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Predictors of E-Cigarette Usage Determinants in the Riyadh Educational Institutes

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ABSTRACT

Aim of the study: The present investigation endeavours to discern the influential factors and determinants with predictive efficacy concerning the utilization of electronic cigarettes among adolescents or university students in Riyadh. Furthermore, the study seeks to delineate prevalent usage patterns of electronic cigarettes within this demographic group. **Method:** The research adopted a quantitative research methodology, employing primary data collection techniques. The study targeted university students in Riyadh, selected through purposive sampling. The sample comprised 536 adolescents of both genders. The collected data underwent analysis through multiple regression testing. **Findings:** The outcomes of the multiple regression analysis unveiled that variables such as residential area, economic status, and age exerted a robust positive and statistically significant influence on the prevalence of e-cigarette utilization. Additionally, the analysis underscored a heightened incidence of dependence on e-cigarettes within the examined population. **Originality:** This research has made distinctive contributions to both theoretical frameworks and practical applications by elucidating and emphasizing the disconcerting escalation and trajectory of e-cigarette prevalence among the youth within the educational institutions of Riyadh.

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Introduction

Adolescence is a pivotal period for developing lifelong habits, shaping behaviours that can persist into adulthood (Wojtecka et al., 2023). In this regard, there is a notable transformation in the prevalence of tobacco consumption among adolescents, marked by a discernible decrease in traditional combustible cigarette smoking and a concurrent rise in the utilization of electronic cigarettes. A parallel trend is observed in other nicotine delivery devices such as hookah, alongside an escalation in the prevalence of Electronic Nicotine Delivery Systems (ENDS) and Electronic Non-Nicotine Delivery Systems (ENNDS) among individuals aged 13 to 15. Empirical investigations indicate a discernible upswing in the consumption of tobacco and other addictive substances among the youth in Saudi Arabia in recent years (Bin Abdulrahman et al., 2022).

Hence, mitigating the initiation of adverse habits during this phase may ultimately attenuate the susceptibility to numerous preventable chronic diseases in later life (Jane Ling et al., 2023). Electronic cigarettes, conceived as instruments for the delivery of nicotine, additives, and flavourings in aerosol form to the respiratory system, have witnessed a surge in popularity globally. Saudi Arabia, too, has become susceptible to the dissemination of this deleterious factor (Rayes et al., 2023). This is apparent upon examination of the escalating count of e-cigarette users, which witnessed an uptick between the years 2014 and 2018. The adverse health implications of this practice are currently under active investigation, given the novelty of these products (Azagba et al., 2020). The discourse commenced in 2017 with the release of studies examining the correlation between e-cigarette usage and the escalating prevalence of smoking behaviour (Azagba et al., 2020). In this respect, Wang, Bhadriraju, and Glantz (2021) emphasizing the gravity of tobacco use among adolescents as a substantial public health concern, the perpetuation of tobacco use, and the augmentation of nicotine dependence into adulthood are acknowledged issues. This study focuses on the phenomenon of tobacco consumption, specifically delving into the determinants that prompt university students to engage in e-cigarette usage. The objective is to furnish precise information aimed at robustly safeguarding adolescents, particularly against the perils of e-cigarette use. Analogous investigations have been undertaken by prior researchers (Al Agili & Park, 2012; Althobaiti & Mahfouz, 2022; Edelen, Huang, & Stucky, 2016; Wang et al., 2021). One of the aforementioned studies examined the prevalence and associations of e-cigarette utilization concerning various demographic variables, such as age, educational qualification, and gender. The findings disclosed an elevated prevalence of e-cigarette usage in Saudi Arabia, particularly among individuals with higher educational attainment, and a higher incidence among the male demographic (Althobaiti & Mahfouz, 2022). Derived from the empirical insights of the referenced study, the researcher formulated the objective of scrutinizing fundamental demographic determinants influencing the proclivity of the younger generation towards e-cigarette dependence. To realize this objective, the researcher delineated the following research objectives:

- To examine the influence of educational attainment on the utilization of e-cigarettes among adolescents
- To investigate the correlation between economic status and residential area in contributing to the prevalence of e-cigarette usage among students.

