

DESCRIBING THE EXPERIENCE OF ELECTRONIC CIGARETTE USE AMONG
TRADITIONAL UNDERGRADUATE COLLEGE STUDENTS WHO SELF-REPORT
FEELINGS OF ANXIETY

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PREVIEW

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Abstract

Objective: To describe electronic cigarette use among undergraduate college students who self-report feelings of anxiety.

Background: Electronic cigarette use, and anxiety are increasing among undergraduate college students. Limited studies have been conducted on electronic cigarette use among college students who self-report feelings of anxiety. Describing the experience of electronic cigarette use and feelings of anxiety will advance our understanding of the phenomenon of electronic cigarette use in this age group. This is particularly important since this group is at increased risk for addiction and mental health disorders, contributing to adverse health consequences.

Research Design: A qualitative descriptive study using the Roy Adaptation Model as the theoretical framework explored the phenomenon.

Setting: One medium-sized private university with two campuses on the east coast of the United States.

Methods: Purposive sampling was used to identify participants who met the study inclusion criteria, which included full-time undergraduate students between 18 and 25 who are proficient in English, self-reported feelings of anxiety, and used electronic cigarettes with nicotine. Data were collected using a demographic questionnaire, smoking status questionnaire, self-report feelings of anxiety questionnaire, and a semi-structured interview guide.

Procedure: Interviews were conducted via ZOOM and recorded. Transcripts were analyzed using Miles and Huberman's (1994) framework for qualitative content analysis. Categories, subcategories, and themes were identified. Trustworthiness was established by addressing the credibility, dependability, confirmability, and transferability of the study results.

Keywords: Electronic cigarettes, e-cigarettes, vaping, anxiety, undergraduate college students

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PREVIEW

Chapter One: Introduction

There has been a decline in nicotine use in recent years since American adults have been smoking fewer cigarettes. Cigarette use has declined from 21% in 2005 to 16% in 2016 (Centers for Disease Control and Prevention [CDC], 2018). However, more adults from 18 to 25 years old are now engaging in electronic cigarette use, contributing to a public health epidemic across the United States (Jenssen & Boykan, 2019). Electronic cigarette use among young adults has risen, especially among non-tobacco users (Schoenborn & Gindi, 2014). The ages of 18 to 25 are the time of independence, particularly in college. As these young adults navigate independently, they are often susceptible to risk behaviors, including nicotine use (Hoeppner et al., 2014).

Consequently, 18% to 40% of college students have tried electronic cigarettes or are current electronic cigarette users (Jones et al., 2020). The use of electronic cigarettes is such a significant problem across the United States that in a national survey, about 10% of never-smokers between the ages 18 and 24 were the largest group reported to have used electronic cigarettes (Schoenborn & Gindi, 2014). Traditional college students are defined as those students' attending college who are between the ages of 18- to 25-years. This study focused on this age group and referred to this group as "college students."

Clarifying the Concept of Anxiety

For purposes of this study, it was essential to differentiate anxiety from an anxiety disorder. These are distinctly different concepts, with this study focusing on college students who reported feelings of anxiety rather than college students who were diagnosed with an anxiety disorder. Feelings of anxiety are common among individuals (Townsend & Morgan, 2018), and anxiety is not always considered a negative behavior. Research has found that low levels of anxiety can be motivating and serve an adaptive function (Townsend & Morgan, 2018).

However, rising anxiety levels can cause discomfort in the form of “a diffuse, vague apprehension that is associated with feelings of uncertainty and helplessness” (Townsend & Morgan, 2018, p. 17). College students are especially susceptible to this type of anxiety, given their age group and the multiple stressors associated with the transition to young adulthood.

Conversely, anxiety disorder is a psychiatric disorder that includes such diagnoses as generalized anxiety disorder, panic disorder, and social anxiety disorder, to name a few.

