ARTICLE

The internal and external risk factors related to e-cigarette smoking initiation among selected college participants in a higher education institution in the National Capital Region (NCR), Philippines

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ABSTRACT

Due to limited data on the e-cigarette use of tertiary education students in the Philippines, this research examined the internal and external risk factors that may lead to e-cigarette initiation. An online survey questionnaire was administered to 352 individuals, with 95 of them being e-cigarette smokers. Specifically, 36.8% were current users, 12.6% had used them in the past, and 50.5% had tried them at least once. Statistical measurements such as frequency, percent, mean, and mode were used to quantify variables such as socio-demographics. The Patient Health Questionnaire (PHQ-4) was used to measure mental health and stress-induced factors. The Fisher's Exact Test was utilized to identify the significant internal and external risk factors, as well as the perceptions of e-cigarette users. Statistical analysis showed two internal risk factors (i.e., gender, and mental health and stress-induced factors) to be highly significant, and all external risk factors (i.e., family, peers, media) were also highly significant. Perceptions of the harmful effects of e-cigarettes and breathing their vapor have also shown to be highly significant, wherein a lower perception of harm showed a greater and more

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KEYWORDS

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frequent e-cigarette use. Socio-demographic characteristics such as the father's educational attainment showed high significance in e-cigarette initiation, wherein students whose fathers have a higher degree of education showed lesser e-cigarette use. The identified risk factors may be beneficial in creating long-term interventions to limit the expansion of e-cigarette initiation in tertiary education institutions and be used to promote awareness of the negative effects of e-cigarettes.

INTRODUCTION

Tobacco use is one of the predominant causes of premature death in the Philippines, with an annual report of eighty-seven thousand six hundred (87,600) Filipinos succumbing to death due to tobacco-related diseases. Lung cancer, chronic obstructive pulmonary disease (COPD), heart disease, and stroke are just four (4) out of forty (40) smoking-related illnesses known to date (Department of Health 2015).

Statistics from the Centers for Disease Control and Prevention show that nearly 9 out of 10 adults who smoke cigarettes daily first try smoking by the age of 18. The prevalence of smoking among young adults is 14.2%, with those attending college having a higher risk of experimenting with smoking. (CVS Health Corporation 2017). Since 2014, e-cigarettes have been the most commonly used tobacco product among the youth, outnumbering traditional cigarettes (U.S. Department of Health and Human Services 2016). Recent studies reported that 45% of college undergraduate students aged 18-25 years used e-cigarettes in their lifetime, with 12% of them using it within the past month. The addition of flavorings to tobacco products makes them appealing to students (Allem et al. 2015; Corey et al. 2015). The emergence of modern tobacco products and the inclusion of flavor additives become a pressing issue as college students are now easily addicted to using such devices. Not only does this impact their health due to the nicotine content in tobacco products, but it also influences the environment. When cigarette and e-cigarette residues are not properly disposed of, these residues end up in the environment, leaving behind toxic chemicals, heavy metals, and nicotine residues (Truth Initiative 2021).

Based on these data, students in universities and colleges are at significant risk of engaging in harmful activities such as smoking. According to Wamamili et al. (2020), people studying at a university can encounter a range of educational, emotional, and social challenges and significant changes in socialization and identity due to being away from home. Aside from these, independence and peer pressure may engage students to experiment with something new, such as cigarettes. The prevalence of smoking among these individuals can be attributed to their awareness of and attitudes toward the risk involved in utilizing it. A study revealed that there is a direct relationship between the proportion of closest friends who smoke and initiation to e-cigarette smoking. An increase in e-cigarette use among adolescents who are currently using and who have never used before is correlated with peer smoking. This may be further heightened by the renormalization marketing strategy of companies (Hwang and Park 2016).

Tobacco usage is a great factor that can impact the health of the general population. Given that young adults are a vulnerable group for e-cigarette use, studying their smoking behaviors and related risk factors is crucial. (Hammond et al. 2020). Knowing how it began and what risk factors aided in their decision can be of help in targeting these areas to provide a more specific solution in devising smoke-free policies and safe spaces in universities in our country. In addition, having knowledge of smoking initiation among college students, in relation to the associated risk factors, can help with public health intervention plans that can reduce the negative impact of smoking-associated diseases.

The identified internal risk factors are age, gender, intellectual ability, mental health and stress-induced factors, and economic status, while the external risk factors are family, peers, and media.

The age of an individual when they first engage in smoking allows the researchers to develop a correlation with the likelihood of smoking, analyzing if there is a difference between exposure to environments that foster positive attitudes toward smoking among younger and more mature individuals. Gender is also assessed to determine if there are differences in the inclination to smoke depending on the individual's gender. Intellectual ability, mental health and stress-induced factors, and socioeconomic status of the participants are also examined to determine if these influence smoking habits.

External risk factors include the influence of the participants' family, peers, and media on their perception of e-cigarettes. To expound, their family's and peers' perception of smoking may influence their perception, which could lead them to adapt their family members' attitudes towards smoking (i.e., leniency, permission, or prohibition). In the same manner, their peers and friends may also influence their smoking status.

They may also form their perceptions regarding smoking based on their knowledge and attitudes acquired from different media such as educational materials, advertisements, and shows, among others. Liang et al. (2015) established that tobacco makers and vendors use social media's business potential for online cigarette marketing. This interaction between the media and the tobacco industry has long existed, allowing online users to receive more pro-tobacco information quickly, regardless of age.

Despite tobacco-related diseases being one of the leading causes of premature deaths in the country, there is limited data on the e-cigarette initiation of college students in the Philippines, specifically when and how they started smoking and the factors associated with it. With this gap in knowledge, this study determined the risk factors leading to e-cigarette smoking initiation among selected 1st to 4th-year undergraduate college participants studying in a higher education institution offering science courses. Specifically, the study determined the prevalence of e-cigarette smoking among the selected study participants; described the socio-demographic profile of the e-cigarette smokers in the study; identified the age of e-cigarette smoking initiation among the selected participants; evaluated the relationship between the identified internal and external risk factors associated with e-cigarette smoking initiation; described the e-cigarette smoking habits of the selected participants; and assessed the relationship between the socio-demographic profile of the e-cigarette smokers and their smoking habits.

These objectives were carried out by using an analytical cross-sectional study as a quantitative and non-experimental research design to examine the relationship between e-cigarette smoking initiation and its related risk factors and the association between a potential risk factor and a certain health result. This research design was seen as essential in the descriptive analyses and in generating hypotheses from the gathered data through surveys or questionnaires.

The results of this study can then be used in planning, creating, implementing, or improving policies, guidelines, and programs that aim to spread awareness about e-cigarette smoking and minimize its effects in the long term.

DEFINITION OF TERMS

Attitude - The positive and negative evaluation of behavior. A function of belief which is equivalent to the sum of belief strength multiplied by outcome evaluation for each individual's beliefs.

Combustible Cigarettes - They are also known as "traditional cigarettes". These are tobacco leaves wrapped in cigarette paper and are lit at the end to create smoke that the user inhales.

Ever Smoker - This is an individual who has ever tried to smoke e-cigarettes, regardless of the number of puffs or amount consumed.

Initiation - This is the transition of an individual from being a never smoker to an ever smoker.

Internal Risk Factors - These risk factors are attributes or characteristics that are directly related to the individual (i.e., age, gender, intellectual ability, mental health and stress-induced factors, economic status).

External Risk Factors - These risk factors are attributes that are external to the individual (i.e., media, peers, family).

Mental Health - It encompasses the emotional and psychosocial well-being of a human and influences cognition, perception, and behavior.

Never Smoker - This is an individual who has never experienced e-cigarette smoking.

Perception - The state or ability to understand presented information.

MATERIALS AND METHODS

Subjects and Study Size

The study was conducted at a higher education institution in NCR, Philippines, targeting 1st to 4th-year undergraduate students in a higher education institution offering science courses, with an inclusion criterion of students aged eighteen (18) and above. The population in the study setting was 3,456 and the sample size was 346, with a confidence interval of 95% and a 5% margin of error.

Sampling Technique

The target college had 3 distinct departments or programs. The study used stratified sampling based on the year levels and departments in the college. The subgroups were divided proportionately to the total sample size, ensuring that each was appropriately represented. Table 1 shows the stratified sample size of the respondents according to program and year level.

Table 1: Stratified Sample Size According to Program and Year Level

	Department A		Department B		Department C	
	Number of Participants	Sample Size	Number of Participants	Sample Size	Number of participants	Sample Size
1st Year	352	35	478	48	78	8
2nd Year	342	34	405	41	72	7
3rd Year	340	34	336	34	77	8
4th Year	401	40	536	53	39	4
Total	1435	143	1755	176	266	27

Variables

The independent variables are the internal and external risk factors that lead to e-cigarette smoking initiation while the dependent variable is the smoking status of college participants from 1st year to 4th year. The independent variables were measured through the analysis of the responses about internal factors (i.e., age, gender, intellectual ability, mental health and stress-induced factors, and economic status) and external factors (i.e., family, peers, media) (see Appendix B), while the dependent variable was measured through the responses to the question about smoking status.