- To clarify the influence of age in ascertaining the prevalence of e-cigarette usage among university students in Riyadh.

In pursuit of the stipulated objectives, a quantitative research approach employing survey instruments has been implemented. The focal point of the study encompasses the educational sector in Riyadh, with students identified as the designated target population.

Through the execution of this study, the researcher endeavours to bring attention to the pressing issue of escalating addiction levels and substance usage among the prospective contributors to the economy. The investigation aims to elucidate the foundational factors that contribute to the proclivity of the younger generation and adolescents towards e-cigarette usage, reinforcing this inclination through inherent structural mechanisms. Moreover, the study intends to underscore the elevated prevalence of substance abuse, akin to a gradual toxin, within the emerging workforce of the economy. It advocates for the imperative need to institute stringent measures and regulations to curb this deleterious factor within the society of Saudi Arabia.

The ensuing segments of this research encompass the literature review, the selected methodology for research implementation, the derived results, their ensuing discussion, and a summarization of the study's findings.

Previous Studies

Numerous studies and research endeavours have notably addressed the widespread prevalence and utilization of e-cigarettes across various age groups, particularly among teens, adolescents, and the young demographic. Within this domain, the researcher has delved into pertinent literature and recent studies to establish an empirical foundation. Like, Pettigrew et al. (2023) investigation focused on the phenomenon of e-cigarette exposure and vaping patterns within a sample of Australian youths aged between 15 and 30 years. The objective was to offer a comprehensive understanding of effective strategies for mitigating harm to young individuals resulting from e-cigarette use. A total of 1,006 participants responded to an online survey, providing information on various variables such as demographics, tobacco consumption, motivations for consumption, e-cigarette acquisition methods, smoking locations, smoking desires, exposure to smokers' behaviour, exposure to e-cigarette advertisements, awareness of e-cigarette-related harms, and minors' awareness of easy access. Nearly half of the participants acknowledged being current consumers (14%) or having at least tried e-cigarettes before (33%). Factors positively correlated with ever-use included prior or current use of tobacco cigars and the number of smoking friends. Despite ongoing restrictions on e-cigarette availability, the results suggest that a substantial portion of Australian youths may regularly encounter e-cigarettes. Enhanced efforts are evidently necessary to regulate e-cigarette availability, aiming to shield the youth from pervasive exposure to vaping practices.

Similarly, Kreslake et al. (2023) study systematically investigated the characteristics and risk factors associated with e-cigarette utilization during adolescence, with a primary objective of fostering tobacco control and minimizing e-cigarette consumption. Employing both case (e-cigarette consumption) and control (no e-cigarette consumption) studies, the research targeted 88 students selected from three vocational secondary schools in

Shanghai. The research methodology involved group interviews and questionnaire surveys, integrating mixed methods. The acquired data underwent analysis using the Colaizzi method, comprising seven sequential steps. Pertinent aspects of teenagers' e-cigarette usage encompassed their age at the initiation of use and the practice of discreet smoking in concealed locations to evade detection by adults. Curiosity and the desire to substitute traditional cigarettes were identified as significant motivations for electronic cigarette use. Risk factors associated with e-cigarette use encompass a deficient comprehension of the adverse consequences of cigarettes at the individual level, evidenced by statistically significant positive outcome expectancy points ($Z = 3.746$, $p < 0.001$) and negative outcome expectancy points ($Z = 3.882$, $p < 0.001$). Furthermore, on the interpersonal level, peer influence exhibited statistical significance ($\chi^2 = 6.510$, $p < 0.01$). Additionally, the influence of social and environmental factors, including e-cigarette sales in stores and WeChat Moments, demonstrated statistical significance in all associations ($p < 0.05$).

As Kreslake et al. (2023) study targeted two age groups, namely adolescents aged 15-17 and young adults aged 18–24 (n = 37,331). Logistic regression analyses were employed to assess the likelihood of e-cigarette consumption in the past 30 days among survey participants (a) towards the conclusion of the pandemic in comparison to the early stage (July 2020), (b) during the late pandemic phase (March–July 2020) in contrast to the early phase, and (c) during the late pandemic compared to the pre-pandemic period. The odds of current e-cigarette usage were notably higher in the later stages of the COVID-19 pandemic than in the early months (OR: 1.27, 95% CI: 1.17–1.38, p = 0.001). No significant disparity in the odds of e-cigarette consumption was observed between young adults and adolescents at the conclusion of the pandemic in comparison to the equivalent period preceding the pandemic. However, the odds were elevated for young adults aged 21 and above (OR: 1.16; 95% CI: 1.01–1.32; p = 0.030).

