Association between depression, anxiety, stress, and vaping among university students in Egypt

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ABSTRACT

INTRODUCTION A growing number of adolescents and young adults are vaping regularly, raising concerns about its long-term physical and mental health consequences. This study aimed to determine the association between vaping and depression, anxiety, and stress among university students.

METHODS A cross-sectional survey was conducted in Egypt in 2022 using the university website. Of the 976 university students aged 17–22 years who responded, 34.3% were female. Students were asked to complete a demographic questionnaire, questions on vaping, and items on the Depression Anxiety Stress Scales (DASS-21). Logistic regression was utilized to construct odds ratios (ORs) with 95% confidence intervals to identify the association between university students' vaping and their levels of depression, anxiety, and stress.

RESULTS Almost half of the students surveyed (47.5%) reported vaping, with a concerning 43% reporting everyday usage. Daily vaping was significantly linked to stress (OR=2.56; 95% CI: 1.97–3.31), anxiety (OR=8.32; 95% CI: 6.15–11.2), and depression (OR=6.70; 95% CI: 5.1–8.88).

CONCLUSIONS University students in Egypt experience a substantial amount of psychological difficulty during their academic life. Our findings suggest an association between vaping and mental health issues among students. Our findings may assist public health officials in enhancing young people's awareness of the consequences of vaping and implementing regulations restricting access to these products.

INTRODUCTION

Vapes, alternatively referred to as electronic nicotine delivery devices, are devices that hold a liquid cartridge that, when heated, releases nicotine as an aerosol[1]. Adolescents and young adults use vapes more than others, which presents a substantial health concern[2]. On average, teens start vaping around the age of 14 years, and the 2023 National Youth Tobacco Survey in the US on students, found that 10% of US high schoolers vape nicotine[2]. A study examined the prevalence of electronic cigarette use in Saudi Arabia, involving 3374 young individuals, and revealed that 26% of this group had tried electronic cigarettes at least once in their lives[3]. Designed to provide high, addictive doses of nicotine in appealing flavors, these easily concealed devices allow teens to use them frequently, even in supervised spaces, heightening addiction risks[4].

College students frequently report higher stress levels than individuals of other age groups[5]. Significant numbers of college students have reported experiencing elevated levels of stress and anxiety[6,7]. As university students acquire independence from their parents, learn to manage finances, balance an increased academic burden and extracurricular activities, and make career decisions, they likely experience unique stressors and demands[8]. In addition, maintaining high grades and competing with peers can contribute to their stress and anxiety levels[9]. In addition, transitioning from a familiar support system to a new social environment can be difficult for university students, contributing to their overall stress[10]. It is possible that an increase in stress, depression, anxiety, loneliness, disturbed sleep, and even thoughts of suicide might result from these pressures that occur during academic life[11,12]. According to one study, the prevalence of depression, anxiety, and tension was 75%, 88.4%, and 84.4%, respectively, among university students[13].

Vaping has been demonstrated to have several detrimental impacts on people's physical and mental health, including an elevated risk of respiratory conditions, including lung illness and asthma[14]. A larger proportion of e-cigarette and

vape users experience depression, anxiety, stress, and panic disorder than non-users in youth populations[15,16]. There is a significant association between conduct disorder, attention-deficit hyperactivity disorder, and oppositional defiant disorder and the use of e-cigarettes and vapes[17]. Moreover, the use of e-cigarettes and vapes has been linked to suicidal thoughts, depression, and attempted suicide[18].

Although the detrimental consequences of vaping on physical health have been extensively studied, the impacts on mental health, especially in young people, have received less attention. The research on the association between vaping and mental health among Arab university students still has significant gaps. Therefore, in this study, the aim was to explore the association between mental health issues and vaping among university students in Egypt. The hypothesis is that individuals who currently engage in vaping are likely to experience higher levels of stress, anxiety, and depression compared to those who have never vaped.