Data Collection and Analysis

A 60-item online survey questionnaire composed of open- and closed-ended questions was administered through Google Forms and was deployed through the participants' institution emails. The questionnaire was sent out to the whole population until the minimum number of respondents was achieved per stratum.

The questionnaire was adapted from the National Youth Tobacco Survey of the Centers for Disease Control and Prevention (CDC) and from a research study conducted by Pearson et al. (2018), which analyzed several population surveys about smoking in general to compile recommended core items for e-cigarette use assessments. For the question about average family income, the choices were adapted from the paper of Albert et al. (2018) of the Philippine Institute for Development Studies. The respective authors were notified of the adaptation of their survey tools for this research and permission was duly granted. A copy of the questionnaire and the respective questions for each of the risk factors can be found in the Appendix.

The study was conducted through a quantitative method. Statistical analysis for quantitative data obtained from multiple-choice questions was done with the help of a consulting statistician and performed using Microsoft Excel, SPSS, and R software. A Cronbach's Alpha score of 0.705 was obtained during the pilot testing. To determine the socio-demographic profile of the study participants, measures of enumeration,

central tendency, and dispersion were used—specifically, frequency and percent distribution, mean, and mode. To determine the significant risk factors leading to e-cigarette initiation, Fisher's Exact Test was used. Statistical significance was determined using a 0.05 level of significance. The Patient Health Questionnaire (PHQ-4) was used to measure mental health and stress-induced factors.

RESULTS

E-cigarette smoking prevalence among participants

A total of 352 college students in a higher education institution in the National Capital Region (NCR), Philippines voluntarily participated in this study. Out of these participants, 73% or 257 were never smokers while nearly 27% or 95 of the participants had either experienced or were currently using e-cigarettes. In particular, 35 out of 95 (36.8%) were current e-cigarette users, 12 out of 95 (12.6%) were former e-cigarette users, and 48 out of 95 (50.5%) had tried these e-cigarettes once or more.

The socio-demographic profile of these 95 study participants gathered from the study is presented in Table 2 and visualized according to smoking status in Figures 1-10. Age and gender were considered internal risk factors in this study.

Table 2: Socio-demographic Profile of E-cigarette Users

Characteristic		Frequency	Percent
Age (years)	Mean (SD) = 20.25 (1.12) Mode = 20		
Sex	Male	36	37.9
	Female	59	62.1
Number of Children in the Family	Exactly one	11	11.6
	At least 2 but less than 4	69	72.6
	At least 4	15	15.8
Birth Order	Only child	11	11.6
	Firstborn	37	38.9
	Second born and middle child	32	33.7
	Last	15	15.8
Average Monthly Income (Php)	Less than 38,080	5	5.2
	38,080 – 66,640	17	17.9
	66,640 – 114,240	22	23.2
	114,240 – 190,400	26	27.4
	More than 190,400	25	26.3
Mother's Educational Attainment	College undergraduate	17	17.9
	College graduate	59	62.1
	Postgraduate	19	20
Father's Educational Attainment	College undergraduate	15	15.8
	College graduate	61	64.2
	Postgraduate	19	20.0
Place of Residence	Within NCR	74	77.9
	Outside NCR	21	22.1
Living Status	Living with parents	31	32.6
	Living with a guardian	9	9.5
	Living with other people	35	36.8
	Living alone	20	21.1
Housing Unit Type	Residential	27	28.4
	Dormitory	15	15.8
	Condominium	47	49.5
	Apartment	6	6.3
Health Status	Healthy	78	82.1
	With medical condition	17	17.9

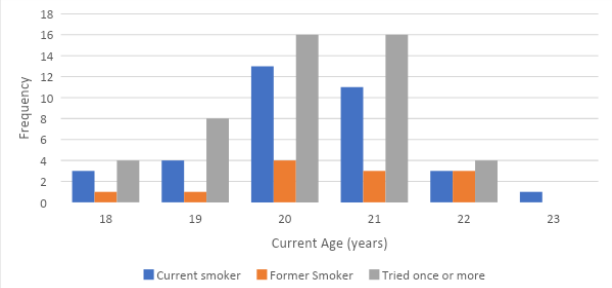


Figure 1: Age Distribution per E-cigarette Smoking Status

Socio-demographic profile of e-cigarette smokers

Figure 1 shows the age distribution of participants with their smoking status as e-cigarette users, with the overall mean age and modal age of 20.25 years and 20 years, respectively, falling under the said age group.

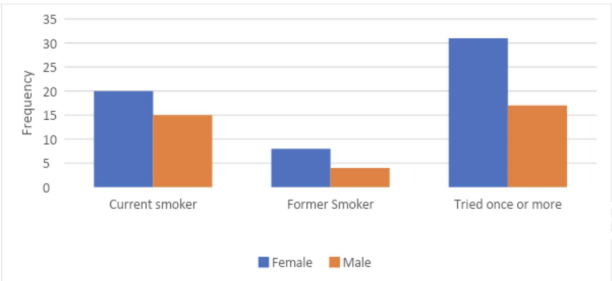


Figure 2: Gender Distribution per E-cigarette Smoking Status

Figure 2 illustrates the gender distribution of these e-cigarette users and their smoking status. Surprisingly, female e-cigarette user participants (59 or 62.1%) outnumbered male e-cigarette user participants (36 or 37.9%). This was also true even when these participants were grouped according to their current e-cigarette smoking status.

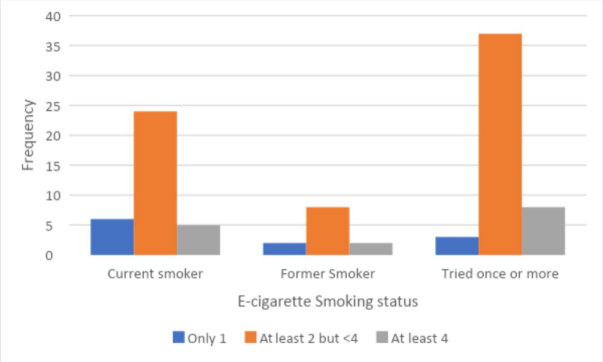


Figure 3: Number of Children Distribution per E-cigarette Smoking Status

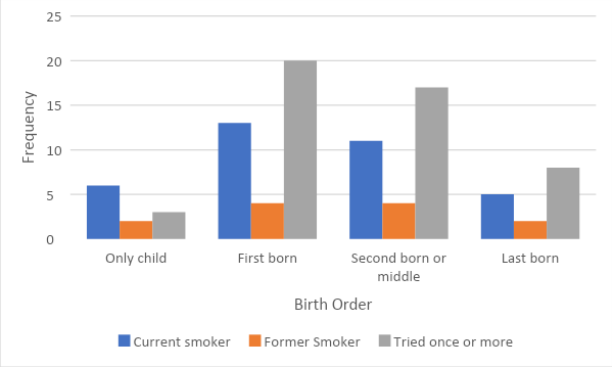


Figure 4: Birth Order Distribution per E-cigarette Smoking Status

As seen in Table 2, the majority of these e-cigarette users are from a family with at least 2 but less than 4 children (69 out of 95 or 72.6%). Figure 3 shows that the majority of the only-child participants were current e-cigarette users (6 out of 11), while Figure 4 demonstrates that the majority of the first-born to last-born e-cigarette users (45 out of 84 or 53.6%) had tried e-cigarettes at least once.

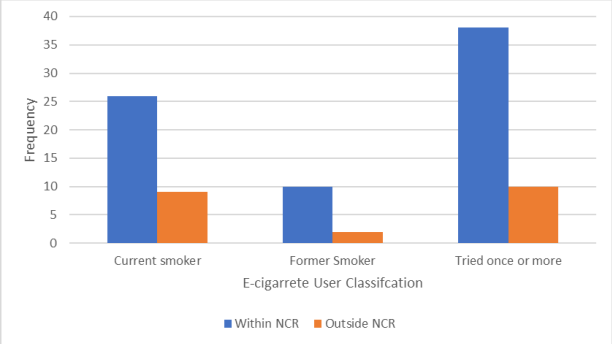


Figure 5: Residence Distribution per E-cigarette Smoking Status

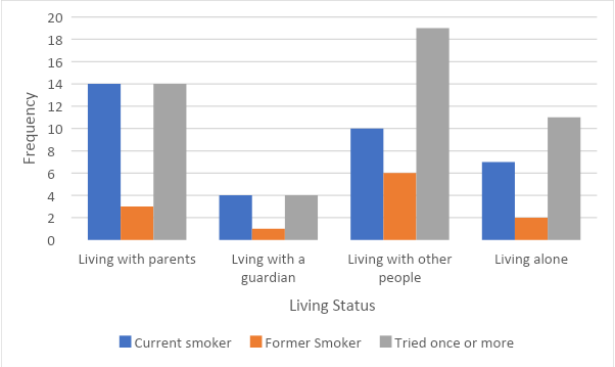


Figure 6: Living Status Distribution per E-cigarette Smoking Status

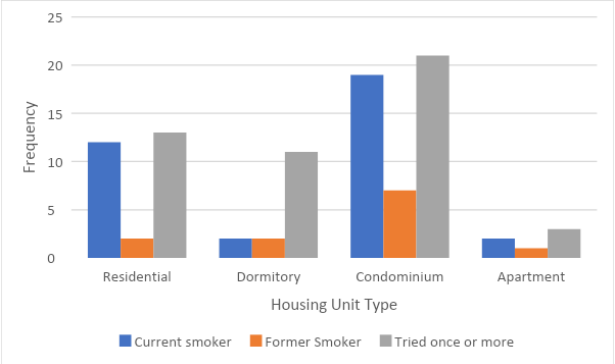


Figure 7: Housing Unit Type Distribution per E-cigarette Smoking Status

In Figure 5, it is seen that more e-cigarette users resided within NCR for every classification, whereas Figure 6 shows those who tried e-cigarettes once or more were of greater proportion when they lived either with other people or alone. On the other hand, most of the e-cigarette users (47 out of 95 or 49.5%) regardless of smoking status were living in condominiums as shown in Figure 7.