A study (Al Agili& Park, 2012) involving participants with an average age of 14.3 years (SD = 1.2) was conducted, with male participants constituting 54% of the sample. The findings indicated a notable tobacco consumption prevalence among students at 9.72%, with a discernible sex disparity (12.43% for males and 6.65% for females). Bivariate and multivariate analyses unveiled that students with higher family incomes, augmented daily allowances, increased class absenteeism, lower religiosity, extended outdoor activities, consumption of Coca-Cola, and tobacco usage were interrelated. Additionally, the subsequent year demonstrated a higher likelihood of tobacco consumption among males. These results emphasize the importance of designing prevention programs tailored to attenuate adolescent tobacco consumption, taking into account these identified characteristics.

Glantz, Jeffers, and Winickoff (2022) conducted a study aiming to assess the intensity of e-cigarette and tobacco product consumption, as well as the level of dependence among American adolescents over time. The representative investigative approach utilized class distribution to adjust responses, considering the specific characteristics of the sample, ranging from sixth to twelfth-grade students in middle and high schools in the United States (Glantz et al., 2022). The study employed variables such as the initial product used, age of initiation, time of use post-waking, daily and monthly consumption rates from 2014 to 2021. The YRBSS scale from the Centre for Disease Control's Youth Risk Behaviour

Surveillance System was employed for this nationwide survey. Findings indicated a peak in e-cigarette consumption prevalence among adolescents in 2019. Over the study period, the age of e-cigarette initiation decreased, addiction measures increased on a daily and monthly basis, and the percentage of users consuming their first product within 5 minutes of waking up rose. In a related study, Owusu et al., 2019 investigated the dual use of cigarettes and e-cigarettes among adults in the United States from 2015 to 2018, coinciding with the proliferation of new generations of e-cigarettes. The study comprised over 10,000 participants distributed across the mentioned years. Weighted polynomial logistic regression models were employed to scrutinize the temporal trends and usage patterns of both cigarette and e-cigarette consumption (Owusu et al., 2019). Nevertheless, the outcomes remained consistent when stratified by gender, age, and race. Azagba, Shan, and Latham (2019) investigating the association between dual use (regular cigarettes and e-cigarettes) over time, considering the first cigarette after waking up (a measure of nicotine dependence) and the implementation of smoking cessation interventions. The study cohort comprised individuals who engaged in dual smoking from 2015 to 2018. Multivariate logistic regression was employed, and the study findings revealed (Azagba et al., 2019). Another study conducted by Althobaiti and Mahfouz (2022) that ascertain the prevalence and correlation of e-cigarette usage among adults in Saudi Arabia. The sample encompassed 3374 participants who had experimented with electronic smoking. Findings indicated a notably elevated prevalence of e-cigarette use among males and individuals with lower educational attainment within the age bracket of 18 to 24 years. Moreover, the utilization of e-cigarettes was more prevalent among the youth and those with prior tobacco smoking experience. There is an urgent imperative for additional randomized studies to delve into the extent of the deleterious effects of vaping within the Kingdom (Althobaiti & Mahfouz, 2022). Finally, the researcher identified a contemporary investigation that explored the socio-economic profile as a determinant of e-cigarette users. The data collection spanned three years, during which an ample amount of data was acquired, analysed, and synthesized to derive conclusive findings. The study's conclusion asserted that individuals with a high socio-economic profile exhibit elevated usage of e-cigarettes (Kock et al., 2019). Therefore, drawing upon the comprehensive discourse surrounding the empirical evidence from recent studies, the researcher has identified age, education level, place of residence, and economic status as pertinent demographic factors influencing e-cigarette usage.

