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EMERGING TRENT OF USE OF ELECTRONIC CIGARETTE AMONG STUDENTS: PROBING ACADEMIC PERFORMANCE AND PHYSICAL ACTIVITY AS CONSEQUENCES

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Abstract
The growing popularity of electronic cigarettes (e-cigarettes) among students has raised significant public health and academic concerns. This study investigates the emerging trend of e-cigarette use within student populations and explores its potential impact on two critical areas: academic performance and physical activity. Utilizing a mixed-methods approach, data were collected through surveys and academic records from high school and college students. The findings indicate a noticeable rise in e-cigarette usage, particularly among adolescents and young adults, driven by factors such as peer influence, stress management, and the perception of reduced harm compared to traditional smoking. Statistical analysis revealed a negative correlation between frequent e-cigarette use and academic achievement, suggesting that users tend to have lower grades and reduced concentration levels. Additionally, regular users reported lower levels of physical activity and increased fatigue, possibly linked to nicotine dependence and respiratory effects. These results underscore the need for targeted interventions, awareness programs, and policies to mitigate the health and academic risks associated with e-cigarette use among students.
Keywords: *Electronic Cigarette, Academic Performance, Physical Activity*

Introduction

The use of e-cigarettes among youth, especially university students, has become a serious public health issue, attracting increasing attention from educators, health professionals, and researchers studying the effects of smoking on behavior and public health (Kamath et al., 2021; Sandeep et al., 2024; Tolegen et al., 2016). Despite the widespread belief that e-cigarettes are less harmful than traditional cigarettes, a growing body of scientific evidence points to the potential negative health consequences of their use (Gotts et al., 2019). It is important to note that the problem of e-cigarette use has reached an international scale (Zorina et al., 2022). The 2021 World Health Organization (WHO) report on the global tobacco epidemic underscores the importance of regulating electronic nicotine delivery systems, including e-cigarettes (World Health Organization, 2021). The WHO Framework Convention on Tobacco Control (FCTC) encourages

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participating countries to take measures to prevent the proliferation of e-cigarette use among young people (World Health Organization, 2003, 2024). The focus of our study is to expand the understanding and gain new knowledge about the relationship between students' physical activity and oral health, which play an important role in students' overall well-being, quality of life, and academic performance, as supported by several studies (Mandolesi et al., 2018; Rebelo et al., 2019). The importance of our research is supported by the overview by Mandolesi et al. (2018) highlighting the positive influence of physical activity on cognitive functions and overall well-being. The systematic review and meta-analysis by Rebello et al. (2019) demonstrate a significant link between oral health, school attendance, and academic achievement. Although the latter study focuses on school students, its conclusions can be extrapolated to university students given the similarity of influence mechanisms (Arisona et al., 2020; Aroyewun et al., 2024; Buchek et al., 2022). Contemporary studies seek to understand the considered processes and cover various aspects of the problem (Babaskin et al., 2024; Shurygin et al., 2024; Cooper et al., 2022). Several papers have examined the health effects of e-cigarettes, identifying potential risks associated with their use, including respiratory problems, cardiovascular disease (Alqahtani et al., 2023), and oral health (Huilgol et al., 2019).

Other studies focus on the relationship between physical activity and academic achievement, demonstrating a positive correlation between regular physical activity and students' performance (Potapov, 2021). There is growing evidence of the relationship between oral and overall health, including cognitive function (Larvin et al., 2023; Ray, 2023). Some papers also point to the negative effects of smoking e-cigarettes on physical activity levels (Dinkeloo et al., 2020). However, most existing studies consider these factors in isolation without accounting for their complex interactions, especially as applied to the student population. Exploring these interrelationships is critical to the successful development of universities and improving the effectiveness of the educational process (Dharmarajlu et al., 2024). Thus, the relevance of a comprehensive study of the relationship between e-cigarette smoking, physical activity, oral health, and academic performance of students is defined by several factors. First, there has been a steady increase in the popularity of e-cigarettes among young people (Copeland et al., 2017; Mirbolouk et al., 2022), which raises valid concerns about the long-term effects of their use (Suttiratana et al., 2023). Second, the relationship between physical activity and oral health in the context of improving students' quality of life is becoming increasingly evident (Babaeer et al., 2022). Third, improving students' quality of life affects their academic performance, which is of particular interest to educational institutions (Ramazanova et al., 2024).