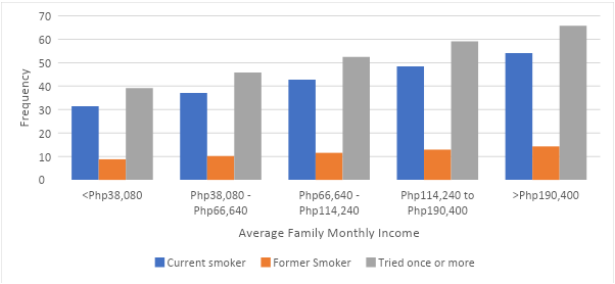
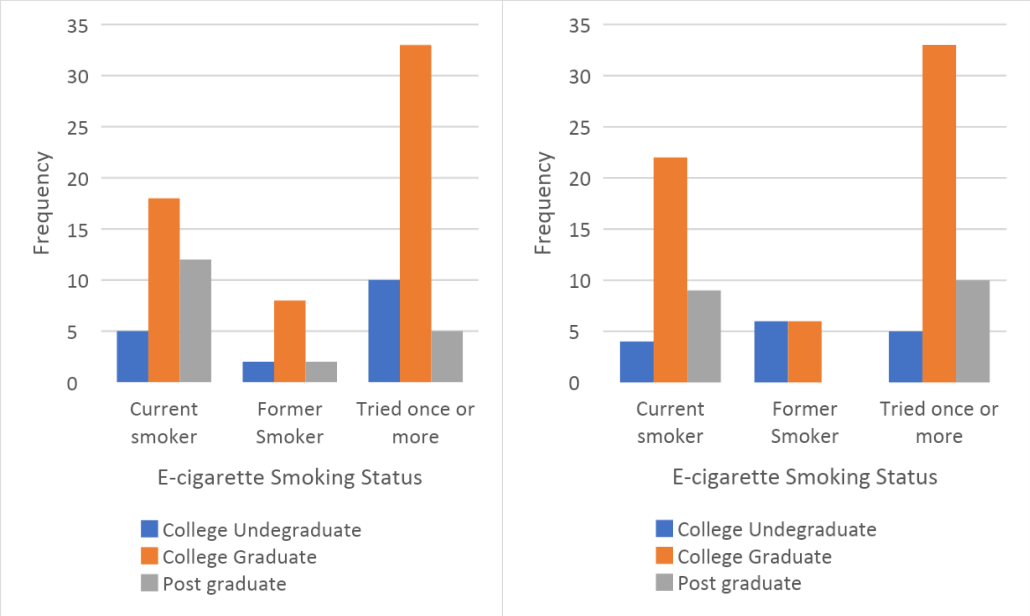


Figure 8: Average Family Monthly Income Distribution per E-cigarette Smoking Status

Figure 8 shows that there were more e-cigarette users when their average family monthly incomes became higher. With 25 out of 95 or 26.3%, it constituted the majority of the individuals who had tried at least once e-cigarettes to the average monthly income that their family was getting.



(a) Mother's Educational Attainment (b) Father's Educational Attainment

Figure 9: Parents' Educational Attainment Distribution per E-cigarette Smoking Status

Both parents of the majority of e-cigarette users earned bachelor's degrees, with 59 out of 95 or 62.1% of the mothers and about 61 out of 95 or 64.2% of the fathers. The number of degree holder parents was greater than those who did not earn a degree as seen in Figure 9.

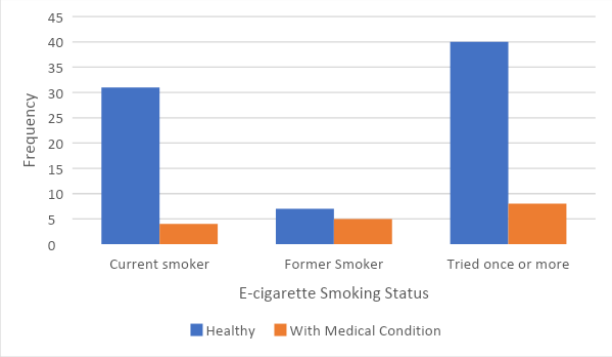


Figure 10: Health Status Distribution per E-cigarette Smoking Status

As listed in Table 2 and shown in Figure 10, at least 80% of the overall e-cigarette users were healthy. The remaining 20% had a medical condition of which almost half of them had an asthma or throat infection which can be considered an effect of smoking;the rest were non-related smoking conditions.

Age of e-cigarette smoking initiation among participants

Table 3: Age of E-cigarette Initiation among Participants

Characteristic		Frequency	Percent
Age (years)	Mean (SD) = 17.68 (2.18)		
	Minor	44	46.3
	Adult	51	53.7
Range (years)	Highest = 22		
	Lowest = 10		

The mean age of participants when they first tried using e-cigarettes was 17.68 years (SD = 2.18) as seen in Table 3. Out of 95 participants, some were as young as 10 years old when they first tried using e-cigarettes while others tried this when they were 22 years old, which suggests that first-time e-cigarette users were classified as minor (44 out of 95 or 46.3%) and adult (51 out of 95 or 53.7%).

Aside from age and gender, the intellectual ability and mental health of the person and stress-induced factors are internal risk factors that can influence the user to initiate e-cigarette smoking. Table 4 shows the academic profile of students who were current or past e-cigarette users as shown in Figures 11 and 12.

Other internal risk factors related to e-cigarette smoking initiation

Table 4: Academic Characteristics of E-cigarette Users

Characteristic		Frequency	Percent
Academic Status	Regular	91	95.8
	Irregular	4	4.2
Academic Program	Academic Program A	4	4.2
	Academic Program B	55	57.9
	Academic Program C	36	37.9
Academic Level	First Year	18	18.9
	Second Year	12	12.6
	Third Year	51	53.7
	Fourth Year	14	14.7
Academic Performance	Above Average	79	83.2
	Average	12	12.6
	Below Average	4	4.2

The majority of students who partake in e-cigarette smoking were regular students representing 95.8% of the 95 participants. Moreover, a greater part of the e-cigarette users were participants from the Academic Program B which constituted 57.9% of e-cigarette users. The academic level also correlated with the use of e-cigarettes; participants who were in their third year constituted the majority or 53.7% of e-cigarette users. Lastly, a greater part of participants who were e-cigarette users were of above academic standing, constituting 83.2% of the participants.

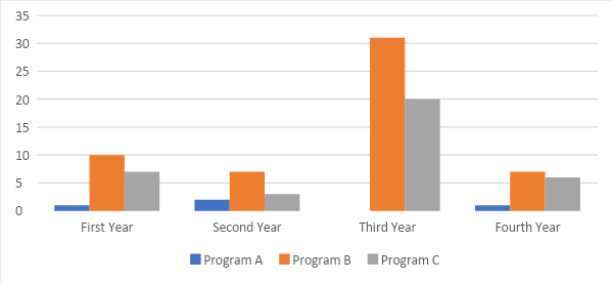


Figure 11: Academic Program Distribution Per Academic Level

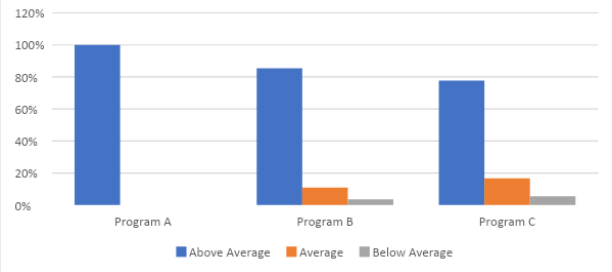


Figure 12: Academic Standing Distribution Per Academic Program

As seen in Figure 11, participants taking academic program B dominated the distribution of these e-cigarette users per academic year level. Moreover, most of the participants belonged to the Third year level. Likewise, in terms of academic standing, these e-cigarette users possessed an above-average academic standing as shown in Figure 12.

The following table has displayed the mental health problems that were considered risk factors that primarily influence the tendency of these college participants to use e-cigarettes.