Generalized anxiety disorder results in a variety of clinical symptoms such as:

...excessive anxiety and worry for at least six months. Difficulty controlling the worrying. Anxiety and worry are associated with a least three of the following: Restlessness, feeling keyed up or on edge, being easily fatigued, difficulty in concentrating or mind going blank, irritability, muscle tension, and sleep disturbance. (Munir et al., 2021, p. 1)

This study aimed not to seek out college students with an anxiety disorder but those who self-report feelings of anxiety, though it may be possible that some participants may have a clinical diagnosis of anxiety. The current literature that is out there on this topic of anxiety among college students who use electronic cigarettes uses clinical screening tools that examine for the clinical disorder of anxiety and is limited in exploring the non-clinical symptoms of anxiety (Jones et al., 2020). This is a research area that needs further exploration because college students are at greater risk for having feelings of anxiety, therefore the use of a clinical anxiety scale is not warranted in the study because the researcher was looking to fill the gap in the limited literature. Furthermore, the college population is when many adults between 18 to 25 are on their own, and some choose to attend college (Arnett et al., 2005). Entering college life and its associated pressures, such as academic demands, puts them at risk for feelings of anxiety and nicotine use (Hoepfner et al., 2014; Jones et al., 2020). Additionally, researchers believe there are distinct changes in the brain between the years 18 to 25, and college is a time when they

are making risky decisions, such as electronic cigarette use, without the full maturity of brain development (Colver & Longwell, 2013). When combining college demands, overcoming the complex challenges of adulthood can affect many students' overall psychological health, can cause feelings of anxiety, and may lead to an increase in the risk of electronic cigarette use (Grant et al., 2019; Mahmoud et al., 2012).

Anxiety has been well documented among college students. In the fall of 2018, 29.5% of the college students in the United States reported feeling overwhelmed with anxiety in the past 2 weeks, and about 19% reported feeling overwhelmed with anxiety in the past year (Elflein, 2020). The top concern for many college students is the transition to college, with stressful changes in the environment and new responsibilities (Elflein, 2020). While many traditional undergraduate college-age students are experiencing anxiety and stress, this is also a time when addiction can start to surface (Grant et al., 2019). Research has suggested that college students are at higher risk for addiction to electronic cigarettes and, in particular, anxiety, Attention Deficit Hyperactivity Disorder (ADHD), and Post-Traumatic Stress Disorder (PTSD) (Bianco, 2019; Grant et al., 2019; Park et al., 2017). However, there is limited research on mental health issues such as anxiety and electronic cigarette use among college students (Grant et al., 2019; Jones et al., 2020).

Background

Electronic cigarette use has gained acceptance and popularity among adults since 2007, when it first entered the U.S. market (Jenssen & Boykan, 2019). Electronic cigarettes, also known as e-cigarettes, are operated by a rechargeable battery that transports nicotine from a solution in the electronic cigarette that becomes a vapor the user can inhale (Grant et al., 2019). Vaping occurs when a user is inhaling the nicotine from an electronic cigarette. The person

vaping can pull the electronic cigarette out of a pocket, take a puff, and then put it away without any fear of burning or smelling smoke (Harrell et al., 2019). Inhaling the nicotine and experiencing the nicotine flavor resembles smoking a cigarette (Grant et al., 2019).

Close to 11 million adults in the United States are currently using electronic cigarettes, and more than half of them are under 35 years old (Rapport, 2018). Electronic cigarettes have increased in popularity because they are widely available and battery-operated. The electronic cigarette's battery can be recharged using a USB port, which allows recharging from a laptop or wall outlet (Harrell et al., 2019). Electronic cigarettes work when the user presses a button on the electronic cigarette, which then causes the circuit to heat a coil inside of it. The heated circuit turns the liquid inside to vapor, and then the user can inhale the vaporized nicotine through the mouthpiece (Schuetz, 2021). Many electronic cigarette companies have advertised that their product is safer than conventional cigarettes (Harrell et al., 2019). Therefore, many users consider electronic cigarettes safer than traditional cigarettes (Harrell et al., 2019).

