Original Research Article

Assessing the Perceptions, Usage Patterns, and Health Outcomes of Vaping as a Harm Reduction Strategy among Current and Former Smokers in the United Arab Emirates: A Cross-Sectional Study

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Abstract

Background: Smoking remains a significant public health concern in the UAE, with efforts to reduce its prevalence facing various challenges. Vaping has emerged as a potential harm reduction strategy, yet little is known about its perceptions, usage patterns, and health outcomes among smokers and ex-smokers in the country. This study aims to assess the perceptions of vaping, its usage patterns, and self-reported health outcomes among current and former smokers in the UAE. *Methods*: A cross-sectional survey was conducted among adults and ex-smokers across the UAE. A structured questionnaire will collect data on demographics, smoking and vaping history, perceived harm reduction, usage patterns, and self-reported health effects. Descriptive statistics, chi-square tests, and logistic regression models were analyzed for the data. *Results*: In the research, 290 participants identified as male (93.1%), with their mean age at 34.7 years (±9.2). Most individuals who started vaping were between 19 and 25 years of age (52.8%). Current smokers evaluated vaping more favorably than former smokers on all key dimensions, although harm reduction, harm reduction support, and social approval ratings proved particularly significant (p < 0.01). Former smokers provided evidence showing they consider vaping to be a substance with addictive properties (p < 0.001) aimed at youth (p < 0.01) and dangerous to use occasionally (p < 0.01). A significant number of 41.4% of participants showed better respiratory symptom improvement following vaping, yet this response was more prominent among former smokers at 58.3% than current smokers at 39.0% (p < 0.005). Commitment to conventional smoking increased the risk of adverse effects between 21.65% for active smokers and 16.7% for previous users (p < 0.001). Multivariate logistic regression identified former smoking status (AOR = 2.8, p < 0.001), strong belief in vaping as a cessation aid (AOR = 1.9, p < 0.001), and higher education (AOR = 1.6, p = 0.04) as significant predictors of exclusive e-cigarette use. *Conclusion*: Ex-smokers gain greater advantages from vaping, but existing cigarette users mostly suffer additional negative consequences and reduced positive outcomes. Vaping behavior strongly depends on how much individuals believe vaping harms them, works as a substitute, or fits into their social environment based on their smoking status. The promotion of exclusive e-cigarette usage for cessation requires complete educational programs, together with strict regulation measures and persistent assessment of health results.
Keywords: Smoking, Vaping, Perception, UAE.

INTRODUCTION

The practice of smoking stands among the major preventable causes of fatal diseases internationally. The World Health Organization (WHO) reports that tobacco usage annually leads to more than 8 million fatalities, including 7 million deaths from using tobacco directly, along with 1.2 million deaths because of inhaling secondhand smoke [1]. Cigarette smoking causes multiple serious health problems among people, including cardiovascular illnesses, chronic obstructive pulmonary disease (COPD), lung cancer, and stroke [2].

Tobacco use stands as a significant public health problem in the UAE. Results from the 2019 Global Adult Tobacco Survey indicated that Arab adults, with a 20.4% male and 1.1% female population, currently smoke tobacco products [1]. The high numbers of smokers exist because of social customs, local traditions related to tobacco consumption and easy access to tobacco products. A significant number of

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people in the country continue to use nicotine even though the nation runs several anti-smoking initiatives alongside tax regulations and smoking cessation services [3].

Electronic nicotine delivery systems (ENDS) serve as popular alternatives to regular cigarette smoking under their names, e-cigarettes, or vaping devices. During the vaping experience, individuals inhale vapours that typically incorporate nicotine together with propylene glycol, vegetable glycerin, and flavoring substances. Vaping differs from conventional cigarettes since it does not need combustion, and its absence prevents dangerous toxicants from appearing in tobacco smoke [4].

Vapers claim it represents an effective tool to lower smoking risks because it helps nicotine-dependent individuals access satisfying doses of nicotine through devices that generate lower levels of damaging carcinogenic chemicals. Studies reveal that smokers who move from tobacco cigarettes to e-cigarettes experience substantial decreases in their body measurements, which detect tobacco-related toxins [5]. There remain ongoing worries about extended vaping safety, together with worries that users keep smoking conventional cigarettes and worries about youth initiation into nicotine addiction.