METHODS

Study design and participants

This study is a descriptive cross-sectional study. The study was conducted between January and September 2022 in Egypt. All participants were students at a private Egyptian university who satisfied the inclusion criteria and consented to participate in the study. The inclusion criterion was being an active student at the private University. The exclusion criterion was having psychological disorders.

Ethics

The British University of Egypt stores all student data and demographic information in a safe location. Ethical approval from the Institutional Review Board of the British University in Egypt was obtained to conduct the study (Approval number: IRB Protocol CL-2422; Date: 20 January 2022). Students at the university filled in a consent form and information sheet. They were made aware of the study's purpose, methodology, confidentiality of the data, option to join, and ability to discontinue participation at any moment. Students were informed that psychological tests would be part of the survey.

Data collection and variables

Standardized questionnaires and various questions were employed. The study data were collected and covered the following below.

Personal information

Sociodemographic, personal, family-related, social, financial, educational, health, and academic issues are all included in the inquiries. Students were also questioned about cognitive problems (difficulties remembering, attention, and concentrating), physical activity, body image satisfaction, time spent on social media, social life satisfaction, living alone or with a family, and the need for psychological services.

Depression Anxiety Stress Scales (DASS)

The students' mental health was assessed using the Depression Anxiety Stress Scales DASS[19] (see Supplementary file). Numerous researchers from a range of demographics have shown that the DASS is a self-report, validated instrument. It has been widely used in various studies to measure levels of depression, anxiety, and stress. The cutoff scores, out of a total score of 42, were as follows: 10 for depression, 8 for anxiety, and 15 for stress, derived from prior research[19]. The DASS is a reliable tool for identifying mental health issues and monitoring changes over time[20]. For the current study, the one-week test-retest stability was high (0.89). The DASS-21 has been standardized also for Egypt[21,22].

Questions about vaping

Students were asked if they vape and how often (daily, most of the time, weekly, occasionally, or never). In addition to open questions concerning reasons for vaping, their attempts to stop vaping, and the strategies they employed were asked.

Study process

The university's website was used to recruit students, and we publicized an advertisement inviting students to take part in the study. Then, we asked students who consent to participate to complete the survey at the university's counseling center. A clinical psychologist assisted by interviewing the students. Each student took around 15–20 minutes to complete the survey.

Outcome measures and data analysis

The primary outcome measures were scores on the DASS. SPSS Sample Power was employed, and statistical analysis ensured that the sample size was sufficient to detect meaningful differences in primary outcomes. A two-tailed significance test with the desired power of 0.80 and a margin of error equal to 5% were the parameters we chose based on previous research. There was 80% power to identify differences in primary outcomes with 500 participants.

The data were evaluated using the IBM SPSS Statistics, version 23 software program. Descriptive statistics (means, standard deviations, frequencies, percentages) were used to describe this sample's sociodemographic and baseline characteristics. Logistic regression was utilized to construct odds ratios (ORs) with 95% confidence intervals (95% CIs) independently to determine whether there is a connection between vaping and the likelihood of developing depression, anxiety, or stress. All main effects were deemed significant at the $p<0.05$ level of statistical significance (two-tailed).

RESULTS

Sociodemographic characteristics

There were 976 participants, 65.7% males and 34.3% females. The mean age of the students was 19.2 ± 1.4 years (range: 17–22 years). Based on vaping or non-

Table 1. Sociodemographic characteristics of vaping and non-vaping university students, a cross-sectional study, Cairo, Egypt, January–September 2022 (N=976)