According to the CDC (2020), electronic cigarettes produce nicotine aerosol. The person using the electronic cigarette inhales the aerosol into the lungs and exhales into the air. Once the user exhales the nicotine, other people around them are likely to be exposed (CDC, 2020). In addition to the dangers of second-hand inhalation from electronic cigarettes, other health risks have recently come to light (CDC, 2020). Young adults continue to use this device, despite recent news about lung injuries and explosions of electronic cigarettes because they consider electronic cigarettes to be a safer alternative and replacement for conventional cigarettes.

However, there are significant health effects (Colaianne et al., 2016; Food and Drug Administration [FDA], 2020b; Hart et al., 2017). Despite these health risks, electronic cigarette

use has become a significant health issue across the United States, such that even non-cigarette smokers partake in this risk behavior (Schoenborn & Gindi, 2014).

Problem Identified

Research has suggested that college students are at risk of having feelings of anxiety, and some use electronic cigarettes as a strategy to manage their feelings of anxiety (Grant et al., 2019; Jones et al., 2020). Young adults take on new responsibilities during college years, and sometimes this can continue into their late 20s (Arnett et al., 2005). During this time, some young adults explore new milestones, such as college degrees, financial and emotional independence, and living independently for the first time (Arnett et al., 2005). Research has shown the stressors for managing a course load, participating in outside activities, and working while going to college highly contribute to the experience of having feelings of anxiety (American Institute of Stress, 2019). Stress and feelings of anxiety are significant issues that have become even more pronounced because of the COVID pandemic (Wang et al., 2020). According to Wang et al. (2020), 38% of college students had anxiety that ranged from moderate to severe, and less than half of the students reported they were able to adapt and cope with their current circumstances.

In the United States, as of Fall 2020, there are about 16 million undergraduate college students, and 40% of college students are between 18 to 24 years old. (National Center for Education Statistics, 2022). According to Arnett et al. (2005), young adults attending college are often influenced by social relationships and the attitudes and beliefs of their peers. Beiter et al. (2014) found that the three major concerns of students are performing their best academically, feeling pressured to accomplish goals, and planning for after graduation. Some of the pressures that college students experience are so great that by the first year of college, they have a dropout

rate of 33%, as of 2020 (Admissionsly, 2020). As a result of these pressures, students are often more susceptible to engaging in risk behaviors such as using nicotine (Hoeppner et al., 2014). The use of electronic cigarettes continues to be popular on college campuses, with many students using electronic cigarettes, despite complex health complications (Spindle et al., 2017).

Another study conducted by Kenne et al. (2016) with 9,077 college students from a midwestern university explored predictors of electronic cigarette use. They found that 27.9% of the sample reported using electronic cigarettes, and about 13.9% of those reported they had never used tobacco previously (Kenne et al., 2016). This study suggested that college students can be vulnerable to engage in this risky behavior, and electronic cigarette use is widely accepted among college students who reported never using tobacco.

Few studies have investigated electronic cigarette use and anxiety among college students; however, in 2015, 30% of college students reported stress and anxiety (American Institute of Stress, 2019). Hefner et al. (2019) surveyed 631 students in a northeastern university to examine electronic cigarette use among students who had a psychiatric illness versus those who did not have a psychiatric illness. These researchers found that electronic cigarette use was greater among college students who had a mental illness as well as a substance use illness ($\chi^2 = 11.65, p < .001$). However, other researchers have pointed out that more studies are needed on the college population and psychosocial issues because little is known about electronic cigarettes and mental health (Bierhoff et al., 2019; Grant et al., 2019; Jones et al., 2020).

A research gap exists on the phenomenon of the experience of electronic cigarette use in college students who also report feelings of anxiety (Bierhoff et al., 2019; Grant et al., 2019; Jones et al., 2020). Current research has highlighted how attitudes can influence behavior (Case et al., 2016; Cooper et al., 2017; Cooper et al., 2018; Katz & Erikinnen, 2019; Trumbo & Harper,

2013). However, what is unknown—and particularly significant for this study—is the experience of electronic cigarette use among college students who self-report feelings of anxiety. Do they believe that vaping will decrease their anxiety levels, or does vaping help them to cope with their feelings of anxiety? What influences college students to start using electronic cigarettes, and do psychosocial factors like anxiety play a role? The investigation of this topic is essential.