Table 5: Mental Health Problems of E-cigarette Users

	Nearly every day		More than half of the days		Several days		Not at all	
Problem	N	%	N	%	N	%	N	%
Little interest or pleasure in doing things	14	14.7	32	33.7	43	45.3	6	6.3
Feeling down, depressed, or hopeless	8	8.4	26	27.4	45	47.4	16	16.8
Feeling nervous, anxious, or on edge	16	16.8	35	36.8	35	36.8	9	9.5
Not being able to stop or control worrying	17	17.9	28	29.5	40	42.1	10	10.5

Table 5 presents the mental health problems and stress-induced factors concerning participants who were currently and previously using e-cigarettes based on the Patient Health Questionnaire 4 (PHQ-4) where the first two problems listed corresponded with depression and the last two problems corresponded with anxiety. The primary mental health problem among participants currently and previously using e-cigarettes was having little interest or pleasure in doing things, with 89 out of 95 (93.7%) experiencing this. Subsequently, feelings of nervousness, anxiety, or being on edge were prevalent, with 16.8% (16 out of 95) reporting this nearly every day, 36.8% (35 out of 95) on more than half of the days, and 36.8% (35 out of 95) on several days. Concurrently, a substantial majority of participants (89.5%, 85 out of 95) reported an inability to stop or control worrying. Lastly, feelings of being down, depressed, or hopeless were also highly prevalent, affecting 83.4% (79 out of 95) of the participants.

The most frequently reported mental health concern experienced nearly every day was the inability to stop or control worrying (17.9%, 17 out of 95). Feeling nervous, anxious, or on edge was the primary problem for more than half the days, reported by 36.8% of participants (35 out of 95). On several days, feeling down, depressed, or hopeless was the most prevalent issue, affecting 47.4% of participants (45 out of 95). Additionally, over half of the participants (54.7%, 52 out of 95) indicated experiencing significant difficulties with concentration, memory, or decision-making due to a physical, mental, or emotional condition.

Table 6: Mental Health and Stress-induced Factor Classification

Classification	Frequency	Percent
None	9	9.5
Mild	34	35.8
Moderate	35	36.8
Severe	17	17.9

Table 6 classifies the mental health and stress-induced factors of participants currently and previously using e-cigarettes according to PHQ-4. Out of 95 participants, only 9 (9.5%) had no issues associated with mental health and stress-induced factors, 17 out of 95 (17.9%) had a severe state, while the majority had a mild (35.8%) or moderate (36.8%) state of mental health.

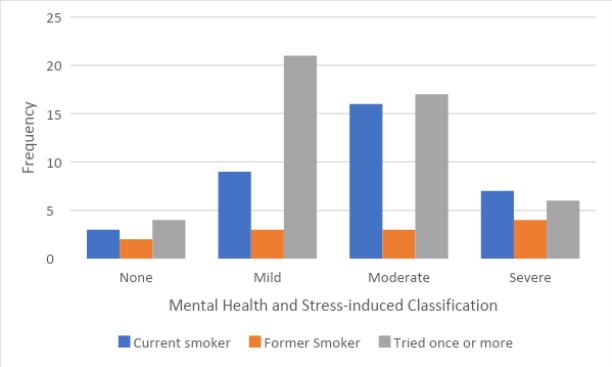


Figure 13: Mental Health and Stress-induced Classification Distribution per E-cigarette Smoking Status

Figure 13 shows the distribution of the e-cigarette smoking status of these participants in relation to their mental health and stress-induced classification. This demonstrates that participants who tried e-cigarettes once or more than once had a mild-to-moderate status of mental health and stress-induced problems. Participants currently using e-cigarettes had a moderate status of mental health and stress-induced problems.

External factors associated with e-cigarette smoking initiation

Table 7: External Factors that Influence E-cigarette Users

Rank	Factor	Frequency	Percent
1	Family or Friends	94	98.9
2	Internet	53	55.8
3	Shows/movies	24	25.3
4	Advertisements	23	24.2

Based on Table 7, nearly all the participants noted that their families or friends had influenced them to start using e-cigarettes (98.9%). When asked if smoking was prohibited in their household, more than half of them (52.6%) grew up in a family where smoking was not banned. Either their parents, guardians, or siblings were allowed to smoke at home.

The second factor that contributed most to the liking of e-cigarettes is the internet, particularly social media sites. Sites that posted content related to e-cigarettes are ranked in Table 8.

Another influential factor was TV shows or movies where characters are shown using e-cigarettes in some scenes either sometimes or most of the time (24 out of 95 or 25.3%). Lastly, advertisements (23 out of 95 or 24.2%) of e-cigarettes influenced these patrons to continue using e-cigarettes.

Table 8: Social Media Sites with Content Related to E-cigarettes

Rank	Media Site	Frequency	Percent
1	Facebook Instagram	66	69.5
2	TikTok	61	64.2
3	Twitter	34	35.8
4	YouTube	27	28.4
5	Reddit	14	14.7

Table 8 shows the social media sites where the participant would see content related to e-cigarettes. The participants had chosen Facebook and Instagram (69.5%) as the sites where they often see e-cigarette-related content. TikTok followed with 64.2 % and Twitter with 35.8%. Based on their responses, people that they knew or were close to were the ones posting e-cigarette-related content in their social media (71 out of 95 or 74.7%), followed by celebrities or social media influencers (49 out of 95 or 51.6%).

Table 9: Perceptions about the Usage of E-cigarettes

		Frequency	Percent
Harmful Effect	No harm	1	1.1
	Little harm	24	25.2
	Some harm	42	44.2
	A lot of harm	28	29.5
Addiction	Less addictive	7	7.4
	Equally addictive	48	50.5
	More addictive	40	42.1
Nicotine Content	Sometimes contain nicotine	12	12.6
	Usually contain nicotine	42	44.2
	Always contain nicotine	41	43.2
Effect of Breathing the Vapor of Other's E-cigarettes	No harm	4	4.2
	Little harm	20	21.1
	Some harm	40	42.1
	A lot of harm	31	32.6
Usage Acceptability by Friends	Completely acceptable	30	31.6
	Mostly acceptable	60	63.2
	Mostly not acceptable	5	5.2

As presented in Table 9, most of the participants perceived that using e-cigarettes had either some or a lot of harmful effects (73.7%) on the health of the user, either equally or more addictive than a regular cigarette (92.6%), that breathing the vapor from other's e-cigarette had either some or a lot of harmful effects (74.7%), and their friends either completely or mostly accepted their usage of e-cigarette (94.8%).

Figures 14 to 18 illustrate their perceptions together with their smoking status classification.

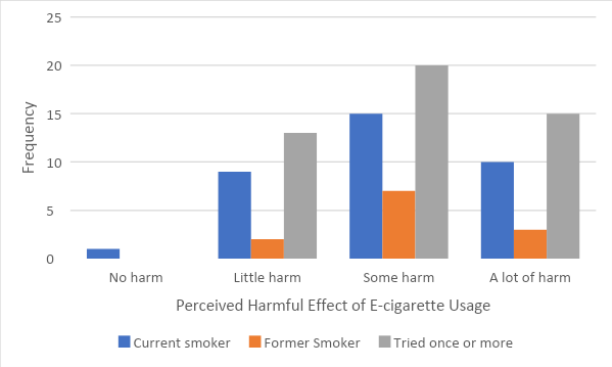


Figure 14: Perceived Harmful Effect Distribution per E-cigarette Smoking Status

Figure 14 shows that only the current e-cigarette users perceived that it had no harmful effect on their health, while those who tried it once or more believed that it had some or a lot of harmful impact on their health. Apparent in this figure is the trend of increasing perception of e-cigarette harmfulness in those who have tried it once or more. Only the current users, which comprised 36.8% of the total e-cigarette users, had continued to use it despite its harm. This means that the remaining 63.2% were fully aware of the harmful effects of e-cigarettes and had ceased using the device.

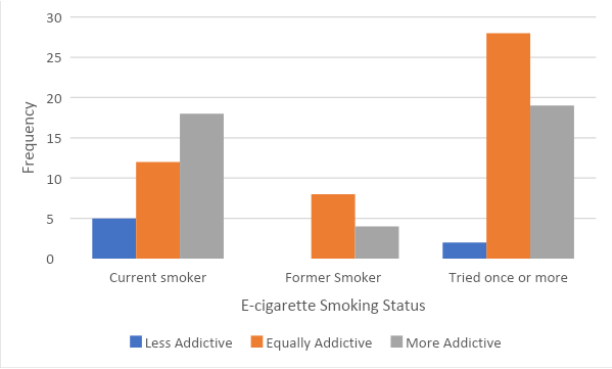


Figure 15: Perceived Addiction Distribution per E-cigarette Smoking Status

As seen in Figure 15, current e-cigarette users perceived that e-cigarettes were more addictive than combustible cigarettes. In retrospect, former e-cigarette users and those who tried once or more perceived that it was equally addictive as combustible cigarettes.

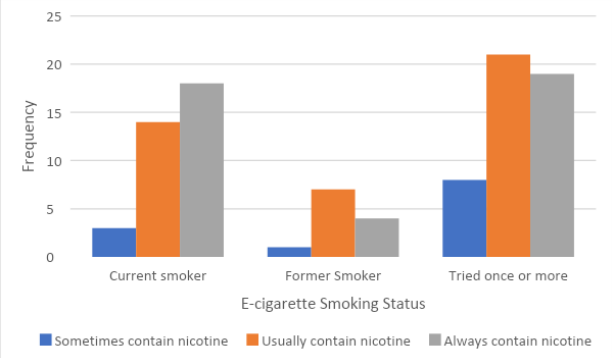


Figure 16: Perceived Nicotine Content Distribution per E-cigarette Smoking Status

Figure 16 denotes that current e-cigarette users perceived that e-cigarettes always contain nicotine, while both the former e-cigarette users and those who tried it once or more perceived that e-cigarettes only usually contain nicotine.