Characteristics	Categories	Non-vaping n (%)	Vaping n (%)	Total n (%)	χ^2	p
Total		512 (52.5)	464 (47.5)	976 (100)		
Sex	Male	328 (33.6)	313 (32.1)	641 (65.7)	1.24	0.28
	Female	184 (18.9)	151 (15.5)	335 (34.3)		
Marital status	Single	512 (52.5)	451 (46.2)	963 (98.7)	14.53	0.000
	Married	0 (0)	13 (1.3)	13 (1.3)		
Academic year	One	78 (8.0)	32 (3.3)	110 (11.3)	19.2	0.000
	Two	343 (35.1)	359 (36.8)	702 (71.9)		
	Three	91 (9.3)	73 (7.5)	164 (16.8)		
Faculty	Psychology	0 (0)	125 (12.8)	125 (12.8)	665.7	0.000
	Communication and Mass Media	78 (8.0)	324 (33.2)	402 (41.2)		
	Pharmacy	434 (44.5)	15 (1.5)	449 (46)		
Area of residence	Rural	18 (1.8)	51 (5.2)	69 (7.1)	25.0	0.000
	Urban	482 (49.4)	392 (40.2)	874 (89.5)		
	Suburban	12 (1.2)	21 (2.2)	33 (3.4)		
Living status	Alone	12 (1.2)	94 (9.6)	106 (10.9)	80.6	0.000
	Living with family	500 (51.2)	370 (37.9)	870 (89.1)		
Any medical illness	No	489 (50.1)	402 (41.2)	891 (91.3)	24.1	0.000
	Yes	23 (2.4)	62 (6.4)	85 (8.7)		
Income	Lower than living expenses	12 (1.2)	70 (7.2)	82 (8.4)	87.8	0.000
	Equal to living expenses	307 (31.5)	316 (32.4)	623 (63.8)		
	Higher than living expenses	193 (19.8)	78 (8.0)	271 (27.8)		
Physical activity	Intensive (daily exercise)	346 (35.5)	101 (10.3)	447 (45.8)	209.3	0.000
	Average	150 (15.4)	304 (31.1)	454 (46.5)		
	Poor	16 (1.6)	59 (6.0)	75 (7.7)		
Body image satisfaction	No	332 (34)	310 (31.8)	642 (65.8)	0.41	0.54
	Yes	180 (18.4)	154 (15.8)	334 (34.2)		
Spending time on social media	Rarely	358 (36.7)	114 (11.7)	472 (48.4)	208.5	0.000
	Average	76 (7.8)	224 (23)	300 (30.7)		
	Most of the time	78 (8)	126 (12.9)	204 (20.9)		
Social life satisfaction	Rarely	152 (15.6)	115 (11.8)	267 (27.4)	29.7	0.000
	Average	360 (36.9)	324 (33.2)	684 (70.1)		
	Most of the time	0 (0)	25 (2.6)	25 (2.6)		
Experiencing cognitive difficulties (trouble in remembering, attention, concentration)	No	370 (37.9)	189 (19.4)	559 (57.3)	98.9	0.000
	Yes	142 (14.5)	275 (28.2)	417 (42.7)		
Need psychological support	No	444 (45.5)	287 (29.4)	731 (74.9)	80.1	0.000
	Yes	68 (7.0)	177 (18.1)	245 (25.1)		

Table 2. Questions about vaping, and stress, anxiety and depression scores, a cross-sectional study, Cairo, Egypt, January–September 2022 (N=976)