Electronic cigarette use is a complex public health problem affecting many college students. It adds to the burden of healthcare costs and creates a new generation of addicted nicotine users (Jones et al., 2020).

Research Question

What is the experience of electronic cigarette use among traditional undergraduate college students who self-report feelings of anxiety?

Significance of the Study

Studies have shown that electronic cigarette use is becoming more prevalent among college students and specifically targets nonsmokers (Kenne et al., 2016; Suftin et al., 2013). For example, in a cross-sectional quantitative descriptive study of 4,444 college students in North Carolina, 12% of electronic cigarette users had never smoked cigarettes (Suftin et al., 2013). While these college students were educated, they nonetheless chose to participate in this risky behavior, even with the revelation of health complications (Colaianni et al., 2016; FDA, 2020b). Such health complications were seen as recently as May 2020, when researchers found that electronic cigarette users were five times more likely to contract COVID-19 (Gaiha et al., 2020).

Studies have also suggested that college students believe electronic cigarettes are safer than cigarettes because of advertising campaigns by electronic cigarette companies calling their products safe alternatives to smoking (Jenssen & Boykan, 2019). However, no electronic

cigarette in the U.S. market has yet been labeled safe by the FDA, even though they remain on the market as an alternative to cigarettes (Dasgupta & Fiala, 2020). In reality, electronic cigarettes contain dangerous and toxic ingredients, such as carbonyl compounds, that are carcinogenic (Kosmider et al., 2014). With minimal health regulations and the identification of lethal ingredients in electronic cigarettes, it is no surprise that these factors are contributing to a serious public health crisis (Dasgupta & Fiala, 2020; Jenssen & Boykan, 2019). Electronic cigarette use, then, is a public health issue that requires further research, particularly because college students—who are the prevalent group among adult nonsmokers—are one of the most understudied at-risk groups of electronic cigarette users (Kenne et al., 2016; Suftin et al., 2013). In addition, research is lacking on psychosocial motivators such as the self-reported feelings of anxiety and the use of electronic cigarettes among college students who are at highest risk for both certain psychosocial issues and electronic cigarette use (Grant et al., 2019; Jones et al., 2020).

Relevance to Nursing

Few studies have investigated electronic cigarette use and anxiety; meanwhile, 40 million adults in the United States report having anxiety, and 75% experience anxiety by the time they reach 22 years old (Anxiety and Depression Association of America, 2020; Jones et al., 2020). Therefore, research in psychiatric mental health, specifically feelings of anxiety and electronic cigarette use, is essential for all health providers to help younger generations, such as college students, achieve proper screening and treatment to overcome addiction (Bierhoff et al., 2019; Grant et al., 2019; Jones et al., 2020). Although electronic cigarette use has grown across the United States, several studies have noted the limited research on mental health and electronic

cigarette use (Bianco, 2019; Hershberger et al., 2018; Jones et al., 2020; Park et al., 2017; Wattick et al., 2021).

For example, in their cross-sectional study of adults between the ages of 18 to over 65, Park et al. (2017) found that adults had the highest rate of electronic cigarette use; specifically, those with psychological distress had a higher chance of using electronic cigarettes. This study reflected the importance of healthcare providers, such as nurses, having effective screening measures for this risk behavior for adults going to college who have self-reported feelings of anxiety, which can put them at higher risk for using electronic cigarettes (Park et al., 2017). Also, the traumatic and life-threatening health conditions that may develop after electronic cigarette use have highlighted the importance of research on the experience of electronic cigarette use among college students who self-report feelings of anxiety.

Assumptions and Bias

This researcher assumes two critical assumptions. The first assumption was that most people, including college-age students, strive for optimal health; however, stressors arising in their environment can cause them to self-neglect and reach for unhealthy behaviors as a form of coping with their anxiety. This assumption is that college students use substances to self-medicate, not to use substances to destroy their health. As a nurse who has a psychiatric background in both practice and education, the researcher assumed that college students are using substances to improve their mental health in one way by self-managing their feelings of anxiety and stress; thus, using substances is their way of coping and adapting to their ever-changing stressful environment that can create anxiety.