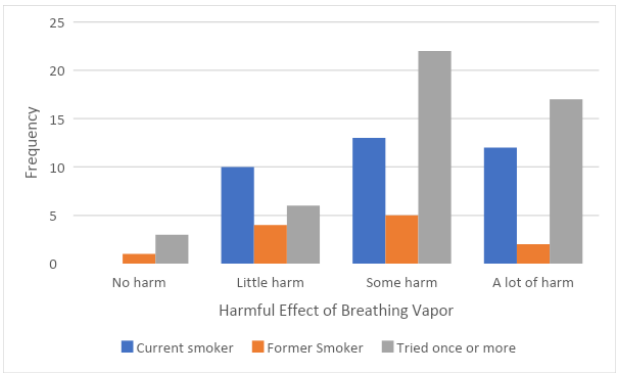


Figure 17: Perceived Harmful Effect of Breathing Vapor Distribution per E-cigarette Smoking Status

Figure 17 illustrates that current e-cigarette users perceived little harmful effect when breathing the vapor of other's e-cigarettes while those who tried it once or more believed that it had some or a lot of harmful effects.

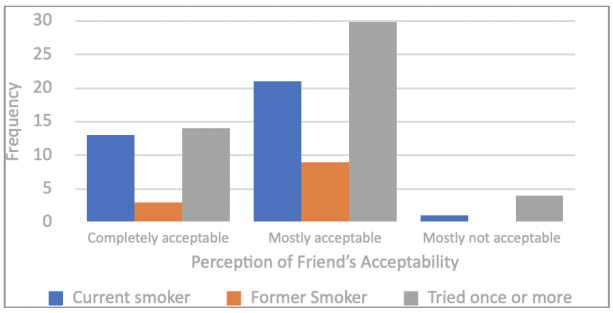


Figure 18: Perceived Friend's Acceptability Distribution per E-cigarette Smoking Status

Figure 18 represents the perceived acceptability of the participants' friends in terms of e-cigarette use. Apparent in this graph is the trend in every smoking status, wherein the acceptability was higher than compared to those who did not completely accept e-cigarette use.

E-cigarette smoking habits of selected participants

Table 10: Smoking Habits of E-cigarette Users

		Frequency	Percent
E-cigarette Usage Frequency	Daily or almost daily	23	24.2
	Less than daily, but at least once a week	12	12.6
	Less than monthly	33	34.7
	Not at all	27	28.4
Type of E-cigarette	Disposable or non-rechargeable	37	38.9
	Uses replaceable prefilled cartridges or rechargeable	35	36.8
	Refilling modular system with liquids	7	7.4
	Cannot determined	16	16.8
	Tobacco menthol/mint	17	17.9
	Fruit	44	46.3

Preferred Flavored E-cigarette	Candy, desserts, or other sweets	15	15.8
	Others	19	20.0
Frequent Places of E-cigarette Use	Home	23	24.2
	Parties/Clubs	38	40.0
	Open Areas	11	11.6
	Others	23	24.2

As shown in Table 10, a quarter of e-cigarette users preferred to smoke using e-cigarettes daily or almost daily, and three-fourths of them preferred to use either disposable or replaceable prefilled cartridges. 54% of them preferred to use e-cigarettes with fruity flavors. In addition, more than half of them smoked e-cigarettes either in closed areas such as parties or at home, while others used them in open areas such as parks.

The relationship between the internal and external risk factors with the smoking status of these e-cigarette users is presented in Table 11.

Association of internal and external risk factors with e-cigarette smoking initiation and status

Table 11: Association of Significant Internal and External Risk Factors and Perception to Smoking Status

Factor		Fisher's Exact Test (*p*-value)
Internal Risk Factor	Gender	$2.503 \times 10^{-4**}$
	Intellectual Ability	0.2426
	Mental health and Stress-induced Factor	$9.116 \times 10^{-4**}$
External Risk Factor	Family	$1.138 \times 10^{-7**}$
	Peers	$9.324 \times 10^{-5**}$
	Media	$5.282 \times 10^{-9**}$
Perceptions (Both internal and external risk factors)	Harmful Effect	$7.43 \times 10^{-7**}$
	Addiction	0.1094
	Nicotine Content	0.6341
	Harmful Effect of Breathing Vapor of other e-cigarettes	$1.582 \times 10^{-6**}$
	Friends' Acceptability	0.7251

***Highly Significant, p < 0.01*

Table 11 shows that internal and external factors highly influenced the smoking status of e-cigarette users. The internal risk factors, such as gender, mental health, and stress, were significantly associated with the smoking status of these e-cigarette users. In particular, female college participants had a higher rate of using e-cigarettes. External factors such as family, peers, and media significantly influenced the initiation of e-cigarette use, as per the highly significant values obtained.

Greater awareness of the harmful effects of e-cigarettes was also found to be associated with lower rates of continued use among those who had tried them, suggesting that knowledge of harm serves as a logical reason for discontinuing e-cigarette use.

Furthermore, the association of socio-demographic characteristics of the participants with their usage of e-cigarettes is enumerated below.

Table 12: Association of Socio-demographic Characteristics and E-cigarette Initiation Usage

Socio-demographic characteristic	Fisher's Exact Test (*p*-value)
Average Family Monthly Income	0.2592
Mother's Educational Attainment	0.1511
Father's Educational Attainment	$5.839 \times 10^{-3**}$
Place of Residence	0.8066
Living Status	0.7426
Housing Unit Type	0.1870
Health Status	0.3128

***Highly Significant, p < 0.01*

As seen in Table 12, a person's father's educational attainment had a significant impact on the use of e-cigarettes. Students whose fathers earned a bachelor's degree or with a higher degree education had a lesser number of times using e-cigarettes.

DISCUSSION

Age of e-cigarette smoking initiation among participants

This study examined the internal and external factors that may lead to e-cigarette initiation among college students. In this study, the mean age of e-cigarette initiation among the participants was 17.68 years as seen in Table 3, with the youngest being 10 years old while the oldest is 22 years old. The findings agree with the study by Dahal et al. (2022), wherein e-cigarette smoking initiation among participants occurred between 10 and 19 years of age. Another study also reported that there are large increases in e-cigarette initiation at ages 18 to 19, which is near the obtained mean age of e-cigarette initiation of 17.68 years (Perez et al. 2021).

Based on the report of the Centers for Disease Control and Prevention (CDC) in 2022, persons aged 18-24 years old are the most prevalent users of e-cigarettes at 9.4%. This agrees with the results obtained in Figure 1 since the overall mean age and modal age of 20.25 years and 20 years, respectively, fall under the said age group. Moreover, Dahal et al. (2022) stated in their study that the age group 20-24 years used e-cigarettes the most in the past 30 days (15.2%), followed closely by the age group 15-19 years.

Bold et al. (2017) investigated the relationship between teenage impulsivity and age. According to the research, youth who support impulsivity were more likely to begin using e-cigarettes earlier in life and use them more frequently. In this manner, the relationship between impulsivity and e-cigarette frequency was mediated by age of onset. Additionally, the findings of the study show that the average age of first e-cigarette use was around 14 years old, although many young individuals claim to have tried them even earlier. Thus, concentrating on younger teenagers may be crucial for stopping the emergence of e-cigarette use. This was in line with the findings of McCabe et al. (2017), who found a substantial correlation between early e-cigarette use and an increased risk of smoking cigarettes and engaging in other drug use behaviors. In comparison to those who never used e-cigarettes or those who started using them later in the 12th grade, the study found that a higher percentage of adolescents who started using e-cigarettes in the ninth grade or earlier (early onset) reported current and lifetime cigarette smoking and other substance use.

Socio-demographic profile of e-cigarette smokers

The current study showed that there are more female e-cigarette users compared to males, as seen in Table 2. This is contrary to several studies and reports on e-cigarette usage wherein there were more male users than females. According to the CDC (2022), among the respondents who reported as tobacco product users, 4.8% of males utilize e-cigarettes while females are 2.8%.

In another study, the majority of the respondents who reported e-cigarette use in the past 30 days were males at 61.1% (Dahal et al. 2022). Another study also reported that among university students in Malaysia, 412 or 42.3% of males are e-cigarette users in comparison to females at 38 or 3.9%. However, similar to the current study's findings, McCauley et al. (2022) also found that there are more female e-cigarette smokers compared to males among 13-20 years old.

The differences in gender distribution may have several underlying reasons. Males are more likely to start e-cigarette use for smoking cessation, reducing the impact of combustible cigarettes on health, and enjoyment, while for females, weight loss or control and stress relief are the primary reasons (Yimsaard et al. 2021). However, caution must be exercised when interpreting the finding that females are more likely to start using e-cigarettes than males, as this finding may be influenced by the disproportionate representation of females in the study sample (59%). This implies the possibility that the observed gender difference may not be an appropriate representation of the broader population; therefore, definitive conclusions regarding gender differences in e-cigarette initiation must not be based solely on the current study.