Variables	Categories	n (%)	Stress Mean (SD)	Anxiety Mean (SD)	Depression Mean (SD)
Frequency of vaping	Occasionally	15 (1.5)	15.7 (10.3)	6.8 (8.2)	6.8 (8.3)
	Weekly	16 (1.6)	8.3 (10.8)	4.7 (6.3)	10 (11.1)
	Most of the time	14 (1.4)	17.7 (11.8)	13 (9.3)	18 (12.2)
	Daily	419 (43.0)	18.1 (8.9)	11.3 (8.5)	16 (9.2)
Reasons for vaping	Variety of flavors such as fruits and candy	38 (3.9)	16.8 (11.1)	11.8 (9.9)	13.7 (11.0)
	Safer than cigarettes	17 (1.7)	11.5 (13.8)	4.3 (5.7)	11.5 (12.2)
	Cheaper than traditional cigarettes	344 (35.2)	17.9 (8.8)	11.2 (8.4)	15.5 (9.2)
	Peer pressure	13 (1.3)	14.3 (11.1)	11.5 (9.9)	13.8 (13.6)
	Stress relief	31 (3.2)	19.6 (8.3)	11.2 (8.3)	18.1 (7.8)
	Easy to use	21 (2.2)	20.5 (6.5)	11.3 (8.2)	19.5 (6.2)
Attempt to quit	No	203 (20.8)	17.1 (9.4)	11.1 (8.3)	15.8 (9.3)
	Yes	261 (26.7)	18.1 (9.2)	11 (8.7)	15.4 (9.6)
Strategies employed to quit vaping	Get rid of all vapes and accessories	83 (8.5)	17.3 (6.1)	9.8 (6.8)	16.5 (6.8)
	Ask people not to vape around me and avoid situations where I know people will be vaping	20 (2.0)	10.7 (11.2)	7.6 (7.8)	12.8 (11.9)
	Social and family support	322 (33.0)	17.8 (9.6)	11.2 (8.9)	14.8 (9.7)
	Meditation	14 (1.4)	16.7 (11.0)	10.4 (9.2)	17 (11.3)
	Sports	7 (0.7)	23.7 (6.4)	12.5 (9.7)	23.1 (8.9)
	Using gum	7 (0.7)	23.7 (8.9)	12 (7.5)	23.7 (10.1)
	Drinking water	6 (0.6)	21.3 (5.4)	16.3 (9.1)	21 (7.2)
	Eating fruits and vegetables	5 (0.5)	28.4 (7.9)	18.8(7.5)	23.6 (6.2)

vaping students, the sociodemographic features of each group are shown in Table 1. In terms of gender and body image satisfaction, we observed no statistically significant differences between those who vaped and those who did not.

Regarding all other study variables (including marital status, academic year, faculty, residence region, living status, income, medical history, physical activity, time spent on social media, satisfaction with social life, cognitive difficulties, and the need for psychological support), we observed statistically significant differences between those who vape and those who did not ($p<0.05$).

The effects of vaping on students' mental health

The prevalence of stress among university students was 52.2%, anxiety was 37.3%, and depression was 51.6%. Nearly half of the students surveyed (47.5%) reported engaging in vaping, with a concerning 43% reporting daily usage. Smaller subsets of students reported vaping every week (1.6%), most of the time (1.4%), or occasionally (1.5%).

Students who abstained from vaping demonstrated lower average scores in stress, anxiety, and depression relative to their vaping counterparts. The mean total stress score for the group that did not vape was 11.1 ± 10.8, and 17.7 ± 9.3 for the group who vape. The mean total anxiety score for the group that did not vape was 3.7 ± 8.5, and 11.02 ± 8.5 for the group who vape. The mean total depression score for the group that did not vape was 6.42 ± 9.8, and 15.5 ± 9.5 for the group who vape.

As shown in Table 2, the higher scores in depression, anxiety, and stress associated with increased vaping frequency are attributed to its ease of use and its provision of immediate alleviation from stress. When compared with the group that did not vape, those who vaped had significantly higher scores on stress ($\chi^2=61.8$, $p<0.00$), anxiety ($\chi^2=237.8$, $p<0.00$), and depression ($\chi^2=198.5$, $p<0.00$).

As shown in Table 3, the results of logistic regression demonstrated that daily vaping significantly increased the likelihood of self-reported psychological discomfort, using cutoff scores of 10 for depression, 8 for anxiety, and 15 for stress, out of a total score of 42, from prior research[19]. Daily vaping was significantly linked to stress (OR=2.56; 95% CI:

Table 3. Logistic regression analysis for the association between vaping and depression, anxiety, and stress, a cross-sectional study, Cairo, Egypt, January–September 2022 (N=976)