A second assumption was that college students are experiencing a transitional conflict within their developmental stage, causing them to adopt maladaptive behavior. College students

may be undergoing stress adjusting to new responsibilities of getting to class on time and balancing studies with sports or extracurricular activities. At the same time, they may be trying to keep on task with assignments and having limited free time with their college life. College students are also experiencing newfound independence while, at the same time, encountering new conflicts because of their demanding schedules.

Purpose of the Study

The purpose of this qualitative descriptive study was to describe the experience of electronic cigarette use among traditional college students who self-reported feelings of anxiety. Examining and exploring the experience of electronic cigarette use among this population with feelings of anxiety can bring about awareness for further research and interventions over time. The results of this research study will contribute to our understanding of the phenomenon of electronic cigarette use among college students who self-report symptoms of anxiety.

Summary

Chapter one discussed how electronic cigarette use is rising among college students ages 18 to 25 years and even among non-cigarette smokers. The ages of 18 to 25 comprise an age group from which psychosocial issues emerge, especially for students who use substances such as electronic cigarettes to cope with anxious feelings. This researcher undertook this study to examine and describe the experience of electronic cigarette use among college students who self-reported feelings of anxiety through the use of semi-structured interviews with a qualitative descriptive design.

Chapter Two: Review of Literature

The purpose of this study was to describe the experience of electronic cigarette use among college students who self-reported feelings of anxiety. This review of the literature explores what is currently known about electronic cigarette use, followed by research on electronic cigarette use among college students. This chapter then explores the college environment, risk behaviors, perceptions, and attitudes that may contribute to electronic cigarette use, followed by studies on the use of electronic cigarettes by college students who self-reported feelings of anxiety. Finally, the lack of research on the relationship between college students' self-reports of feelings of anxiety and electronic cigarette use is discussed.

Review of Literature on Electronic Cigarette Use

When electronic cigarettes first entered the U.S. market in 2007, they were promoted as a smoking cessation tool (Franck et al., 2014). Manufacturers made the shape of the electronic cigarettes long and thin, like a conventional cigarette, with the escaping vapor similar to the smoke emitted from a cigarette (Franck et al., 2014). However, the harmful effects of electronic cigarettes were unknown at that time (Griffiths et al., 2020). Recently, some healthcare providers have begun to recognize the damaging health effects of electronic cigarettes on their patients (Griffiths et al., 2020). One study found that the flavor pods often inserted into an electronic cigarette can cause Deoxyribonucleic Acid (DNA) damage (Muthumalage et al., 2019). This can lead to the deterioration of cells, causing an inflammatory response that can, in turn, damage the DNA in cells of the lungs (Muthumalage et al., 2019).

Another study that explored the side effects of electronic cigarette use found a slight elevation in diastolic blood pressure (Farsalinos et al., 2014). However, in 2019, a more severe life-threatening issue occurred—the outbreak of e-cigarette or vaping product use-associated

lung injury (EVALI) among electronic cigarette or vaping product use by some electronic cigarette users. Patients with EVALI showed nonspecific lung injuries with pulmonary inflammation, such as pneumonia and diffuse lung damage (Griffiths et al., 2020). In the fall of 2019, the Centers of Disease Control and Prevention (CDC) were alerted to an outbreak across the United States of young people experiencing shortness of breath, cough, and life-threatening lung disease that required mechanical ventilation (Griffiths et al., 2020). Chemicals in the electronic cigarettes that contributed to EVALI were unknown at the time of the outbreak in 2019 (Perrine et al., 2019). As of 2020, the CDC found that Vitamin E Acetate was the major contributor to the EVALI outbreak. Vitamin E Acetate is an ingredient in delta-9-tetrahydrocannabinol (THC), which is found in electronic cigarettes that contain marijuana. Ingestion of Vitamin E Acetate can lead to respiratory distress (CDC, 2020; Schuetz, 2021). In addition, as of January 2020, 2,600 patients have been diagnosed with EVALI in the United States (Griffiths et al., 2020). These recent findings of EVALI have caused the government to intervene and raise the age for buying electronic cigarettes from 18 to 21 years old. Also, in some states, healthcare providers are now required to report to their state health department if their patients have had health complications from electronic cigarette use in the last 90 days (Johnson, 2019).