Materials and Methods

The Strategy, Sample and Data Collection

The research was conceived within the framework of a quantitative research strategy involving primary data collection. The focus of this study is on the educational sector in Saudi Arabia, specifically centred around the geographical confines of Riyadh. The primary objective is to investigate the utilization of e-cigarettes among adolescents, with a specific emphasis on students as the target demographic. Respondents are required to be enrolled in one of the aforementioned universities. Due to the unknown population size, the researcher employed a suitable sampling strategy to efficiently target respondents. Subsequently, a non-probability purposive sampling strategy was adopted, aligning with

the nature of the research. A specific sample size, exceeding 300, was determined as appropriate to yield statistically robust and meaningful results.

In the final phase, the investigator employed a tangible medium coupled with a self-administered data collection approach, directing attention to proximate secondary schools in Riyadh. The focus of data acquisition was expressly centred on students. The researcher scrupulously adhered to all established ethical guidelines throughout the research endeavour. Data collection procedures were characterized by voluntary participation, assuring trust, and guaranteeing confidentiality, anonymity, and the judicious utilization of the gathered data.

Participants Demographics

In conformity with the variables under consideration in the demographic investigation, participants exhibited an age spectrum spanning from 17 to 22 years, yielding an arithmetic mean of 1.92. Educational levels encompassed secondary stage, university, and postgraduate studies, with an arithmetic mean of 1.99. Regarding the residence, participants hailed from diverse locales, including north-centre, southwest Riyadh, and a village, resulting in an arithmetic mean of 1.76. Lastly, the economic income variable demonstrated a range from 5,000 to over 10,000 thousand riyals, culminating in an average of 2.26. Participants satisfied the specified criteria for inclusion in the study. An essential prerequisite was the provision of consent by the respondent to respond to the study inquiries. The distribution of study subjects based on demographic variables is depicted in Figure 1.

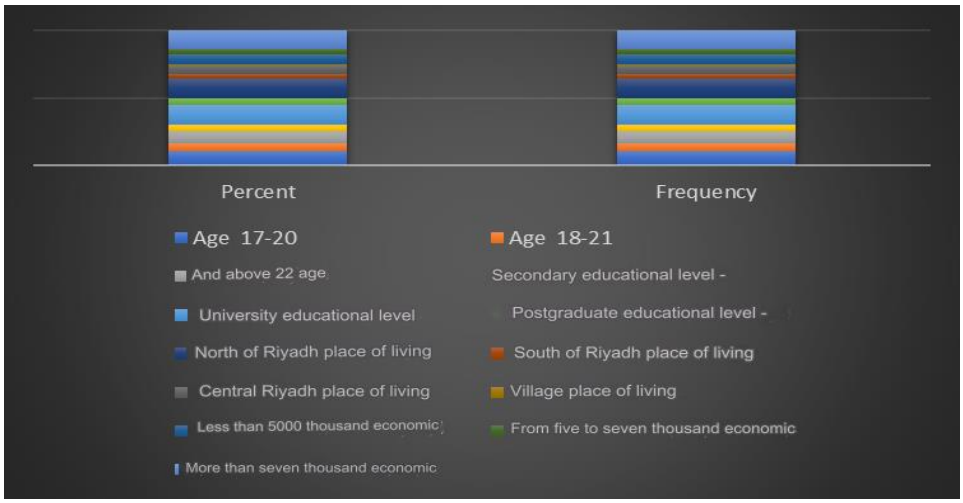

Figure 1 *Shows the Study Subjects According to the Demographic Variables.*

Measures

E-Cigarette Dependence Scale: The instrument employed in this study, derived from the initial iteration of the Item Bank v1.0 - PROMIS, comprises a total of (22) items. Crafted by (Edelen et al., 2016; Morean et al., 2019) the PROMIS scale, exhibiting a high level of reliability with a range between [0.90–0.96], served as the foundation. The adapted scale

retained the original instructions from the PROMIS scale. Respondents were instructed to select one of the provided alternatives (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Almost always), with the term "smoke" substituted with "e-cigarettes."

The dimensions encompassed nicotine dependence (items 1, 2, 3, 4, 5, 7, 8, 9, 16, 21), termination attempts (items 6, 10, 11, 12, 13, 19, 20, 22), and use case (items 14, 15, 17, 18). Validation of these dimensions occurred through Pearson's correlation coefficient analysis, revealing correlation values ranging from (0.78-0.97). The instruments' stability was further affirmed by Cronbach's alpha (0.86) and McDonald's stability (0.96), attesting to their appropriateness for the present study.

