest pain, and chronic coughing."
    3. Vape Device: "Found near the patient's belongings. Contains an unidentified liquid."
- Closing Text:
  A slideshow or text-based summary of how vaping leads to these real-life health effects.

4. Design Features

- Single Room Layout:
    - Three clickable objects are positioned within a simple 2D environment.
    - A fixed top-down camera for simplicity.
- Simple Art Style:
    - Hand-drawn or pixel art for the room and objects.
    - Static images for clues.
- Minimal UI:
    - Text boxes for clue descriptions and the ending cutscene.
    - No inventory or complex menus.

5. Team Tasks

1. Programmer:
    - Basic player movement and interaction triggers.
    - Sequence events when all 3 clues are discovered.
2. Artist:
    - Draw one room, three interactive objects, and 2–3 static images for clues.
3. Writer:
    - Write brief text for the opening, clue descriptions, and the final reveal.
4. Sound Designer:
    - Add ambient hospital sounds and a short suspenseful track.

6. Timeline

- Day 1–2: Set up Unity project, create a single room layout, and implement movement and interaction.
- Day 3–4: Add 3 interactive objects and text-based clues.
- Day 5–6: Design static clue images and the final cutscene.
- Day 7: Playtest and finalize.

Effectiveness

Many efforts have been made to dissuade young people from vaping, however few have made much impact in actually convincing them to not start the habit. From our earlier analysis, the problem does not lie in a lack of publicly available information regarding the health risks, although the long term effects are still undocumented due to their very recent rise in prevalence. Rather, the issue appears to lie more in that youth find it to be cool and trendy, further compounded by the fact that vaping has many appealing flavours and doesn't have the same unpleasant odour that traditional cigarette smoking does. We feel that our game will address these issues by streamlining the delivery of the information in a quickly digestible format. Further, by showing the results of vaping directly from the perspective of a medical professional, we believe that we can circumvent the social aspects by delivering a preliminary education on the topic in an individualized environment.

Summary/Conclusions

Dissuading youth from developing the habit of vaping isn't an easy task, but by using gamification we can provide convincing rationale about the hazards of vaping using interactive methods that can be engaging to youth, even those with short attention spans. Potential problems in our solution include not being able to address the social issue that vaping presents as it lacks a variable element to account for the presence of peer pressure and habits that've been learned throughout development. A possible way to solve this issue going forward could be to introduce a shaping element by making the game more difficult by adding distracting peers who spread misinformation about vaping and disrupt the player's path, testing the resolve of the player. However, the positive potential outcome of our game in reducing the popularity of vaping in adolescents is the outcome that we will continue to strive for in the future.

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