

The Impact of Electronic Cigarettes on Junior High School Students – A Case Study of Junior High School Students in Chiayi County, Taiwan

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Abstract: *Background:* Preventing crime or illegal behavior early on, especially among junior high school students whose minds and bodies are still developing, will have a significant impact on their future adult behavior. Electronic cigarettes are emerging contraband, particularly enticing to some junior high school students. Researching this topic can provide insights into how likely junior high school students are to be tempted by novelty. *Method:* This study adopts a qualitative research approach, conducting semi-structured interviews with five junior high school students who have previously used electronic cigarettes, using purposive sampling to obtain firsthand information and present the perspectives of 14-15-year-olds on electronic cigarettes. *Results:* Students influence each other through peer relationships, with negative friends or classmates encouraging the adoption of criminal behaviors. Variables related to individual personality and social environment interact to shape criminal behavior. When external social temptations (external forces) and internal tendencies or resistance (internal forces) both lean towards criminal behavior, individuals are more likely to engage in crime. *Conclusion:* Classical criminology emphasizes the theory of free will, asserting that every individual has the ability to discern right from wrong and freely choose their behavior in pursuit of happiness and avoidance of pain. If the chosen behavior is illegal, punishment must be accepted. Fortunately, in this study case, four out of five students emphasized that they would not smoke electronic cigarettes in the future, citing reasons such as the lack of attractiveness of electronic cigarettes and awareness of the harm they cause to the body.

Keywords: Junior high school students, e-cigarettes, tobacco-like products, Taiwan

1. Introduction

As frontline educators in schools, teachers encounter various behaviors from students every day, ranging from moments of joy to moments of concern. The joy comes from witnessing the vibrant performances of students in their youth, while the concern arises when some students make mistakes or veer off the right path. One of the concerning issues in schools is the prevalence of smoking, especially the emergence of new smoking products like electronic cigarettes (e-cigarettes).

Here are some reports regarding e-cigarettes:

1. Integration of E-Cigarettes into Campus Tobacco Control: The Ministry of Education Mandates Strict Prohibition in School Regulations (Union Daily, 2022).

The allure of new tobacco products among youth poses a threat to health. The Ministry of Education continues to enforce a comprehensive smoking ban in schools below the high school level. In addition to strengthening students' awareness of the health hazards of smoking, educational materials on e-cigarette prevention have been promoted. Recently, e-cigarettes, which have sparked discussion, have been included in the promotion of campus smoking prevention and substance abuse control. Schools at all levels are required to incorporate them into their regulations, strictly prohibiting faculty, staff, and students from carrying and smoking them, in order to safeguard a healthy campus environment jointly. The Ministry of Education, through the Department of Education, stated that by the regulations of the Tobacco Hazards Prevention Act, smoking is completely prohibited in junior high schools and below. While students are generally aware of the health risks associated with smoking, recent promotion of novel and trendy electronic cigarette products has led to misinformation spread by manufacturers claiming that they are "healthier," "do not produce second-hand smoke," and "can help with smoking cessation." These false claims have misled the public and affected the correct recognition and understanding of electronic cigarettes among adolescents and children.

2. E-cigarette Use Doubles in 3 Years; Estimated 79,000 Students Become Smokers (Central News Agency, 2022). The latest statistics from the Health Promotion Administration show that the use of e-cigarettes among junior high and high school students has doubled from 2.7% to 6.6% over the past three years. It is estimated that as many as 79,000 adolescents in Taiwan are using e-cigarettes, indicating a rampant use of e-cigarettes on campuses, seriously endangering the health of young people.

The Health Promotion Administration of the Ministry of Health and Welfare conducted the "Youth Smoking Behavior Survey in the Republic of China in 2021" on 28,000 junior high and high school students across Taiwan last year. It announced the survey results at a press conference this morning. The survey showed that the usage rate of traditional cigarettes among junior high school students decreased from 7.8% in 2008 to 2.2% in 2021, a decrease of 71.8%. Among high school students, the rate decreased from 14.8% in 2007 to 7.2% in 2021, a decrease of approximately 51.4%. In contrast, the usage rate of electronic cigarettes among adolescents has increased rather than decreased. The usage rate of electronic cigarettes among junior high school students increased from 1.9% in 2018 to 3.9% in 2021, while among high school students, it increased from 3.4% to 8.8%. The overall usage rate of electronic cigarettes among adolescents increased from 2.7% to 6.6%, more than doubling in just 3 years.