Healthcare practitioners, together with smokers and non-smokers, present differing opinions regarding vaping practices. Western research shows that numerous smokers consider vaping a healthful substitute for smoking and an efficient way to stop using cigarettes [6]. Farsalinos *et al*., (2014) established through research that most vapers consider e-cigarettes to present reduced health dangers than conventional cigarettes [7].

Public awareness about vaping remains heavily impacted by the news media, while governmental regulations, together with scholarly uncertainties, create confusion regarding vaping products. Research between 2018 and 2019 proved that smokers were divided in their views about using vaping as a safer alternative to tobacco due to opposing opinions on health risks and nicotine addiction. No substantial research exists to understand how local smokers in the UAE view vaping as a practice.

The rising vaping market in the UAE lacks an extensive study about its effects, particularly on behavior patterns and beliefs and the wellness consequences of those who smoke or have quit. According to policymakers, healthcare professionals, and public health authorities, evidence-based regulations and smoking cessation approaches need to understand these essential factors. This research investigates UAE current and former smokers' views about vaping as a harm reduction approach, together with their vaping behavior patterns and self-rated health effects.

1. Study Design
This was a cross-sectional survey designed to assess the perceptions, usage patterns, and self-reported health outcomes of vaping as a harm reduction strategy among current and former smokers in the UAE.

2. Study Setting and Population
2.1 Population
- Currently, smokers continue to use traditional cigarettes.
- Former smokers who have quit smoking, either by vaping or through other cessation methods.

2.2 Inclusion Criteria
Participants must meet the following criteria:
- Aged 18 years or older.
- Residents of the UAE.
- Individuals who are current or former smokers.
- Willing to provide informed consent for participation.

2.3 Exclusion Criteria
- Individuals who have never smoked.
- Participants with incomplete or inconsistent responses in the questionnaire.
- People with severe medical conditions that prevent their participation in the survey.

3. Sample Size Calculation
To determine the required sample size, the following formula for cross-sectional studies will be used:

$$n = \frac{Z^2\, P(1-P)}{d^2}$$

n = required sample size
Z = standard normal variate (1.96 for a 95% confidence interval)
P = estimated prevalence of vaping among smokers assumed 25% based on available data) [9]
d = margin of error (5% or 0.05)

Sample Size Calculation

$$n = \frac{(1.96)^2\, x\, 0.25\, x\, (1 - 0.25)}{(0.05)^2}$$

$$n = \frac{3.8416\, x\, 0.025 x 0.75}{0.0025}$$

$$n = \frac{0.7203}{0.00025} = 288$$

4. Sampling Technique
A stratified random sampling approach was used to ensure representation across different demographics (age groups, gender, smoking status, and regional distribution). Participants were recruited through Online surveys (Google Forms)

5. Data Collection Method
The study used a structured self-administered questionnaire, which aims to gather extensive data

regarding smoking and vaping behaviors and related perceptions together with health effects. The survey uses Google Forms to develop the questionnaire, which provides content in English and Arabic so that members from various linguistic backgrounds in the target population can fully participate. The distribution network utilizes digital and physical channels, from online social media to specialized websites, community centres, healthcare outlets, and face-to-face outreach at public places for audiences with different online access levels. The questionnaire is divided into five major sections to study different research aspects. The first section incorporates demographic factors, which include age followed by gender, education level, employment status and residential areas to establish sample identity and discover social trends. This segment explores how participants have engaged with tobacco through their smoking and vaping histories, starting with initiation ages and continuing with smoking duration and former quit attempts and quitting motivations, along with any experience using vapes (Section 2). Behavioral patterns regarding smoking and vaping become clear in this part through examinations of switching behaviors. Section 3 of the study investigates public beliefs regarding vaping as a harm reduction method alongside safety evaluations compared to smoking and its effectiveness for smoking cessation. It identifies who participants trust for information (media, healthcare providers or peers). These findings expose the influences which direct consumption decisions. Usage Patterns (Section 4) examines actual user behaviors by measuring how often individuals use cigarettes and vapes alongside the potency of e-liquids, system types and whether participants vape exclusively or simultaneously use cigarettes. Section 5 of the study contains Self-Reported Health Outcomes that seek subjects' reports about their subjective medical and psychological health effects, including respiratory symptoms, cardiovascular changes, and general health status following their transition to vaping. This section collects preliminary information about health-related outcomes.