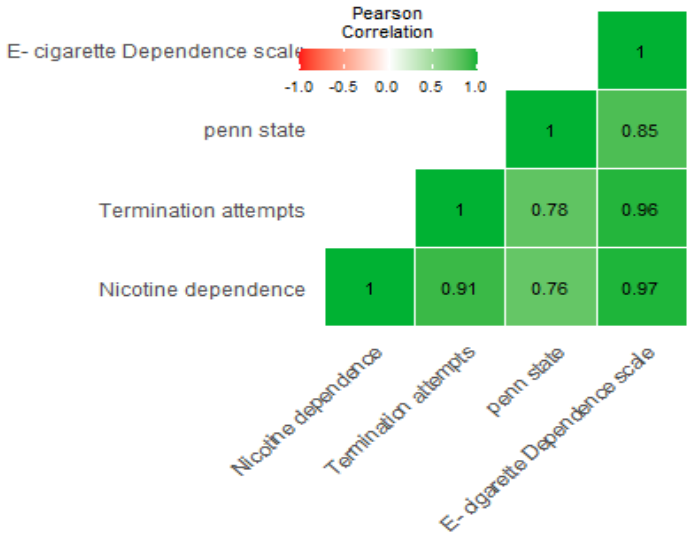

Figure 2. *Shows the Pearson's Correlation Coefficient Between the Dimensions of the E-Cigarette Use Scale.*

Results

1. *Level of Dependence on E-Cigarette Use Among Adolescents*

Table 1

Shows the Arithmetic Averages and Descriptive Statistics of Adolescents' Dependence on E-Cigarette Use.

	Descriptive						
	Mean	**HERSELF**	**Median**	**SD**	**Variance**	**IQR**	**Range**
Nicotine Dependence	38.1	0.331	41.0	7.67	58.8	9.00	33.0
Termination Attempts	33.9	0.391	41.0	9.06	82.0	15.00	33.0
Penn State	20.1	0.651	14.0	15.06	226.9	34.00	37.0
E-Cigarette Dependence	92.0	1.126	88.0	26.08	680.0	53.00	89.0

Table 1 elucidates the prevailing patterns of e-cigarette dependence among adolescents, with the foremost dimension being nicotine dependence, indicated by an arithmetic mean of (38.1). Subsequently, endeavours to cease smoking manifested in the second dimension with an arithmetic average of (33.9). Conclusively, the third-dimension encapsulating smoking instances and use cases displayed an arithmetic mean of (20.1). The aggregate score for overall usage exhibited a notably elevated level, characterized by an arithmetic mean of (92.0).

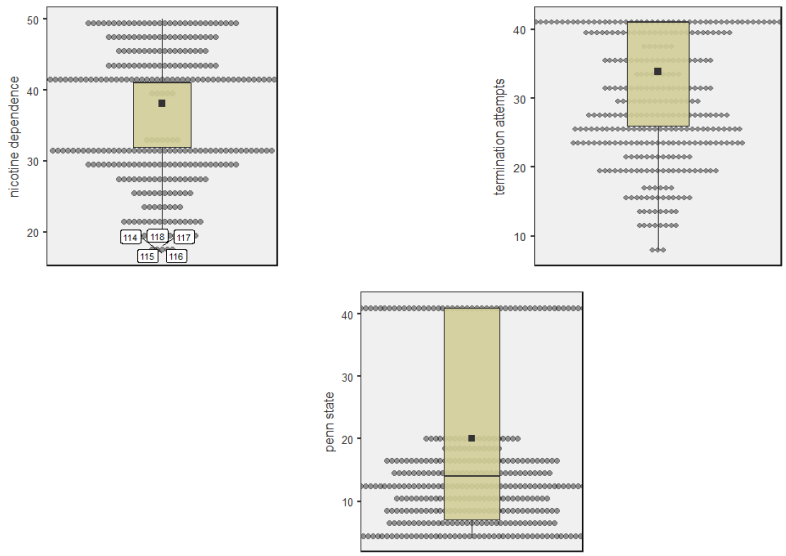

Figure 3. *Shows the Arithmetic Averages and Standard Deviations of the Dimensions of the Study Subjects' Use of E-Cigarettes.*

2. *Demographic Factors Affecting Dependence on E-Cigarette Use Among Adolescents*

Table 1

Model Fit Measures.