Variables	Scores	Non-vaping[a] n (%)	Vaping n (%)	Total n (%)	OR (95% CI)
Total		512 (52.5)	464 (47.5)	976 (100)	
Stress	No (0–14)	301 (30.8)	166 (17.0)	467 (47.8)	2.56 (1.97–3.31)**
	Mild (15–18)	59 (6.0)	61 (6.3)	120 (12.3)	
	Moderate (19–25)	80 (8.2)	146 (15.0)	226 (23.2)	
	Severe (26–33)	66 (6.8)	74 (7.6)	140 (14.3)	
	Extremely severe (≥34)	6 (0.6)	17 (1.7)	23 (2.4)	
Anxiety	No (0–7)	431 (44.2)	181 (18.5)	612 (62.7)	8.32 (6.15–11.2)**
	Mild (8–9)	8 (0.8)	31 (3.2)	39 (4.0)	
	Moderate (10–14)	6 (0.6)	108 (11.1)	114 (11.7)	
	Severe (15–19)	14 (1.4)	53 (5.4)	67 (6.9)	
	Extremely severe (≥20)	53 (5.4)	91 (9.3)	144 (14.8)	
Depression	No (0–9)	355 (36.4)	117 (12.0)	472 (48.4)	6.7 (5.1–8.88)**
	Mild (10–13)	6 (0.6)	45 (4.6)	51 (5.2)	
	Moderate (14–20)	107 (11.0)	206 (21.1)	313 (32.1)	
	Severe (21–27)	28 (2.9)	60 (6.1)	88 (9.0)	
	Extremely severe (≥28)	16 (1.6)	36 (3.7)	52 (5.3)	

The cutoff scores were as follows: 10 for depression, 8 for anxiety, and 15 for stress, out of a total score of 42, derived from prior research[19]. a Reference. **p<0.01.

1.97–3.31, p=0.00), anxiety (OR=8.32; 95% CI: 6.15–11.2, p=0.00), and depression (OR=6.7; 95% CI: 5.1–8.88, p=0.00)

DISCUSSION

The association between mental health issues and vaping among Egyptian university students was studied. The aim was to examine the relationship between university students' vaping and their levels of depression, anxiety, and stress. Compared to students who claimed to be non-vaping, those who reported currently vaping also had higher levels of stress, anxiety, and depression.

Our results are in line with earlier studies that found links between current vaping and stress, anxiety, and depression[15]. Moreover, comparable to previous studies[23], the findings emphasize a concerning link between vaping and adverse mental health outcomes, particularly among students engaging in daily usage. This relationship suggests that while vaping may provide momentary relief from stress, it may exacerbate underlying psychological distress over time.

Many different and complex variables contribute to the association between current vaping and depression, anxiety, and stress. Understanding this relationship involves a number of factors, including coping strategies, genetic predisposition, and societal factors[18,23,24]. Furthermore, the addictive qualities of nicotine found in vape devices may potentially play a role in the onset or aggravation of mental health conditions[25].

Our findings indicated that depression was the most prevalent condition among college students, followed by stress and then anxiety. Earlier research indicates that stress is the most prevalent condition among college students, followed by anxiety and then depression[26]. Another study indicates that anxiety is the most prevalent issue, followed by stress and depression[13].

Since there are several causes of stress and anxiety in college students, one of these causes could be associated with the COVID-19 pandemic[27,28]. Egypt's economic hardships and dense population may also be responsible for this, since they may also be factors for a high stress rate. As a member of the Arab world, Egypt faces a number of challenges. For instance, Arab governments have experienced several historical disturbances, such as the Arab Spring Wars[29].

Limitations

The study has some limitations. First, analyzing self-reported data in a cross-sectional manner limits the ability to determine the direction of effects among depression, anxiety, stress, and current vape usage. Second, this study depends on self-report; a critical limitation is the participant's ability and willingness to provide personal information related to depression, anxiety, and stress. Future research may use a larger sample of university students to investigate the

association between vaping and depression, anxiety, and stress.

The recommendations of the present study are to teach students skills that improve their emotional regulation during stressful situations and to help control their anxieties, fear, depression, and stress.

CONCLUSIONS

This study contributes to the current body of knowledge about the mental health ramifications of vaping. University students experience a substantial amount of psychological difficulty during their academic life. The findings of the present study suggest an association between vaping and mental health issues among students. Further research is needed to determine the direction of this relationship and potential underlying factors.

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DATA AVAILABILITY
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