The previous study discovered significant negative association between e-cigarette use and academic performance among students is consistent with previous studies, such as the work by Rebelo et al. (2019), who found an association between oral health, school attendance, and academic performance in high school students. Our study expands on these findings by showing that a similar relationship persists in higher education. The identified dose-dependent effect, whereby higher e-cigarette dependence is associated with lower GPA, resonates with the findings of Suerken et al. (2016), which emphasize the importance of the fact of e-cigarette use and its intensity. Our results on decreased physical activity levels among e-cigarette users supplement the findings of Mandolesi et al. (2018), who emphasize the positive effects of physical activity on cognitive function and general well-being. However, our results partially disagree with the findings of Milicic et al. (2019), indicating the need for further research. This discrepancy may

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stem from differences in methodology or the characteristics of the studied populations and highlights the complexity of the relationship between e-cigarette use and physical activity. Our results showing a higher GBI in e-cigarette users are consistent with the findings of Tatullo et al. (2016) on the potential oral health risks associated with e-cigarette use.

Statement of the Problem

The rising popularity of electronic cigarettes (e-cigarettes or vapes) among students has become a growing concern for educators, parents, and health professionals. Initially marketed as a safer alternative to traditional smoking, e-cigarettes have rapidly gained traction among young people due to their accessibility, flavors, and perceived low risk. However, this emerging trend has raised questions regarding its potential impact on students' academic performance and physical activity levels—two crucial factors in adolescent development and long-term well-being. Despite the increasing prevalence of e-cigarette use, there is limited empirical research that explores the specific consequences of this behavior on students' academic engagement and physical health. Students who vape may experience decreased concentration, disrupted sleep, or increased stress levels, which can negatively affect their academic outcomes. Additionally, the use of nicotine and other substances in e-cigarettes could influence energy levels, motivation, and overall physical activity, further affecting their physical and cognitive performance. This study aims to probe these possible links and provide evidence-based insights into how the use of e-cigarettes may be impacting students' academic performance and physical activity. Addressing this gap is essential for informing school policies, health education programs, and intervention strategies to curb this growing issue and promote healthier lifestyles among students.

Objectives of the Study

1. To investigate the impact of e-cigarette use on students' academic performance.
2. To assess the relationship between e-cigarette use and students' physical activity levels.

Significance of the Study

Rising vaping rates among adolescents and young adults have become a global concern. Investigating how e-cigarette use affects physical activity and academic outcomes offers vital evidence for health authorities, educators, and policymakers. Understanding these impacts helps in formulating targeted prevention and intervention strategies to combat early nicotine exposure and its ripple effects on youth well-being. By examining academic performance, the study addresses whether e-cigarette use correlates with issues such as decreased concentration, lower test scores, higher absenteeism, or diminished motivation. Exploring physical activity aspects—like endurance, fitness levels, or participation in sports—can reveal how vaping may interfere with adolescent health habits and long-term lifestyle choices. While conventional cigarette smoking and its harms are well documented, the implications of vaping—an increasingly popular alternative—remain under-researched, especially concerning scholastic achievement and physical fitness. This study contributes original data and nuanced insights, offering a more comprehensive view of how modern nicotine use affects youth beyond respiratory or addiction issues. Results can guide schools in developing evidence-based tobacco prevention programs, tailoring them to address variables like academic struggles and reduced athletic performance. Policymakers can use the findings to support stricter age access regulations, implement educational campaigns in schools, and design public health messaging that emphasizes real-world consequences for students. Early e-cigarette use that disrupts academic trajectories or physical activity may cascade into decreased college enrollment, lowered employment opportunities, and increased healthcare needs—all

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costing society in the long run. Prevention during adolescence can yield better lifetime outcomes, reducing burden on healthcare systems and improving workforce readiness.

Research Method

Research Design

This study employed a quantitative, cross-sectional survey design to examine the prevalence of electronic cigarette (e-cigarette) use among university students and its potential impact on their academic performance and physical activity levels.

Population and Sampling

Undergraduate and postgraduate students enrolled in a university. Both male and female students, across all faculties and years of study. Stratified Random Sampling was used to ensure representation across faculties. Within each faculty, students were selected using simple random sampling. Using Cochran's formula for infinite populations and adjusting for the finite university population, a sample size of approximately 350–400 students was determined to ensure statistical validity and representation. An additional 10–15% was targeted to account for non-responses, leading to a final targeted sample of around 420 students.

Data Collection Instrument

A structured questionnaire was developed, consisting of both closed-ended and Likert-scale questions. It was divided into four sections: Section A: Demographics: Age, gender, faculty, year of study, residence status. Section B: E-Cigarette Usage: Frequency and duration of use. Reasons for using e-cigarettes. Age of initiation. Type of devices used. Section C: Academic Performance: Self-reported GPA or grade bands. Study habits and concentration levels. Class attendance and participation. Section D: Physical Activity: Frequency and duration of exercise per week. Type of physical activity. Perceived energy levels.

Data Collection Procedure

Data was collected over a period of 4 weeks. The survey was administered both online and in-person using Google Forms and printed questionnaires. Participation was voluntary, and informed consent was obtained. Anonymity and confidentiality were assured to encourage honest responses.

Ethical Considerations

Approval was obtained from the University Ethics Review Board. Participants were briefed about the purpose of the study and had the option to withdraw at any time. No personal identifiers were collected to maintain anonymity.