							Overall Model Test			
Model	**R**	**R^2**	**Adjusted R^2**	**AIC**	**BIC**	**RMSE**	**F**	**df1**	**df2**	**p**
1	0.243	0.0588	0.0517	4974	5000	24.8	8.30	4	531	< .001

Tables (1, 3, 4) delineate the elucidated demographic variables incorporated into the multiple regression equation, encompassing age, educational level, place of residence, economic level, and experience. Collectively, these variables accounted for 0.0588 of the variances, as indicated by the adjusted correlation coefficient (Adjusted R^2) of 0.0517. The correlation coefficient (R) further illustrated a variance of 0.243, signifying the cumulative impact of these independent variables on adolescents' dependence on electronic cigarettes. The statistical significance of this impact was affirmed by the obtained F-statistic value of 8.30, which was found to be less than 0.05, reaching a level of significance below .001.

Table 2

Omnibus ANOVA Test.

	Sum of Squares	df	Mean Square	F	p
Age	1776	1	1776	2.865	0.091
Educational Level	249	1	249	0.401	0.527
Place of Residence	10812	1	10812	17.447	< .001
Economics	11135	1	11135	17.967	< .001
Residuals	329068	531	620		

Table 3 elucidates that the foremost influential factors shaping adolescents' dependence on electronic cigarettes are derived from their place of residence, as evidenced by the statistically significant F-statistic value of 17.44 ($p < 0.05$, reaching <.001). Subsequently, economic level emerged as a significant determinant, with an F-statistic value of 17.96 ($p < 0.05$, reaching <.001). In contrast, age, as the third factor, demonstrated statistical significance with an F-statistic value of 2.86. Notably, the variable of educational level exhibited an insignificantly impact on e-cigarette dependence, evidenced by a p-value of 0.527, surpassing the 0.05 and 0.01 thresholds

Table 3

Model Coefficients: E-Cigarette Dependence Scale.

			95% confidence interval				
Predictor	Estimate	HERSELF	Lower	Upper	t	p	Stand. Estimate
Intercept	78.52	5.46	67.802	89.25	14.386	< .001	
Age	2.14	1.27	-0.344	4.63	1.693	0.091	0.0738
Educational Level	1.06	1.68	-2.237	4.37	0.633	0.527	0.0274
Place of Residence	-4.70	1.13	-6.911	-2.49	-4.177	< .001	0.1813
Economics	-5.48	1.29	-8.023	-2.94	-4.239	< .001	0.1883

Table 4 manifestly indicates that the (t) values achieved statistical significance for both the place of residence and economic level variables, underscoring their impact on factors influencing adolescents' dependence on electronic cigarettes.

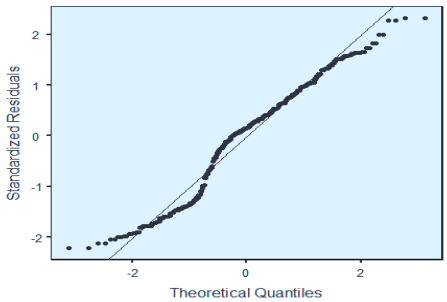

Figure 4. *Affective Relationship of Independent Variables on the Dependent Variable.*

Age ✲ Educational Level ✲ Place of Residence

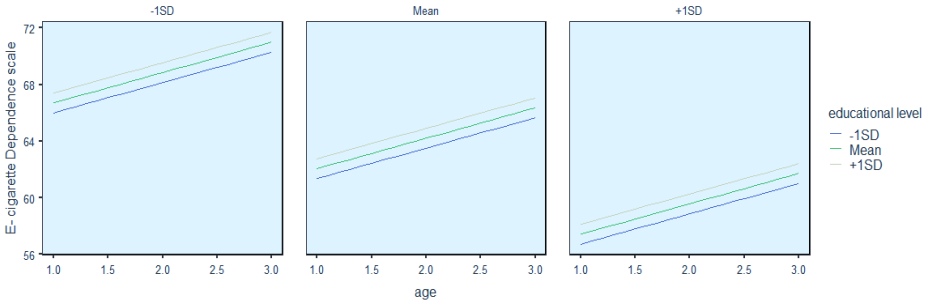

Figure 5. *Reactive Relationship of These Variables (Age, Place of Residence, Educational Level) With the Dependent Variable (Dependence on the Use of Electronic Cigarettes).*