These news reports highlight the rapid rise of e-cigarettes as a new tobacco product. Adolescents in junior high school are particularly vulnerable as they undergo physical and emotional challenges during adolescence. Some students, eager to prove their maturity, may turn to e-cigarettes. Therefore, understanding what makes e-cigarettes attractive to students is one of the motivations for this research. Additionally, qualitative semi-structured interviews will be conducted to understand why students choose e-cigarettes over conventional tobacco products, and to understand the use of e-cigarettes among junior high school students in Chiayi County. With the advancement of technology and the prevalence of the internet, the occurrence of

smoking and even drug use on campuses is no longer surprising news. As educators on the front lines, understanding the use of e-cigarettes among junior high school students in Chiayi County is particularly relevant and urgent.

There is not much research on electronic cigarettes. Relevant studies include Lin's (2020) "Study on the Acceptance of Heated Electronic Cigarette Products by Smokers in Taiwan," which explores the acceptance of heated electronic cigarettes among smokers in Taiwan and investigates the key factors that current smokers may consider when switching to heated electronic cigarettes (Lin, 2020). Additionally, Wu (2017) conducted a study titled "Exploring the Effects of Electronic Cigarettes on Exercise Capacity and Blood Biochemical Values Using a Mouse Model," which concluded that short-term exposure to high doses of nicotine for 14 days can affect mouse muscle strength and liver glycogen storage, while kidney and liver function and histopathological sections remain unaffected in blood biochemistry (Wu, 2017). Chen (2016) published a paper titled "On the Application of Preventive Principles in Risk Control Measures and Legal Boundaries—Taking the Regulation of Electronic Cigarettes as an Example," advocating for comprehensive prohibition measures against electronic cigarettes due to the uncertain risks associated with them (Chen, 2016). This approach, however, may face challenges in passing the necessity review based on the principle of proportionality and may not be justified through the application of preventive principles.

There is limited research on e-cigarettes among junior high school students. Therefore, the main research objectives of this study are:

1. Is e-cigarette use harmful to health?
2. Why do junior high school students try e-cigarettes?
3. What is the impact of e-cigarette use on the lives and behavior of junior high school students?

1.1 Definition of Terms

Junior High School Students: Students aged 12 to 15 who are enrolled in junior high school and receive compulsory education in the Republic of China.

Electronic Cigarettes (E-cigarettes): Electronic cigarettes, also known as e-cigarettes or vapes, are devices powered by batteries that heat a liquid solution (e-liquid or e-juice) containing nicotine, flavorings, and other chemicals to produce an aerosol, commonly referred to as vapor, which is inhaled by the user. E-cigarettes do not involve burning tobacco and do not produce tar or carbon monoxide, potentially reducing harm compared to traditional cigarettes.

Alternative Tobacco Products : Refers to materials other than tobacco ingredients or materials that alter the physical state of tobacco ingredients, which can mimic the delivery of nicotine or non-nicotine electronic or non-electronic compounds and other similar products.

Taiwan: Taiwan, officially the Republic of China (ROC), is an island located in East Asia, off the southeastern coast of China, across the Taiwan Strait.

1.2 Literature Review

1.2.1 Statistics from the Health Promotion Administration:

Studies have indicated that electronic cigarettes release toxic and carcinogenic substances such as formaldehyde, acetaldehyde, ultrafine particles, heavy metals, etc., which may cause obstructive bronchiolitis and damage to organs such as the brain, heart, lungs, liver, and kidneys. Additionally, they pose risks of addiction, secondhand, and thirdhand smoke exposure. The World Health Organization states that all forms of tobacco products or e-cigarettes are harmful, as e-cigarettes often contain nicotine and harmful carcinogens, harming both users and those exposed to secondhand smoke, with no evidence to support that e-cigarettes are safe or help with smoking cessation. Furthermore, foreign studies show that adolescents who have used e-cigarettes are more likely to have intentions to smoke and are more prone to initiating smoking behavior. Adolescents who have used e-cigarettes are more than twice as likely to try combustible cigarettes compared to those who have not used e-cigarettes, and dual use poses even greater health risks and makes cessation more difficult.