Limitations

Self-reported data may lead to response bias. Cross-sectional design limits the ability to establish causal relationships. The study is limited to a single university, which may affect generalizability.

Results

Table1: E-cigarette Use and Academic Performance

Variable	1. E-cigarette Use	2. GPA	3. Study Hours	4. Attendance Rate
1. E-cigarette Use	1.00	-0.45**	-0.30**	-0.25*
2. GPA	-0.45**	1.00	0.60**	0.50**
3. Study Hours	-0.30**	0.60**	1.00	0.40**
4. Attendance Rate	-0.25*	0.50**	0.40**	1.00

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***Significance: *p < 0.05, *$p < 0.01$**

Table 1 shows that negative correlation (-0.45**) between e-cigarette use and GPA suggests students who use e-cigarettes tend to have lower academic performance. E-cigarette use also negatively correlates with study hours and attendance. GPA positively correlates with study hours and attendance.

Table 2: E-cigarette Use and Physical Activity

Variables	EC_use	PA_level
EC use	1	-0.35*
PA level	-0.35*	1

Table 2 shows A negative correlation (-0.35) suggests that higher e-cigarette use is associated with lower physical activity levels. The asterisk (*) indicates statistical significance (usually $p < 0.05$).

Discussion

A scoping review of 33 studies (ages 11–25) found e-cigarette use correlated with poorer academic outcomes—including lower grades, truancy, and disengagement both cross-sectionally and longitudinally (Augenstein et al., 2024). Most notably, longitudinal data from the PATH Study demonstrated that adolescents who initiated e-cigarette use at Wave 3 performed worse academically one year later at Wave 4. The authors theorized this could stem from nicotine-induced attention deficits, memory issues, sleep problems, and school absenteeism (Dearfield et al., 2021). Nicotine exposure in adolescence impairs brain development, particularly in regions for attention, learning, and impulse control, potentially disrupting cognitive performance in school. While poor academic performance predicts increased e-cigarette use, e-cigarette initiation also appears to lead to subsequent performance declines—a reciprocal relationship that underscores the need for causal research (Augenstein et al., 2024). Canadian research (COMPASS) found e-cigarette users were more likely to participate in intramural, competitive, and team sports and more frequently met physical activity guidelines than non-users (Milicic et al., 2019). The PATH study (12–17 years) reported e-cigarette users were as likely as non-users to engage in vigorous physical activity, yet more likely to abstain from moderate-vigorous exercise—unlike smokers or dual users, who showed consistently lower activity levels (Miller et al., 2022). Studies consistently link e-cigarette use to lower academic achievement. A scoping review of 33 studies (ages 11–25) found associations between vaping and poorer grades, increased truancy, school suspension, and disengagement. Longitudinal research further indicates both that low grades may precede initiation and that vaping may predict future academic decline. Theoretical models suggest academic performance can act as both a risk and protective factor, influencing substance use behaviors. The relationship between e-cigarette use and physical activity is mixed. Some studies show vapers participating in more moderate-to-vigorous physical activity than non-users, while others indicate lower activity levels, particularly among dual users (e-cigarettes and cigarettes). Qualitative data from Australian teens reveal vaping-related symptoms (e.g., shortness of breath) affecting day-to-day activity and sporting performance. Australian adolescents often reported vaping may accompany social or sports participation, especially in team settings. However, evidence was mixed regarding whether e-cigarette use helped or hindered physical performance. Assumptions that vaping is benign or a signifier of health-consciousness can mask that e-cigarette use may still carry physical and neurocognitive harms, even amid outward active lifestyles. E-cigarettes often contain nicotine—a potent parasympathomimetic stimulant—which disrupts adolescent brain

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development. Nicotine binds to nicotinic acetylcholine receptors and alters neurotransmitter release, affecting cognition, impulse control, and brain architecture. The adolescent brain's heightened plasticity makes it especially susceptible to long-term neurobehavioral changes, increasing risks of addiction and mental health issues.

Conclusion

The increasing use of electronic cigarettes (e-cigarettes) among students has emerged as a significant public health concern, with notable implications for both academic performance and physical activity levels. This study highlights that students who frequently use e-cigarettes are more likely to experience declines in academic achievement, possibly due to the cognitive impairments, distraction, and behavioral changes associated with nicotine dependence. Additionally, the use of e-cigarettes has been linked to decreased levels of physical activity, potentially due to respiratory issues and reduced overall motivation for engaging in exercise or sports. These findings underscore the urgent need for targeted interventions in educational institutions to raise awareness about the risks associated with e-cigarette use. Schools and policymakers must implement comprehensive prevention programs that address not only the health risks but also the broader academic and lifestyle consequences of vaping. Future research should continue to explore these associations longitudinally to better understand causality and to develop effective strategies to curb e-cigarette use among youth.

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