Discussion

The findings of the study revealed a pronounced prevalence of electronic cigarette usage among adolescents, indicated by a substantial arithmetic mean of (92.0). This outcome can be elucidated through several factors, encompassing the distinctive characteristics of the adolescent developmental stage, cognitive and mood fluctuations inherent to this phase, motivational factors associated with the adoption of smoking behaviours, a desire for social recognition, and the developmental changes inherent in adolescence. Notably, the intensity and frequency of substance intake, particularly nicotine, are reflective of these developmental shifts.

Furthermore, the characteristics of adolescence are marked by a heightened degree of diverse and disparate fluctuations across various facets. Adolescents undergo various challenges during this period, compounded by cognitive curiosity, an inclination towards experimental behaviours, and a proclivity for incorporating novel practices into their lives periodically. Consequently, the reviewed studies corroborate the substantial prevalence of electronic cigarette use among adolescents, affirming the multifaceted nature of factors influencing their engagement in such behaviour (Glantz et al., 2022; Jane Ling et al., 2023; Karbouji et al., 2018; Kinouani et al., 2020; Kreslake et al., 2023; Mohammad et al., 2018; Morean et al., 2019; Owusu et al., 2019; Pettigrew et al., 2023).

The study outcomes additionally revealed that age, educational level, place of residence, economic level, and experience constituted the explanatory demographic variables incorporated into the multiple regression equation, collectively accounting for 5.88% of the variance. Notably, the study identified place of residence, economic level, and age as the predominant factors significantly influencing adolescents' dependence on electronic cigarettes (Kreslake et al., 2023; Mohammad et al., 2018; Morean et al., 2019; Owusu et al., 2019; Pettigrew et al., 2023; Smoking & Health, 2020; Wang et al., 2021). In addition to the observed significant effects, the study uncovered a negligible impact of educational level on the escalation of electronic cigarette usage among university students. In an effort to empirically substantiate this observation, the researcher conducted a

comprehensive examination of various studies exploring the relationship between educational level and e-cigarette usage. However, all the reviewed studies consistently reported a positive and statistically significant association between these variables (Aghar et al., 2020; Assari, Mistry, & Bazargan, 2020). However, the study has brought to light the non-significant effects. The aggregated non-significant findings may be attributed to several factors, such as limitations in the quality of collected data, the relatively low educational attainment of the targeted respondents, and a lack of informed educational awareness among respondents, preventing them from recognizing its significance as a contributing factor.

The aforementioned findings indicate alignment with psychological theories addressing the characteristics of adolescents and their psychological and social structures. The applicability of theories like Erikson's developmental stages becomes evident, highlighting the adolescent stage marked by diverse mood fluctuations and an identity crisis with its attendant disorders. Furthermore, the results elucidate insights from theories explicating addiction in the realm of various electronic cigarettes (Halevy & Gross, 2023; Ma, 2019; Syed & McLean, 2017; West & Brown, 2013). It is noteworthy that adolescents contend with diverse mental disorders, coupled with a proclivity for emulation and a yearning for social assimilation, reflecting their aspirations for psychosocial adjustment.

Conclusion

The principal aim of this investigation was to explicate distinct predictors, specifically age, place of residence, and economic status, influencing the utilization of e-cigarettes among adolescents within the Saudi Arabian context. Employing a quantitative questionnaire research strategy, data were gathered from 356 university students currently enrolled in Riyadh universities. Through the application of multiple regression analysis, the study discerned that age, economic status, and place of residence significantly impact the e-cigarette dependence of adolescents, specifically the university students in Riyadh. Furthermore, the study identified an inconsequential influence of educational level on e-cigarette usage among young adolescents in Riyadh universities. The researcher summarized the findings, asserting a heightened prevalence of e-cigarette usage and dependence among university students in Saudi Arabia, particularly in the age bracket of 18 to 24, characterized by affluent economic backgrounds and robust residential settings, suggesting a heightened propensity for diversion and e-cigarette usage in this demographic.