Socio-demographic factors such as average monthly income, place of residence, and living status were not significantly associated with smoking initiation as found in Table 11. For the average income, similar studies conducted by Azagba et al. (2023) and Moore et al. (2015) also found that socioeconomic status was not a significant factor in smoking. For the place of residence and living status, the current study's results were contrary to the study by Nolan et al. (2017) wherein there is a significant correlation between e-cigarette use and urban-rural location.

Based on the results in Table 11, the father's educational attainment was found to be a significant factor while the mother's educational attainment was not significant. In a study by Zaloudikova et al. (2012), the educational level of parents influenced exposure to passive smoking at home, however, it did not affect the opinions of their children about smoking. Aside from that, Wang et al. (2022) and Öncel et al. (2011) found that adolescents with parents who have a higher education level were less likely to use e-cigarettes, indicating that parental education level plays a role in adolescent e-cigarette use.

Other internal risk factors related to e-cigarette smoking initiation and status

Mental health and stress-induced factors were significant factors in e-cigarette smoking initiation in the study, as shown in Table 11. Similarly, Javed et al. (2022) correlated mental health and e-cigarette use and found that it had a higher incidence in smokers compared to nonsmokers. Particularly, depression, suicidal ideation, and suicidal attempts were higher in smokers compared to nonsmokers.

A study conducted by Obisesan et al. (2019) reveals that current and previous e-cigarette users have a higher likelihood of reporting a clinical diagnosis of depression in contrast to non-users. Moreover, they have established that there is no significant difference concerning e-cigarette use and mental health in relation to sex, age, and race. It is also stated in the study that a relationship between nicotine and trace metals (e.g., lead and aluminum) found in e-cigarettes and depression is possible. Nicotine may produce effects by increasing sensitivity to stress and disturbing the cerebral dopamine pathway, while trace metals such as lead and aluminum may contribute to this since they affect both the central nervous system and the peripheral nervous system.

Despite depression and anxiety being the focal mental health and stress-induced factors in this study, it is noted by Becker et al. (2020) that eating disorders, ADHD, impulsivity, suicidality, stress, and conduct disorders are mental health conditions also associated with e-cigarette use. Furthermore, ADHD may serve as a risk factor for e-cigarette initiation and use in adolescents. This is attributed to the individuals' neurobiology and psychosocial characteristics.

External factors associated with e-cigarette smoking initiation and status

External factors such as family, friends, and media were also examined in the study and were presented in Table 7. All external factors were found to be significant according to the values obtained and shown in Table 11. Nearly all the participants have pointed out that family or friends have influenced them to start using e-cigarettes. The usage of e-cigarettes by family members or friends can be a significant factor that can influence a person's e-cigarette usage (Wang et al., 2018).

In the current study, more than half of the e-cigarette users grew up in a family where smoking is not prohibited. This correlates with the study of Hanafin et. al (2021) wherein parental knowledge and supervision of e-cigarettes can affect the e-cigarette smoking status of adolescents so a parent's encouragement or approval of e-cigarette usage is vital in the smoking initiation of children.

Moreover, the family, including parents and siblings, have a major role in the social environment of an individual (Fite et al., 2017). Parents and siblings using e-cigarettes may have affected the perception and behavior of the individual, which contributes to the risk of using the product themselves. This may most likely be the reason why the majority of e-cigarette users come from a family with at least 2 but less than 4 children as seen in Table 2. In addition, a study conducted by Vuolo and Staff (2013) reported that the risk of smoking is high among individuals who reside with a family member who is a heavy, persistent smoker.

In a study by Joung et al. (2016), they explored cigarette usage by family members and its influence on adolescent smoking behavior. It was found that the odds of adolescents being ever smokers were higher in those who have any family members who smoke than those who do not have family members who smoke. Adolescent boys have higher odds of smoking e-cigarettes if they have siblings who use it, while girls would have higher odds of smoking if their mother uses it. Guidance and monitoring by parents are significant factors in using of e-cigarettes by teenagers. A study by Hanafin et al. (2021) has shown that a lack of monitoring by parents would lead to an increased chance of e-cigarette usage. This factor of parental monitoring was found to be more significant for boys than girls.

Influence by peers was also found to be significant. In a study by Kinnunen et al. (2018), the most common source of e-cigarettes was friends. Similarly, Gorukanti et al. (2017) reported that adolescents with friends who use e-cigarettes had more positive attitudes toward e-cigarette ingredients, safety, addictive properties, and regulation.

Groom et al. (2021) correlated the influence of friends on teen vaping and found that having friends who use e-cigarettes has a great impact on their decision to smoke. Most of the teens in the study got their first vaping products from their peers and have also learned how to use them. In the interview part of this study,

some participants stated they would not start vaping if their friends didn't vape. In addition, some participants have also stated that if their friends vaped less, then they would vape less.

Social advantages to using e-cigarettes are also a factor that can influence their use. In a study by Cavallo et al. (2019), several young adults have stated that friends might see them more favorably if they used e-cigarettes. This cool image factor of e-cigarette use among friends has made them try to fit in. In a study by Holman et al. (2013), psychological factors on male smokeless tobacco use were explored. In order to fit in a group, a lot of participants answered they would do what their friends would tell them to do even if they did not want to.

The current study found a significant correlation between media and e-cigarette smoking initiation. For more than half of e-cigarette users, the internet has influenced them to start using e-cigarettes. Social media sites such as Facebook and Instagram were identified as where they often see e-cigarette-related content. Almost seven out of every ten participants use Facebook or Instagram, where they have access to e-cigarette-related content. Frequently seeing advertisements of e-cigarettes on social media sites like Facebook may contribute to the perception of adolescents on e-cigarettes. It may put cigarettes in a positive light and also create this perception that using them is normal (Camenga et al. 2018).

Other media such as shows, movies, and advertisements have also contributed to smoking initiation. According to Allem et al. (2022), the exposure of youth to smoking-related content in media would increase their positive expectations of smoking. Those who liked movie stars who smoked frequently in movies are more likely to smoke than those who do not (Tickle et al. 2006, as cited in Allem 2022).

According to Grana and Ling (2014), websites that sell e-cigarettes frequently contain unfounded health claims and smoking cessation messages to encourage people to buy their products. An individual's perception of the harmful effects of e-cigarettes can be affected by the advertisements they see in social media and newspapers (Hung et al. 2022). Additionally, a study by Pokhrel et al. (2019) found that positive health claims found in e-cigarette advertisements can make adolescents believe that e-cigarettes are safer alternatives to cigarettes. This can increase the risk of e-cigarette initiation among nonsmokers.

The e-cigarette user's perception of the harmful effects of e-cigarettes in general and breathing in their vapor was found to be significantly affecting the initiation, as presented in Table 11. Meanwhile, the perception of its nicotine content, addictiveness, and acceptability by friends was not significant. Only the current users have perceived it to have no harmful effects, while former and those who have tried it once or more have perceived it to be harmful. Longitudinal and cross-sectional studies have shown that low harm perceptions of e-cigarettes are more associated with increased e-cigarette use (Jiang et al. 2019). A study conducted at the University of Texas reported that e-cigarette users are almost three times more likely to view e-cigarettes as posing little to no harm in contrast to non-users. The study noted that the lack of knowledge on the relative harm of e-cigarettes was associated with increased e-cigarette use (Cooper et al. 2016).

Another study conducted by Mclesih et. al. (2022) regarding the knowledge of college students on e-cigarettes noted that although the participants were aware of the health risks brought by e-cigarettes, they were relatively unaware of the harmful contents present within them.

The results seen in Table 9, where most participants perceive e-cigarettes as harmful, agree with results in a study on first-year university students conducted by Aldurayish et. al. (2023) wherein participants' knowledge of the harmful effects of e-cigarettes was high. It was found that 61.2% of participants were knowledgeable about its addictive properties, 61% were knowledgeable about its risk of asthma, and 75.2% were knowledgeable about its nicotine content. Another study conducted by Mclesih et. al. (2022) on the knowledge of college students on e-cigarettes noted that the majority of participants recognize the risks of cardiovascular and lung disease when using e-cigarettes.

E-cigarette smoking habits of selected participants

The smoking habits of the participants were also examined and almost a quarter of them have been smoking daily as seen in Table 10. The participants have identified that they prefer sweet flavors like fruit and candy. In another study conducted by Landry et al. (2019), 29.5% of the respondents claimed that flavor was a common reason for e-cigarette initiation, with common flavors such as fruit, sweets, menthol/mint, and others. Those who used flavored e-cigarettes had a higher satisfaction and perceived odds of e-cigarette addiction compared to those who did not use flavored e-cigarettes.

Most of the participants have identified closed areas such as parties or clubs to be the places where they would often use e-cigarettes. WHO has determined that secondhand aerosols from e-cigarettes are a new source of air contamination for hazardous particulate matter. The elevated concentration of toxicants from these aerosols presents a health risk, especially to those who already have respiratory conditions (Wilson et al. 2017).

CONCLUSIONS

Findings from this study indicate a significant association between the mentioned internal and external risk factors with regard to e-cigarette initiation, as well as one's perceptions of e-cigarettes. Specific internal risk factors such as gender, and mental health and stress-induced factors, contribute to a higher risk of e-cigarette use. However, due to the larger ratio of the female to male population, this risk factor may not represent the true value. With regard to mental health, 90.5% of the respondents have shown either mild, moderate, or severe symptoms, which may be greatly correlated to e-cigarette use. Studies have shown that e-cigarettes may be used as a method of coping with their mental health, hence the initiation of the product.