Manufacturers continuously introduce new types of products and use enticing flavor additives to attract adolescents to try or purchase e-cigarettes. They also use marketing tactics, such as massive dissemination of e-cigarette information through online social media platforms, deliberately omitting their health hazards. Marketing phrases like "reduce exposure to harmful substances," "tobacco alternatives," "aid smoking cessation," "less smoke," and "pleasant flavors" are used to deceive the public, gradually entering the country through various channels and posing a serious threat to adolescent health. The National Health Administration has requested local governments to strengthen inspections of physical e-cigarette stores and continue monitoring illegal sales of e-cigarettes on the internet (e.g., shopping platforms, social media platforms), and forward the cases to local health authorities for follow-up investigations.

1.2.2 The Tobacco Hazards Prevention Act specifies:

The Tobacco Hazards Prevention Act (hereinafter referred to as "this Act") was promulgated and implemented on March 22, 112 (Taiwanese calendar). The related provisions and penalties are as follows:

- A. Prohibition of the use of tobacco products: Any person shall not use tobacco products. Violators shall be fined between NT\$2,000 and NT\$10,000.
- B. Prohibition of manufacturing, importing, or advertising tobacco products or their components: Manufacturers or importers who manufacture or import tobacco products or their components shall be fined between NT\$10 million and NT\$50 million.
- C. Prohibition of selling or displaying tobacco products or their components: Violators shall be fined between NT\$200,000 and NT\$1 million.
- D. Prohibition of supplying tobacco products or their components: Those who supply tobacco products or their components shall be fined between NT\$10,000 and NT\$250,000.

Due to e-cigarettes being a new type of tobacco product, there is currently little statistical data from the Health Promotion Administration. According to information from Wikipedia, the Public Health England report in 2015 suggested that e-cigarettes are 95% less harmful than traditional cigarettes and help 20,000 smokers quit each year. However, the credibility of the 95% data cited in this report has been questioned by some scholars due to weak evidence and conflicts of interest. As a result, reports on the harm of e-cigarettes have been largely neglected.

2. Materials and Methods

The subjects of this study were junior high school students from the school where the researcher served in Chiayi County. The study employed purposive sampling, conducting semi-structured interviews with five students who had previously used electronic cigarettes. All five students were in the ninth grade of junior high school and had used e-cigarettes both on and off campus before the amendment of the Tobacco Hazards Prevention Act (March 22, 2023). Therefore, they were selected as interview subjects.

3. Results

Using a qualitative analysis approach, the interview records were analyzed through an inductive method. The analysis steps are as follows:

- A. Present the obtained data in textual form. Thoroughly review all interview transcripts, examining the content sentence by sentence or in small paragraphs to identify important messages and provide marking and summarization.
- B. Classify and summarize the identified key words or key terms proposed by the interviewees into units of meaning.
- C. After summarizing and classifying the units of meaning, examine whether each unit aligns with the main theme of the study.
- D. Summarize the identified units of meaning into common themes and investigate whether they align with the context of the study.

The coding principles are described as follows:

Code Explanation:

1Q: Represents the researcher's question to case one.

1A: Represents the response of case one to the question.

1Q001: Represents the researcher's first question to case one, and so forth.

1A001: Represents the response of case one to the first question, and so forth.

Table 1: Analysis of Interviewees' Characteristics

	Case One	Case Two	Case Three	Case Four	Case Five
Age	14	15	15	15	14
Gender	Male	Male	Male	Male	Male
Academic Performance	Average	Below Average	Special Education	Average	poor
Conduct	Grade B	Grade B	Grade C	Grade B	Grade D
Commendations	3	6	1	2	0

Warnings	0	0	0	0	6
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(1) All students who used e-cigarettes were male, aged between 14 and 15. Four of them were in the same class, while the other was in a different class. They all knew each other. Quakers proposed the theory of bad company, suggesting that negative influences from friends can lead to the adoption of bad habits.

(2) Academic performance ranged from average to poor, with average scores ranging from 78 to 40. This indicates that students with higher scores (90 and above) tend to have a stricter and healthier self-concept, making them less susceptible to temptation.

(3) Personal conduct ranged from grade B to grade D, largely confirming Sutherland's theory of differential association, which suggests that criminal behavior is primarily learned through interactions within intimate personal groups.