6. Data Analysis

The data collected were analyzed using the advanced statistical software SPSS v29. Frequencies and percentages were calculated for categorical variables (e.g., smoking status and perceptions of vaping). Continuous variables (e.g., age and years of smoking) were summarized using measures of central tendency (mean) and dispersion (standard deviation). The chi-square test was used to assess associations between categorical variables. Independent t-tests were applied to compare means between groups, depending on the number of groups being compared. Additionally, logistic regression was utilized to identify predictors of key outcomes. A p-value of less than 0.05 was considered significant.

RESULTS

The study included 290 participants, with a mean age of 34.7 ± 9.2 years. The majority were aged 25–34, 150 (51.7%) participants. This was followed by 70 (24.1%) participants aged 18–24 years, 40 (13.8%) aged 45–54 years, and 30 (10.3%) aged 35–44 years. Concerning gender, 270 (93.1%) participants were male. In this study, 180(62.1%) participants held a bachelor's degree. High school diploma holders were 40(13.8%), while those with a master's degree and a doctorate/PhD were 30 (10.3%) each. A small portion, 10 (3.4%), reported having no formal education.

Regarding employment status, 220(75.9%) participants were employed. Students and unemployed individuals comprised 30(10.3%), while retirees comprised 10(3.4%) of the sample. Table 1

Table 1: Demographic Characteristics of the study participants (n=290)

Variable	Frequency (%)
Mean year (mean±SD)	**34.7 ±9.2**
Age Group	
18–24	70 (24.1%)
25–34	150 (51.7%)
35–44	30(10.3%)
45–54	40(13.8%)
Gender	
Male	270 (93.1%)
Female	20 (6.9%)
Education Level	
Bachelor's degree	180 (62.1%)
Doctorate /PhD	30 (10.3%)
High school diploma	40 (13.8%)
Master's degree	30 (10.3%)
No formal education	10 (3.4%)
Employment Status	
Employed	220(75.9%)
Retire	10(3.4%)

Student	30(10.3%)
Unemployed	30(10.3%)
Region of Residence	
Sharjah	20 (6.9%)
Dubai	220 (75.9%)
Ajman	10 (3.40%)
Ras Al Khaimah	20 (6.9%)
Abu Dhabi	10 (3.4%)
Fujairah	10 (3.4%)

The majority, 153 (52.8%), reported starting smoking between the ages of 19 and 25. This was followed by 56 (19.3%) who began smoking before the age of 15, 55 (19.0%) who started between 15 and 18, and 26 (9.0%) who started smoking at 26 years of age or older. About smoking duration, 84 (29.0%) participants reported smoking for 6–10 years, 83 (28.6%) for 1–5 years, and 82 (28.3%) for more than 10 years. A smaller group, 41 (14.1%), had been smoking for less than one year. When asked about vaping experience, most participants, 200 (69.0%), indicated that they had tried vaping, whereas 90 (31.0%) had not. Table 2

Table 2: Smoking History and Vaping Experience of the Study Participants (n = 290)

Variable	Frequency (%)
At what age did you start smoking	
15–18 years	55(19.0%)
19–25 years	153(52.8%)
26+ years	26(9.0%)
Below 15 years	56(19.3%)
Years of smoking	
1–5 years	83(28.6%)
6–10 years	84(29.0%)
Less than 1 year	41(14.1%)
More than 10 years	82(28.3%)
Have you tried Vaping?	
Yes	200(69.0)
No	90(31.0)
Current smoking	
Yes	254(87.6%)
Ex-smoker	36(12.4%)

Among the 200 participants who reported vaping experience, 120 (60%) individuals cited the primary reason for initiating vaping as quitting smoking. 40 (20%) reported curiosity, followed by influence from friends or family 20(10%). A smaller proportion reported cost savings 10(5%) and a desire to reduce cigarette consumption 10(5%). Regarding vaping frequency, 70 (35%) participants vaped occasionally (less than once a week), 60 (30%) did so a few times per week, 50 (25%) reported vaping multiple times per day, and 20 (10%) used vape products daily.

When asked about the type of vape used, 80 (40%) reported using disposable e-cigarettes, while another 80 (40%) preferred pod systems. 40 (20%) participants used box mods with refillable tanks.

Concerning nicotine strength, 80 (40%) participants each selected both high (13–20+ mg/ml) and low (1–6 mg/ml) nicotine concentrations. Ten (5%) preferred medium-strength nicotine (7–12 mg/ml), and 30 (15%) reported using nicotine-free vape products.