Furthermore, the study placed a strong emphasis on the vital role that external factors such as family, peers, and the media play in one's decision to begin using e-cigarettes, particularly among young adults and adolescents. Studies have indicated that having friends who use e-cigarettes and being exposed to e-cigarette content, especially on various social media platforms, can make e-cigarette use seem more mainstream and socially acceptable.

With respect to one's perceptions of e-cigarettes, a highly significant association was found for both their perception of its harmful effects and the harmful effects of breathing e-cigarette vapor. A larger understanding of the danger caused by e-cigarettes may lead to a higher chance of discouragement from using them. This shows that proper health information on e-cigarette harm is influential in reducing e-cigarette initiation.

The study also identifies the educational attainment of one's father as a key socio-demographic factor that impacts e-cigarette initiation among college students. The study indicates that students with fathers who possess bachelor's degrees or higher

are less prone to using e-cigarettes, highlighting the significant role of parental education in the initiation of e-cigarette use by adolescents.

The lack of overall disseminated health information media regarding the harmful effects of e-cigarettes and the concept as a whole may still be a prominent factor in the continued use of e-cigarettes by the participants in the target higher institution. That, coupled with the aforementioned internal and external risk factors, greatly influences one's perceptions regarding e-cigarette initiation.

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CONFLICT OF INTEREST

There is no conflict of interest arising from the financial, familial, and proprietary considerations of the researchers which could affect their ability to act impartially.

LIMITATIONS OF THE STUDY

Given the inherent constraints of the research environment imposed by the COVID-19 pandemic, the study's authors were compelled to administer the survey via an online platform. However, the authors suggest that incorporating qualitative data, through interviews or focus groups, could yield a more profound understanding of the internal and external risk factors, as well as individuals' perceptions regarding the initiation of e-cigarette use. Qualitative data can capture respondents' subjective experiences and motivations; thus, combining both quantitative and qualitative data could elicit a more complex understanding of the factors contributing to e-cigarette initiation.

Furthermore, the study was solely conducted among undergraduate students enrolled in science courses at a college, resulting in limitations in the sample size and the number of e-cigarette smokers obtained in the research. Future studies could encompass a broader population to obtain a more representative sample of e-cigarette smokers, such as by conducting the study university-wide or restricting respondents to solely e-cigarette smokers.

Additionally, the study will only be limited to e-cigarettes and their related initiating factors and risk factors, as well as their correlation to the respondents' perceptions of e-cigarettes. The research and its associated survey will only focus on e-cigarettes and not on combustible cigarettes. The study will not extensively discuss topics regarding smoking cessation. The data to be gathered from the study will only be representative of college participants' initiation and related risk factors regarding e-cigarettes and not of other age populations, specifically those aged eighteen (18) years old and above.

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APPENDIX

A. Survey Questionnaire

SECTION 1: The first section of this questionnaire will ask questions related to information about yourself, your living situation, and your family.	
01	**What is your name?** *(Optional)* _____
02	**What is your assigned sex at birth?** ☐ Male ☐ Female
03	**What is your age?** _____
04	**What is your date of birth?** _____
05	**Are you currently enrolled as a regular student?** ☐ Yes ☐ No
06	**What program are you currently enrolled in?** ☐ Biochemistry ☐ Medical Technology ☐ Pharmacy
07	**What is your year level?** ☐ 1st year ☐ 2nd year ☐ 3rd year ☐ 4th year
08	**What region do you currently live in?** ☐ Region I - Ilocos Region ☐ Region II - Cagayan Valley ☐ Region III - Central Luzon ☐ Region IV-A - CALABARZON ☐ Region IV-B - MIMAROPA ☐ Region V - Bicol Region ☐ Region VI - Western Visayas ☐ Region VII - Central Visayas ☐ Region VIII - Eastern Visayas ☐ Region IX - Zamboanga Peninsula ☐ Region X - Northern Mindanao ☐ Region XI - Davao Region ☐ Region XII - SOCCSKSARGEN ☐ Region XIII - Caraga ☐ NCR - National Capital Region ☐ CAR - Cordillera Administrative Region ☐ BARMM - Bangsamoro Autonomous Region in Muslim Mindanao
09	**What is your living status?** ☐ Currently living with parents ☐ Currently living with a guardian ☐ Currently living with other people (e.g., friends, dormitory roommates) ☐ Currently living alone
10	**What kind of housing unit do you currently live in?** ☐ Residential/Private Property

	☐ Dormitory ☐ Condominium unit ☐ Apartment
11	**How many siblings do you have (including yourself)?** _____
12	**What is your birth order among your siblings (ex. 1st, 2nd)? Please put N/A if you have no siblings.** _____
13	**What is the educational attainment of your mother?** ☐ No Grade Completed ☐ Elementary Undergraduate and below ☐ Elementary Graduate ☐ Highschool Undergraduate ☐ Highschool Graduate ☐ Post Secondary Undergraduate ☐ Post Secondary Graduate ☐ College Undergraduate ☐ College Graduate ☐ Post Baccalaureate ☐ N/A
14	**What is the educational attainment of your father?** ☐ No Grade Completed ☐ Elementary Undergraduate and below ☐ Elementary Graduate ☐ Highschool Undergraduate ☐ Highschool Graduate ☐ Post Secondary Undergraduate ☐ Post Secondary Graduate ☐ College Undergraduate ☐ College Graduate ☐ Post Baccalaureate ☐ N/A
15	**What is your average monthly family income?** ☐ Less than Php 9,520 ☐ Php 9,520.00 - Php 19,040.00 ☐ Php 19,040.00 - Php 38,080.00 ☐ Php 38,080.00 - Php 66,640.00 ☐ Php 66,640.00 - Php 114,240.00 ☐ Php 114,240.00 - Php 190,400.00 ☐ More than Php 190,400.00
16	**Do you have any current medical condition/s?** ☐ Yes ☐ No
17	**If yes, please name the medical condition/s that you have. If no, write N/A.** _____
SECTION 2: The following questions will ask about your current academic standing and mental health. Please select the best answer for each question.	
18	**During the past 12 months, how would you describe your grades in school?** ☐ Mostly A's (1.00) ☐ Mostly B's (1.25-1.5) ☐ Mostly C's (1.75-2.25) ☐ Mostly D's (2.5-3.00) ☐ Mostly F's (5.00) ☐ None of these grades ☐ Not sure

19-22 **During the past two weeks, how often have you been bothered by any of the following problems?** (*Select the best answer*)

	Not at all	Several days	More than half of the days	Nearly every day
Little interest or pleasure in doing things				
Feeling down, depressed, or hopeless				
Feeling nervous, anxious, or on edge				
Not being able to stop or control worrying				

23 **Because of a physical, mental, or emotional condition, do you have a serious difficulty concentrating, remembering, or making decisions?**
- Yes
- No
- Do not know

SECTION 3: The following questions will be related to e-cigarette use and influence by your family, friends, and media.

24 **How were you introduced to e-cigarettes/How did you know about e-cigarettes?** *(Select all that apply)*
- Friend/family member
- Internet
- Advertisements
- Shows/Movies
- Others (*please specify*): _____

25 **When you are using the Internet, how often do you see advertisements or promotions for e-cigarettes?**
- I do not use the internet
- Never
- Rarely
- Sometimes
- Most of the time
- Always

26 **When you read newspapers or magazines, how often do you see advertisements or promotions for e-cigarettes?**
- I do not read newspapers or magazines
- Never
- Rarely
- Sometimes
- Most of the time
- Always

27 **When you watch TV or streaming services or go to the movies, how often do you see people or characters using e-cigarettes?**
- I do not watch TV or streaming services, or go to the movies
- Never
- Rarely
- Sometimes
- Most of the time
- Always

28 **When you watch TV or streaming services or go to the movies, how often do you see advertisements or promotions for e-cigarettes?**
- I do not watch TV or streaming services, or go to the movies

	☐ Never ☐ Rarely ☐ Sometimes ☐ Most of the time ☐ Always
29	**When you use social media, how often do you see posts or content (pictures, videos, or text) related to e-cigarettes?** ☐ Never ☐ Less than monthly ☐ Weekly ☐ Daily
30	**On which social media sites have you seen posts or content related to e-cigarettes?** *(Select all that apply)* ☐ Facebook ☐ Instagram ☐ TikTok ☐ Twitter ☐ YouTube ☐ Reddit ☐ Others: _____
31	**Who usually posted the content related to e-cigarettes on your social media?** *(Select all that apply)* ☐ People I know in real life ☐ Online friends I have not met in real life ☐ Celebrities or social media influencers ☐ E-cigarette brands or sellers ☐ Online news articles ☐ Public health campaigns ☐ Others: _____
32	**While growing up, did any of your parents/guardians/siblings smoke at home?** ☐ Yes ☐ No ☐ Do not know/remember
33	**What is the smoking status of your mother?** ☐ Daily smoker ☐ Occasional smoker ☐ Ex-smoker ☐ Never smoked ☐ Do not know/remember
34	***Referring to the previous question (Question 33):*** **If yes, does your mother smoke openly or discreetly?** ☐ Openly ☐ Discreetly ☐ Do not know/remember
35	**What is the smoking status of your father?** ☐ Daily smoker ☐ Occasional smoker ☐ Ex-smoker ☐ Never smoked ☐ Do not know/remember
36	***Referring to the previous question (Question 35):*** **If yes, does your father smoke openly or discreetly?** ☐ Openly ☐ Discreetly ☐ Do not know/remember
37	**Are there any smokers in your friend group?** ☐ Yes