(4) Case 1 received 3 commendations, Case 2 received 6 commendations, and Case 5 received 6 warnings. This suggests that individuals, whether performing well or poorly, are still susceptible to temptation when encountering trendy and fashionable things, as proposed by Tarde's Law of Imitation.

Analysis of Interviewee Cases

(1) Source of E-cigarettes

Cases 1, 2, and 4 purchased their e-cigarettes online, while Cases 3 and 5 received them from friends.

Cases 1 to 4 were motivated by curiosity and fun, while Case 5 felt obliged to smoke when offered by friends.

1A015: It costs only the price of a breakfast. Around a hundred dollars.

1A001: Just for fun.

2A003: Bought it on Shopee.

2A006: Just wanted to try it out, out of curiosity.

3A002: From outside. A classmate lent it to me. Smoking alone.

3A005: Out of curiosity.

4A002: Yes, one costs over NTD300, Green Apple flavor.

4A008: Out of curiosity.

5A002: Given by friends from outside.

(2) Sensation of Vaping

It feels cool (Cases 2, 3, 4, and 5), no feeling (Case 1).

1A006: No feeling, just a fragrance.

2A009: Cool.

3A003: Cool, sucked into the throat, feels okay.

4A006: Okay, a bit cool, keeping it in the mouth.

5A008: Feeling energized, cool.

(3) Degree of Vaping

Only mouth inhalation (Cases 1 and 4), inhalation into the throat (Cases 2 and 4), inhalation into the lungs (Case 5).

1Q007: Did you inhale into your lungs?

1A007: No, just inhale into the mouth and then exhale.

2Q011: Inhaled into the mouth or into the lungs?

2A011: Just into the throat.

3Q003: How does it feel after inhaling?

3A003: Cool, sucked into the throat, feels okay.

3Q004: Why didn't you inhale into the lungs?

3A004: Don't know how.

4A006: Okay, a bit cool, keeping it in the mouth.

5Q004: What's the feeling when smoking?

5A004: Cool, inhaled into the lungs.

(4) Willingness to Try Again

Cases 1 to 4 directly answered "No" when asked if they would continue, while Case 5's response was more ambiguous, saying they wouldn't smoke unless friends offered.

1Q009: Will you continue smoking?

1A009: No, smoking harms the body.

1Q011: Would you like to try again?

1A011: No.

2Q014: Did you try again later?

2A014: No.

2Q015: Why don't you want to try again?

2A015: Not used to it.

3Q006: Would you buy again after graduation?

3A006: No.

3Q007: Why?

3A007: Not enjoyable to smoke.

4Q014: Will you buy again in the future?

4A014: No, too expensive.

4Q015: If the price drops to over NTD100 , will you buy it?

4A015: No.

4Q016: If you earn over NTD 1000 after vocational high school, will you buy it?

4A016: No, don't want to go bad, e-cigarettes are not attractive.

5Q009: Will you buy e-cigarettes after graduation?

5A009: If friends have them, I won't waste money.

5Q010: Do you want to quit smoking?

5A010: Yes, I don't socialize with friends outside anymore.

(5) Purchasing Channels

Cases 1, 2, and 4 bought online, while Case 5 received from friends outside, based on social relationships with friends.

2A003: Bought on Shopee.

2Q018: How did you get the purchase information?

2A018: Saw it on the website.

4Q001: How did you get e-cigarettes?

4A001: Ordered together with Case 2 online.

5Q002: How did you get e-cigarettes?

5A002: Given by friends from outside.

(6) Price of E-cigarettes

Each costs around NTD100 to 300 , affordable for students with breakfast money lasting a few days.

1Q015: Is the price expensive?

1A015: Just the cost of a breakfast, a hundred yuan or so.

2Q004: How much is the price?

2A004: Bought one, almost NTD300 .

(7) Pickup Location

All at convenience stores, with high secrecy making it difficult for parents or others to notice.

2Q020: How was the delivery made?

2A020: Picked up at a convenience store, high secrecy.

4Q003: Did your parents know when you bought it?

4A003: No idea, bought it secretly.

4Q004: Is it also picked up at a convenience store?

4A004: Yes.

(8) E-cigarette Flavors

Diverse flavors, including tea, fruit, and mint.

4A002: Yes, Green Apple flavor.

