

The Vaping Epidemic: Investigating the Science Behind Addiction

Adam T. Nelson

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"In 2020, approximately one in five high school students and one in 20 middle school students currently used e-cigarettes" (Wang et al., 2020). Dr. Teresa Wang, Ph.D., and other scientists studied e-cigarette use among middle and high school students in the United States, published in the *Morbidity and Mortality Weekly Report*, a highly respected peer-reviewed medical journal. Although their data shows a relative decline from 2019, they report that an alarming 3.6 million youths still use e-cigarettes, or vapes, in the U.S., and suggest a limitation that COVID-19 disrupted data collection, lowering values. In addition, the Centers for Disease Control and Prevention (CDC) provides a fact sheet up-to-date with data on youth tobacco use based on scientific evidence reviewed by experts in the field. The fact sheet analyzes how a continued smoking rate threatens the future of the U.S. and warns citizens that research expects 5.6 million Americans currently under 18 to die prematurely from smoking-related illnesses (CDC, 2022).

Nina Julia, chief editor and founder of the Center for Advancing Health (CFAH), a nonprofit organization employing journalists who report on current health issues, wrote in an article that 53.4% of adolescents who vape intend to quit, and 67.4% say they have tried, indicating that many teens want to quit (Julia, 2023). However, Dr. Richard Miech et al. expand on the CFAH's data and present further indications in their article published in the *Journal of the American Medical Association*, a peer-reviewed medical journal. "The prevalence of unsuccessful quit attempts among adolescents who had used either e-cigarettes or cigarettes was higher than the prevalence of unsuccessful cigarette quit attempts in each of the previous 13 years" (Miech et al., 2022). Since there was a consistent decline in unsuccessful quitting attempts before widespread use, the research group concluded that e-cigarettes significantly contributed to

the sudden increase in 2020. In other words, the 2020 increase in unsuccessful quitting attempts resulted from e-cigarettes ascending to the most common form of teen smoking since 2014.

While Nina Julia accurately claims that most vaping teens want to quit, the data from Dr. Miech's study reveals that most fall short of their goal. This report investigates the science behind addiction and the fragile path back to sobriety by analyzing the views and opinions on the vaping epidemic from the doctoral, independent organization, and adolescent perspectives.

By examining the nature of addiction from a doctoral perspective, the outlying cause of addiction is the chemical nicotine. In a National Institute of Health (NIH) news article, lead editor Dr. Harrison Wein, Ph.D., reports from an interview with Dr. George Koob, "A common misperception is that addiction is a choice or moral problem, and all you have to do is stop. But nothing could be further from the truth," says Dr. George Koob, director of NIH's National Institute on Alcohol Abuse and Alcoholism" (Wein, 2015). The government-funded NIH Office of Communications and Public Liaison published the news article in 2015, granting the possibility that it is outdated or irrelevant. While most smokers describe feeling a "high" sensation when inhaling nicotine, The National Institute on Drug Abuse (NIDA) explains that "a transient surge of endorphins in the reward circuits of the brain causes a slight, brief euphoria when nicotine is administered" (NIDA, 2022). The reward circuit is a signaling pathway that releases dopamine when the correct chemical fits into a receptor, like a key into a lock. In a healthy body, the reward circuit naturally releases dopamine when doing pleasurable things like listening to music and exercising. The receptors that initiate the pathway mistake nicotine as the correct key due to their chemical composition and shape similarities. As a result, nicotine stimulates an unnatural dopamine release at higher levels before quickly breaking down, starting the addictive cycle (NIDA). In his report, Dr. Wein highlights another claim about the cycle's

long-term effect: "Addiction can also send your emotional danger-sensing circuits into overdrive, making you feel anxious and stressed when you are not using the drugs or alcohol" (Wein, 2015). Nicotine's ability to manipulate its victims' brains makes it dangerous, and the tighter its hold, the tougher it is to quit.

By integrating the perspectives from independent organizations and adolescents, the view on addiction shifts from focusing on the object to focusing on the person. Some adolescents may need clarification on the NIDA's complex explanation. Thankfully, Quit Victoria, an Australian organization and company determined to help ease people out of nicotine addiction, provides a psychological explanation that helps younger generations understand vaping addiction while still aligning with the information from the NIDA. Quit Victoria posted a YouTube video integrating various techniques to guide viewers through nicotine's route, navigating the reward system toward its destination where dopamine overflows the bloodstream (Quit Victoria, 2021). The charismatic narrator captivates teens by drawing a series of diagrams and colorful illustrations of the pathway while telling the story of the evil chemical that infiltrates their bodies every day so, at the end of the video, they know the disturbing science behind nicotine and the danger it poses (Quit Victoria, 2021). In the final seconds, a link to their website appears, inviting people to learn about nicotine replacement therapy (NRT). Viewers can interpret this as an attempt to guide them towards quitting or as a marketing strategy for an NRT product, potentially losing credibility. Quit Victoria and the NIDA display differing opinions about quitting methods, one arguing for NRT specifically, the other noting that it depends on the person.

Adolescents who vape may use it as a coping mechanism for stress or anxiety, leading to psychological dependence on the behavior. Emily Lamison and Jen Mele, undergraduate students attending Elizabethtown College, used the scientific method to explore why college young adults

start using e-cigarettes and how their behaviors affect them. The girls collected their data using an ecological momentary assessment study, where participants responded to an extensive series of surveys. From that data, they measured and compared the effects of vaping on positive effects, negative effects, and stress. Their findings, published in a peer-reviewed journal, *Summer Scholarship, Creative Arts and Research Projects*, provide deeper insight into the adolescent's perspective. The pair concluded that "the results suggest that overall, participants experienced higher levels of positive affect than negative, before and after vaping. This is consistent with previous research that explains that youth may increase their vaping behaviors in order to reduce negative affect" (Lamison & Mele, 2020). Additionally, adolescents may face psychological barriers to quitting, such as fear of withdrawal symptoms and difficulty breaking habits. Lamison & Mele continue that "vaping also presents users with negative consequences such as worries of developing addiction and an inability to function without the presence of regular vaping" (Lamison & Mele). While Reddit is neither a peer-reviewed nor an entirely reliable source, a public forum titled *r/QuitVaping* offers a suitable place for anyone to ask and answer questions, share experiments, and give others advice. For example, user *money4meduh*'s post provides valuable information on the nicotine withdrawal timeline based on personal experiences and shared knowledge from other users' comments. In the thread, any Reddit user can read, "it's important to note that the timeline for nicotine withdrawal can vary from person to person, and some people may experience more intense or longer-lasting symptoms than others" (*money4meduh*, 2023). This crucial message, along with the other *r/QuitVaping* posts, resonates with its readers by transforming the discouraging number of diverse journeys towards sobriety into a sign of hope that anyone, including adolescents, can find a comment they relate to in the forum's miles of text.

Based on an investigation of the doctoral, independent organization, and adolescent perspectives, nicotine's biological features and psychological factors are both aspects that contribute to addiction, and neither one contributes more than the other.

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