In terms of purchasing behavior, 110 (55%) obtained vape products from local vape shops, 60 (30%) purchased online, and 30 (15%) bought them from supermarkets or convenience stores. When asked about their beliefs regarding the relative harm of vaping versus smoking traditional cigarettes, 80 (40%) believed vaping is much less harmful, and 10 (5%) perceived it as slightly less dangerous. In comparison, 40 (20%) felt it was equally detrimental, and 60 (30%) thought it was more dangerous. Twenty (10%) participants reported being unsure. Regarding the perceived effectiveness of vaping as a smoking cessation aid, 80 (40%) considered it very effective, 40 (20%) effective, 60 (30%) were uncertain, and 30 (15%) regarded it as not effective at all. Table 3

Table 3: Vaping Behaviors and Perceptions among Participants Who Have Tried Vaping (n = 200)

Reason for starting vaping	
Cost savings	10(5%)
Curiosity	40(20%)
Influence from friends/family	20(10%)
To quit smoking	120(60%)
To reduce cigarette consumption	10(5%)
How often do you smoke	
A few times per week	60(30%)
Daily	20(10%)
Multiple times per day	50(25%)
Occasionally (less than once a week)	70(35%)
Type of vape	
A box mod with a refillable tank	40(20%)
Disposable e-cigarette	80(40%)
Pod system	80(40%)
Nicotine Strength	
High (13–20+ mg/ml)	80(40%)
Low (1–6 mg/ml)	80(40%)
Medium (7–12 mg/ml)	10(5%)
Nicotine-free	30(15)
Where do you purchase vape	
Local vape shop	110(55%)
Online store	60(30)
Supermarket/convenience store	30(15%)
Do you believe vaping is less harmful than smoking cigarettes?	
No, equally harmful	40(20%)
No, more harmful	60(30%)
Not sure	20(10%)
Yes, much less harmful	80(40%)
Yes, slightly less harmful	10(5%)
How effective do you think vaping is as a smoking cessation aid?	
Not effective at all	30(15%)
Not sure	60(30%)
Somewhat effective	40(20%)
Very effective	80(40%)

Among the 200 participants who reported vaping experience, the primary source of influence for initiating vaping was social media, cited by 80 (40%) individuals. This was followed by friends and family, who influenced 60 (30%) respondents. Advertisements were reported as a source by 20 (10%) participants, while healthcare professionals and scientific studies or articles were each cited by 10 (5%) of participants. Additionally, a small subset of participants indicated being influenced by a combination of sources. These included social media, friends/family, advertisements, and broader combinations involving healthcare professionals and scientific literature (Figure 1).
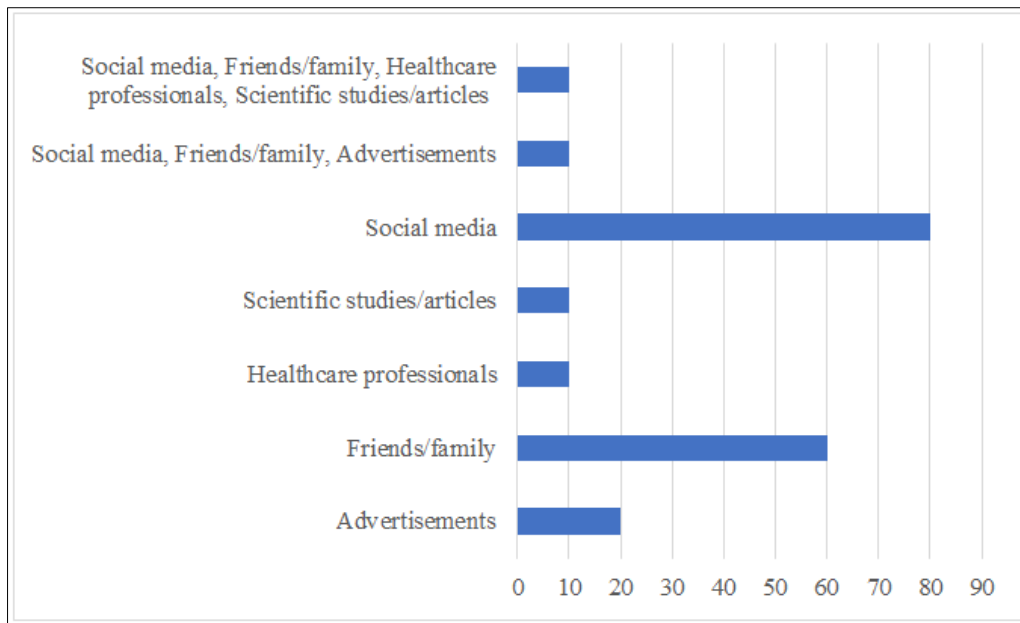
Figure 1: Sources of Information That Influenced Participants to Try Vaping (n = 200)