2Q020: What attracted you to buy it?

2A020: Many flavors, like fruit, grape, mint, and tea flavors.

4. Discussion

In summary, students are susceptible to the influence of bad company when it comes to using electronic cigarettes. Quakers proposed the Theory of Bad Company, suggesting that negative friends are capable of instilling criminal habits, leading to a chain reaction of influence. Electronic cigarettes, emerging in a novel form, attract young people and students who are eager to try them out. When external factors in the environment trigger tendencies toward criminal behavior and individuals cannot restrain their inner desires, it can easily lead to criminal acts. W.C. Reckless, an American criminologist, introduced the Containment Theory in 1976, which explains the formation of criminal behavior through the interaction of internal and external control systems. This theory emphasizes the interaction between personal variables such as personality and social environmental variables in explaining the formation of criminal behavior.

According to Article 40, Paragraph 3 of the Tobacco Hazards Prevention Act, "Those who use tobacco-like products shall be subject to a fine of no less than two thousand New Taiwan Dollars and no more than ten thousand New Taiwan Dollars." This law falls under administrative law, and violations are subject to fines as prescribed, constituting a civil offense rather than a criminal liability. However, it is still a violation of the law. When a student smokes an electronic cigarette and is perceived by other students as trendy and fashionable, they may also imitate the behavior. Sutherland (1939) proposed the Theory of Differential Association, suggesting that criminal behavior is learned through contact with delinquent peers. The

frequency and duration of this contact influence the effectiveness of learning, with criminal behavior primarily learned through interaction within intimate personal groups.

The affordable price makes it accessible to students, and the discreet delivery provided by convenience stores makes it less likely to be discovered. Curiosity, experimentation, and fun are the reasons why these students make purchases. The diverse range of flavors also greatly appeals to young learners. Fortunately, four out of five students clearly stated that they would not make another purchase, indicating that while electronic cigarettes may initially attract novelty seekers, the overall experience is rather average.

Smoking electronic cigarettes and tobacco not only harm lung development and physical health but also increase the risk of addiction and even potential exposure to drugs. Therefore, besides advising junior high school students to stay away from electronic cigarettes and tobacco, it is even more important to encourage them to develop good lifestyle habits. This will help them distance themselves from negative influences. As mentioned in case 5Q010: "Do you want to quit smoking?" 5A010: "Yes, I don't associate with friends outside anymore." A strong self-concept can help individuals resist the temptation of external negative influences.

Researchers' recommendations:

(1) Cut off the source

The recent amendment to the Tobacco Hazards Prevention Act stipulates a complete ban on the manufacturing, importation, advertising, sale, consumption, display, and provision of electronic cigarettes, each with corresponding penalties. This should serve as a significant deterrent. However, the related prohibitions can still be carried out in secret. As the saying goes, "Where there's a will, there's a way." As long as there is significant profit and a large consumer base, electronic cigarettes will inevitably be traded and consumed in the shadows. Therefore, strict crackdowns on manufacturers and importers, accompanied by heavy penalties, are necessary to deter such activities and protect society from being overrun by electronic cigarettes.

(2) Educating the Next Generation about the Dangers of Tobacco and Drugs

Electronic cigarettes contain unidentified chemicals, and the harm caused by their consumption to the body is self-evident. Therefore, significant educational content should be incorporated into life and health courses to teach students about these dangers. Only with clear health knowledge can students be made aware of and cherish their physical well-being, thus refraining from experimentation.

5. Conclusion

(1) This study is limited to sampling rural schools in Chiayi County, Taiwan, with no samples from urban areas. Therefore, the research results cannot explain all behaviors.

(2) The sample size is only five, which is not extensive enough, and there is only one school included. Thus, the study can only be interpreted as regional research. Subsequent research that includes a broader range of schools and covers regions across Taiwan would provide more objective results.

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Conceptualization: Wu, Guang-Yu

Data Collection: Wu, Guang-Yu

Data Analysis: Wu, Guang-Yu

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Investigation: Wu, Guang-Yu

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Project Administration: Wu, Guang-Yu

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Visualization: Wu, Guang-Yu

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We hope that through this study, we can understand the collective behavior of teenagers and learn how to intervene and improve their undesirable behavior.

Conflicts of Interest:

The authors declare no conflict of interest.

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