	☐ No ☐ Do not know/remember
38	**Were you ever invited to smoke by your friends?** ☐ Yes ☐ No ☐ Do not know/remember
39	***Referring to the previous question (Question 38):*** **If you answered yes to the previous question, did you accept the invitation to smoke / did you smoke?** ☐ Yes ☐ No ☐ Do not know/remember
40	**Were the harmful effects of smoking ever discussed with you at school or at home?** ☐ Yes ☐ No ☐ Do not know/remember
41	**If you answered yes to the previous questions, what are the reasons why you may start or choose to continue smoking?** *(Select all that apply)* ☐ My friends also use e-cigarettes ☐ Some members of my family use e-cigarettes ☐ It helps me alleviate my problems ☐ It makes me feel better emotionally and mentally ☐ It makes me feel socially acceptable ☐ I don't think it's that harmful compared to cigarettes ☐ I don't want to start smoking ☐ Others (*please specify*): _____
SECTION 4: The following questions are related to your knowledge, attitudes, and beliefs on e-cigarettes. Please select the best answer among the choices.	
42	**How much do you think people harm themselves when they use e-cigarettes some days but not every day?** ☐ No harm ☐ Little harm ☐ Some harm ☐ A lot of harm
43	**Do you believe that e-cigarettes are (LESS ADDICTIVE, EQUALLY ADDICTIVE, or MORE ADDICTIVE) than cigarettes?** ☐ Less addictive ☐ Equally addictive ☐ More addictive ☐ I have never heard of e-cigarettes ☐ I don't know enough about these products
44	**Do you think that e-cigarettes…** ☐ Never contain nicotine ☐ Rarely contain nicotine ☐ Sometimes contain nicotine ☐ Usually contain nicotine ☐ Always contain nicotine
45	**Do you think that breathing the vapor from other people's e-cigarettes causes…** ☐ No harm ☐ Little harm ☐ Some harm ☐ A lot of harm
46	**Please complete the following sentence. My friends think that e-cigarette use is…**

	☐ Completely acceptable ☐ Mostly acceptable ☐ Mostly not acceptable ☐ Not acceptable
SECTION 5: The following questions ask about your smoking status and habits. Please select the best answer among the choices.	
47	**Do you smoke cigarettes?** ☐ Yes, currently ☐ Yes, in the past ☐ Yes, I have tried once or more ☐ No
48	**Do you use e-cigarettes?** ☐ Yes, currently ☐ Yes, in the past ☐ Yes, I have tried once or more ☐ No
If respondent answers YES, proceed to answer questions 49-60):	
49	**How old were you when you first tried e-cigarettes?** _____
50	**How often do you smoke e-cigarettes?** ☐ Daily or almost daily ☐ Less than daily, but at least once a week ☐ Less than weekly, but at least once a month ☐ Less than monthly ☐ Not at all ☐ Do not know/remember
51	**What e-cigarette type do you use the most?** ☐ Disposable or non-rechargeable ☐ Uses replaceable prefilled cartridges or rechargeable ☐ Refilling modular system with liquids (using a combination of separate devices such as batteries and atomisers) ☐ Do not know/remember
52	**What e-cigarette brand do you smoke the most?** ☐ JUUL ☐ Suorin Drop ☐ Myblu ☐ Vuse Alto ☐ Puff Bar ☐ Others (*please specify*): _____ ☐ Do not know/remember
53	**Does the e-cigarette you mostly use for smoking contain nicotine?** ☐ Yes ☐ No ☐ Do not know/remember
54	**Do you use flavored e-cigarettes?** ☐ Yes ☐ No ☐ Do not know
55	***Referring to question 54:*** **If yes, what is your most preferred flavor (or most often used flavor)?** ☐ Tobacco

	☐ Tobacco menthol/menthol/mint ☐ Fruit ☐ Candy, desserts, or other sweets ☐ Chocolate ☐ Alcoholic drinks ☐ Others (*please specify*): _____ ☐ Do not know/remember
56	**Where do you often use e-cigarettes?** ☐ Home ☐ School ☐ Parties/clubs ☐ Open areas (e.g., streets) ☐ Car ☐ Others (*please specify*): _____ ☐ Do not know/remember
57	**Why do you use e-cigarettes?** *(Select all that apply)* ☐ To replace traditional cigarettes or tobacco products ☐ It is less harmful to health ☐ It has a lot of flavor options ☐ For party tricks ☐ To quit traditional tobacco products ☐ Cost ☐ Using e-cigarettes looks cool ☐ Peer pressure or socialization ☐ Others (*please specify*): _____
58	**Have you ever taken an effort to quit smoking e-cigarettes?** ☐ Yes ☐ No ☐ Do not know/remember
59	**Have you ever been suggested to quit smoking e-cigarettes?** ☐ Yes ☐ No ☐ Do not know/remember
60	**Do you consider yourself to be addicted to e-cigarettes?** ☐ Yes ☐ No ☐ Do not know/remember
SECTION 5: End of Survey	

The Centers for Disease Control and Prevention (CDC) aims to provide helpful information on e-cigarettes and its harmful effects to the human body. To learn more about e-cigarettes and its associated risks, visit: https://www.cdc.gov/tobacco/basic_information/e-cigarettes/pdfs/Electronic-Cigarettes-Infographic-p.pdf.

The Department of Health (DOH), in partnership with the Philippine Lung Center and the World Health Organization (WHO) aims to promote smoking cessation through its platform "Quitline". Quitline offers both a 24-hour hotline and mobile cessation number which smokers can contact anytime. Smokers who wish to quit may call the toll free hotline number 1558 (165 – 364) or simply text 'STOPSMOKE' to 0921-203-9534 or 0977-627-7539.

Should you want to receive a copy of the findings after the completion of the study or have any concerns, kindly email the principal investigator at rianaashley.bautista.pharma@ust.edu.ph.

Thank you for your participation!

B. Identification of Internal and External Risk Factors and Perception Towards E-cigarettes Questions from the Questionnaire

INTERNAL FACTORS	
Age	What is your age?
Gender	What is your assigned sex at birth?
Intellectual Ability	During the past 12 months, how would you describe your grades in school?
Mental Health and Stress-induced Factors	During the past two weeks, how often have you been bothered by any of the following problems? (Select the best answer) 1. Little interest or pleasure in doing things 2. Feeling down, depressed, or hopeless 3. Feeling nervous, anxious, or on edge 4. Not being able to stop or control worrying
	Because of a physical, mental, or emotional condition, do you have a serious difficulty concentrating, remembering, or making decisions?
Economic Status	What is your average monthly family income?
EXTERNAL FACTORS	
Family	How were you introduced to e-cigarettes/How did you know about e-cigarettes?
	While growing up, did any of your parents/guardians/siblings smoke at home?
	What is the smoking status of your mother?
	If yes, does your mother smoke openly or discreetly?
	What is the smoking status of your father?
	If yes, does your father smoke openly or discreetly?
	Were the harmful effects of smoking ever discussed with you at school or at home?
	If you answered yes to the previous questions, what are the reasons why you choose to continue smoking?
Peers	How were you introduced to e-cigarettes/How did you know about e-cigarettes?
	Were you ever invited to smoke by your friends?
	If you answered yes to the previous question, did you accept the invitation to smoke / did you smoke?
	Were the harmful effects of smoking ever discussed with you at school or at home?

	If you answered yes to the previous questions, what are the reasons why you choose to continue smoking?
Media	How were you introduced to e-cigarettes/How did you know about e-cigarettes? (Select all that apply)
	When you are using the Internet, how often do you see advertisements or promotions for e-cigarettes?
	When you read newspapers or magazines, how often do you see advertisements or promotions for e-cigarettes?
	When you watch TV or streaming services or go to the movies, how often do you see people or characters using e-cigarettes?
	When you watch TV or streaming services or go to the movies, how often do you see advertisements or promotions for e-cigarettes?
	When you use social media, how often do you see posts or content (pictures, videos, or text) related to e-cigarettes?
	Who usually posted the content related to e-cigarettes on your social media? (Select all that apply)
	If you answered yes to the previous questions, what are the reasons why you choose to continue smoking? (Select all that apply)
PERCEPTION TOWARDS E-CIGARETTES	
Perception	How much do you think people harm themselves when they use e-cigarettes some days but not every day?
	Do you believe that e-cigarettes are (LESS ADDICTIVE, EQUALLY ADDICTIVE, or MORE ADDICTIVE) than cigarettes?
	Do you think that e-cigarettes…
	Do you think that breathing the vapor from other people's e-cigarettes causes…
	Please complete the following sentence. My friends think that e-cigarette use is…