A comparative analysis of perception statements revealed significant differences between smokers and ex-smokers in their attitudes toward vaping. Smokers were more likely to perceive vaping as less harmful than traditional smoking, with a mean score of 4.1 ± 1.1 compared to 3.2 ± 1.1 among ex-smokers (p < 0.01). Similarly, smokers showed stronger agreement with the notion that vaping helps reduce cigarette consumption (3.9 ± 1.2 vs. 3.1 ± 1.2; p < 0.05) and aids in smoking cessation (3.7 ± 1.2 vs. 3.0 ± 1.2; p < 0.01). They also considered vaping to be more socially acceptable (3.6 ± 1.3) than ex-smokers (2.9 ± 1.3; p < 0.01).

In contrast, ex-smokers were significantly more likely to perceive vaping as addictive (3.9 ± 1.3) compared to smokers (2.7 ± 1.3; p < 0.001) and more strongly believed that vaping is marketed toward youth (4.2 ± 1.4 vs. 3.0 ± 1.4; p < 0.01). Ex-smokers were also more cautious about the perceived safety of occasional vaping (2.6 ± 1.2) than smokers (3.5 ± 1.2; p < 0.01) and more concerned about the harm of secondhand exposure to vapor (3.6 ± 1.3 vs 2.8 ± 1.3; p < 0.01). These findings underscore the divergence in perception between current and former smokers, suggesting that direct smoking status may shape one's beliefs about the risks, benefits, and social implications of vaping. (Table 4)

Table 4: Comparison of Perceptions toward Vaping between Smokers and Ex-Smokers

Perception statements	Smoker Mean ± SD	Ex-smoker Mean ± SD	P value
Vaping is less harmful than traditional smoking	4.1 ± 1.1	3.2±1.1	<0.01
Vaping helps reduce cigarette use	3.9± 1.2	3.1±1.2	<0.05
Vaping aids in smoking cessation	3.7± 1.2	3.0±1.2	<0.01
Vaping is socially acceptable	3.6±1.3	2.9±1.3	<0.01
Vaping is addictive	2.7± 1.3	3.9±1.3	<0.001
Vaping is marketed to youth	3.0± 1.4	4.2±1.4	<0.01
Vaping is safe for occasional use	3.5± 1.2	2.6±1.2	<0.01
Second-hand vaping is harmful	2.8± 1.3	3.6±1.3	<0.01

Among the 290 participants, self-reported health outcomes following the initiation of vaping revealed distinct differences between former and current smokers. Overall, 120 (41.4%) participants reported improved respiratory symptoms, with a significantly greater proportion among former smokers (21 [58.3%]) compared to current smokers (99 [39.0%]; *p* < 0.005). In contrast, 109 (37.6%) reported no change in their health status. This outcome was more commonly reported by current smokers (100 [39.4%]) than former smokers (9 [25.0%]), though the difference did not reach statistical

significance (*p* = 0.098). Additionally, 61 (21.03%) participants experienced adverse effects associated with vaping, with these effects being slightly more frequent among current smokers (55 [21.65%]) than former smokers (6 [16.7%]); this difference was statistically significant (*p* < 0.001). These findings suggest that former smokers are more likely to report health improvements after initiating vaping, while current smokers may be more vulnerable to experiencing adverse outcomes.

Table 5: Self-Reported Health Outcomes Following Vaping Initiation among Former and Current Smokers

Health Outcome	Total (n = 290)	Former Smokers (n=36)	Current Smokers (n=254)	p-value
Improved respiratory symptoms	120 (41.4%)	21 (58.3%)	99 (39%)	< 0.005
No change in health status	109 (37.6%)	9 (25%)	100 (39.4%)	0.098
Experienced adverse effects	61(21.03%)	6 (16.7%)	55 (21.65%)	< 0.001