Significance of the Study

The primary objective of any research endeavour is to ultimately furnish a reasoned foundation and valuable insights that can offer recommendations and empirical knowledge to both theoretical and practical domains. The ensuing discourse has addressed implications in both these facets in the subsequent paragraphs.

From a theoretical standpoint, this study has illuminated the milieu of adolescents currently enrolled in Riyadh universities, offering noteworthy insights into the prevalence and utilization of e-cigarettes among this demographic. Furthermore, it extends the contextual scope of preceding studies by examining additional demographic factors,

encompassing age, economic status, place of residence, and educational level. The perspectives of the respondents underscore the significance of age and the distinctive factor of residency in amplifying e-cigarette usage among students. The study also underscores the role of economic status as a contributing factor, augmenting students' inclination toward deviation and e-cigarette usage. Lastly, the research introduces a novel perspective by indicating that educational level does not exert a discernible impact on e-cigarette usage. Regardless of educational attainment, the emerging young generation exhibits a heightened prevalence of e-cigarette usage.

Beyond its theoretical ramifications, the study has presented salient observations with practical utility for governmental entities, legislative bodies, university administrations, and the parents of students and the youth.

Primarily, this study has drawn attention to a concerning scenario characterized by elevated adoption, intentions, and usage of drugs and addictive substances among adolescents. Consequently, there is an imperative for governmental intervention to address the pervasive use of cigarettes and take stringent measures against suppliers of such addictive substances. The aim is to safeguard the younger generation from succumbing to the deleterious effects on health, morality, and personality associated with these substances. Additionally, the study underscores the pivotal role of the demographic factor of place of residence in fostering e-cigarette usage, imparting a message to parents to vigilantly monitor their children's activities and shield them from the insidious influence of drugs. Lastly, universities are urged to implement measures for maintaining a drug-free campus environment and fostering awareness campaigns against substance abuse.

Limitations of the Conducted Research

Despite the numerous implications and contributions offered by this study, certain limitations have been identified. Firstly, the study relies on the illustration of demographic factors among students in higher education institutions in Riyadh without developing a specific empirical model for investigation. Secondly, the research confines itself to a singular geographical location, namely Riyadh, for data collection, thereby limiting the generalizability and diversity of responses within the dataset. Finally, the study focuses exclusively on e-cigarettes as its primary theme, providing no insights into factors influencing the intentions to use addictive substances.

Recommendations

In light of the aforementioned study limitations, the researcher proposes specific areas for consideration in future investigations. Subsequent studies may contemplate engaging in the following empirical endeavours:

1. Directing the attention of stakeholders, decision-makers, and entities responsible for adolescent services towards the importance of fostering their care, prevention, and health and psychological rehabilitation. This can be achieved through the incorporation of comprehensive education on the adverse effects of various forms of smoking into student curricula.

2. Examining preliminary factors that serve as the initial catalysts in heightening adolescents' proclivity for deviation and attraction towards drugs. Future research endeavours may delve into understanding the reasons, triggers, and consequences of drug awareness among the youth.
3. Subsequent researchers may opt for a different target population as their selected respondents and elucidate the demographical factors influencing their support for e-cigarette usage.
4. While this study has focused exclusively on a singular type of addictive substance, future researchers are encouraged to explore the prevalence, usage patterns, and reasons for the adoption of various targeted drugs among students and other pertinent target populations.
5. Recognizing the limitation of generalizability and diversity in this study, future research endeavours may employ diverse methods of data collection and explore alternative avenues to reach respondents who may be geographically distant and challenging to access within the specified target population.
6. Subsequent research endeavours have the opportunity to construct empirical models that integrate both demographical factors and the catalysts, insights, and reasons serving as explanatory constructs in understanding the influence on drug usage.

Conflict of interest

The authors declare that the research was conducted without any commercial or financial relationships that could be understood as potential conflicts of interest.

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