Electronic cigarettes continue to attract young adults because of appealing features such as the ability to conceal, especially as electronic cigarettes give off no smoke or odor (Burt & Jing, 2020). The electronic cigarette cartridge stores the liquid containing nicotine; the atomizer is a piece of the electronic cigarette next to the battery that heats liquid nicotine and disperses the chemicals as an aerosol into the mouthpiece, so the user can inhale to enjoy (Food and Drug Administration [FDA], 2020a; U.S. Department of Health and Human Services, 2021). As of January 2020, the U.S. FDA issued a policy to ban the sale of fruity and mint-flavored pods to

discourage young people from using electronic cigarettes. However, menthol and tobacco have not been banned (FDA, 2020a, 2020c). In addition, electronic cigarettes continue to attract young adults because of other appealing features such as a device that can be easily refilled or a battery that can be conveniently recharged. Users can charge the battery by using a USB port that comes with the electronic cigarette and plug it into a wall or laptop (Burt & Jing, 2020; Harrell et al., 2019). Hart et al. (2017) found that current users of electronic cigarettes, especially young adults, perceive electronic cigarettes as a safe and healthy alternative, which is less likely to be recognized as a tobacco product.

Review of Literature on Electronic Cigarette Use Among College Students

Three known factors for electronic cigarette use among college students were identified in this review: environment, risk behaviors, and perceptions and attitudes regarding electronic cigarettes. The literature has shown that these factors influence many college students to engage in electronic cigarette use. Only a limited number of qualitative studies have explored electronic cigarette use among college students.

Factor One: Environment

The first factor contributing to electronic cigarette use among college students is the environment. The environment is defined as peer use, social media, advertising, and marketing of electronic cigarettes that lead to electronic cigarette use (Agarwal et al., 2018; Cheyney et al., 2018; Kreitzberg et al., 2019; Pokhrel et al., 2017; Pokhrel et al., 2018; Reinhold et al., 2017). A total of six studies have suggested that college students' environment is a factor associated with electronic cigarette use. In addition, each study pointed to peers, parents, college campuses, marketing, and advertising as contributing to college students' use of electronic cigarettes.

Agarwal et al. (2018) conducted a prospective cohort study using a convenience sample of college students from 24 colleges/universities in Texas who never used electronic cigarettes. The researchers investigated the role of the students' social environment, beliefs, and attitudes to see how these factors influenced them to start using electronic cigarettes over 1 year. Of the 2,110 participants who never used electronic cigarettes, 329 students (15.6%) started using within 1 year. They also found that college students who never used electronic cigarettes had an increased chance of initiating electronic cigarette use when peers were also using electronic cigarettes. Exposure to peer influence was one of the major driving factors of why non-users became users of electronic cigarettes, OR 1.42 95% CI [1.23,1.65], ($p < .0001$). Also, results revealed a higher chance of college students using electronic cigarettes when living with someone who used electronic cigarettes, OR 1.60 95% CI [1.02, 2.50], ($p < .05$). In addition, there was a higher chance of using or initiating electronic cigarettes when college students were dating someone who also used electronic cigarettes.

In contrast, Cheyney et al. (2018) used the ecological model to investigate the social and environmental influences within the college campus on electronic cigarette use among current electronic cigarette users. Cheyney et al. relied on a qualitative, descriptive research design with a purposive sample across three large college campuses in the Southwest. They completed 33 interviews that were transcribed for coding and then analyzed for emerging themes. All participants had to have used an electronic cigarette once a week. Within their interviews, Cheyney et al. found that most participants who used electronic cigarettes stated that their parents would want them to use electronic cigarettes rather than cigarettes. It was also evident that most of their friends were supportive of them using electronic cigarettes. In addition, electronic cigarette users stated that four out of five of their closest friends used electronic