Multivariate logistic regression analysis was conducted to identify predictors of exclusive e-cigarette use. Former smoking status emerged as a strong and statistically significant predictor, with former smokers being nearly three times more likely to use e-cigarettes exclusively (AOR = 2.8; 95% CI: 1.7–3.9; $p < 0.001$). A higher perception score regarding the belief that vaping aids in smoking cessation was also significantly associated with exclusive e-cigarette use (AOR = 1.9; 95% CI: 1.4–2.8; $p < 0.001$), indicating that individuals with stronger cessation-related beliefs were more inclined to vape exclusively. Higher educational attainment showed a modest but significant association (AOR = 1.6; 95% CI: 1.0–1.9; $p = 0.04$). In contrast, neither age (AOR = 1.09; 95% CI: 0.99–2.1; $p = 0.15$) nor male gender (AOR = 1.4; 95% CI: 0.8–2.5; $p = 0.45$) was found to be a statistically significant predictor. These findings suggest that prior smoking behavior, perceived cessation benefits, and educational level play important roles in the likelihood of adopting exclusive e-cigarette use. Table 6

Table 6: Multivariate Logistic Regression Predicting Exclusive E-Cigarette Use

Variable	AOR	95% CI	p-value
Former Smoking Status	2.8	1.7 – 3.9	< 0.001
Higher Perception Score (Vaping aids cessation)	1.9	1.4 – 2.8	< 0.001
Age (per year increase)	1.09	0.99 – 2.1	0.15
Male Gender	1.4	0.8 – 2.5	0.45
Higher Education Level	1.6	1.0 – 1.9	0.04

DISCUSSION

The research examined demographic information and behavioral and health aspects of exclusive e-cigarette users whose backgrounds included smoking and nonsmoking demographics from a total participant pool of 290 individuals. This study identified important findings about individuals who start vaping and how they use it, together with their health perceptions and separate attitudes displayed by smokers and those who have quit smoking. Research findings enrich the current understanding of electronic cigarette use as an approach to reducing tobacco-related risks and helping users abstain from traditional smoking.

The study data shows that 52.8% of study participants began vaping at the ages of 19 and 25. This age group corresponds with studies identifying early adulthood as the crucial period when people start their use [15]. Social media emerged as the main source of vaping influence (40%), while friends and family came in second with 30% according to research, while social media acts as the dominant platform of vape promotion [16, 17].

Among the respondents who used vaping as an alternative to smoking the primary motivation recorded by 60% was smoking cessation. The data indicates that numerous people consider e-cigarettes to reduce harm which supports established studies [18]. The primary cause of vaping initiation is smoking cessation for 60% of participants, yet curiosity (20%), and peer influence (10%) show that recreational reasons for vaping still matter, according to Peńzes *et al*., (2021) [19].

The study findings indicated that smokers maintained more positive views than non-smokers about all aspects, including harm reduction (4.1 vs 3.2), smoking reduction (3.9 vs 3.1) and cessation aid (3.7 vs 3.0) and social acceptability (3.6 vs 2.9), p<0.05. The smokers' ongoing dependence on nicotine and their conscious reasoning for conducting this activity produce the observed beliefs about vaping being safer than combustible tobacco [20]. Smokers view e-cigarettes as devices that can help them switch from combustible tobacco due to behavioral addiction models that validate harm reduction pathways [18].

Former smokers who completely stopped smoking tobacco reported better respiratory symptoms than current smokers at rates of 58.3% versus 39.0% which demonstrates that full combustible tobacco cessation enhances the perceived advantages of vaping (p < 0.005). The findings line up with previous research, which shows people who substituted completely e-cigarettes reported better respiratory function alongside reduced coughing and better stamina [18-21].

Subjects with higher education demonstrated a pattern of choosing e-cigarettes alone over traditional smoking (AOR = 1.6, p = 0.04). The educational background affected the decisions due to enhanced health literacy and better information access. National survey data shows that people with higher levels of

education usually choose perceived safer alternatives and demonstrate better success in quitting [18]. Research findings reveal that age and gender demographics do not affect users' exclusive preference for e-cigarettes; therefore, psychologists may recognize psychological aspects as more influential factors.

The identified data establishes a harm-minimization link for ex-smokers who vape yet create multiple health-related worries at the same time. The belief among smokers that vaping presents fewer risks, together with extensive social media exposure and experimental behavior, shows that numerous people start vaping before appreciating its actual health consequences. Experimental behaviors among younger age groups have the potential to develop into severe nicotine addiction.

CONCLUSION

Ex-smokers gain greater advantages from vaping, but existing cigarette users mostly suffer additional negative consequences and reduced positive outcomes. Vaping behavior strongly depends on how much individuals believe vaping harms them, works as a substitute, or fits into their social environment based on their smoking status. The promotion of exclusive e-cigarette usage for cessation requires complete educational programs together with strict regulation measures and persistent assessment of health results.

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