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Assessing the Mediating and Moderating Role of Negative Feelings in the Relationship of Vaping and Physical Aggression of E-Smokers

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Keywords	Abstract
Vaping, Physical Aggression, Negative Feelings, E-Smokers.	*The study examines the impact of vaping on the physical aggression of e-smokers in Pakistani society with mediation and moderation effects. A cross-sectional research design is followed, and 152 e-smokers were recruited from different areas of Pakistan. The data was collected through adapted measures while using the snowball sampling technique with the help of the online survey method. For data analysis, including descriptive analysis, reliability analysis, correlation matrix, mediation and moderation tests, SPSS 25 was used. The test results of the reliability analysis indicated that all the measures have excellent values of Cronbach's alpha. The outcomes of the regression test showed that vaping has a positive and significant impact on the physical aggression of e-smokers, and the presence of the mediating variable (negative feelings) partially mediated this relationship, but negative feelings as a moderator have no direct effect on the link of vaping and physical aggression of e-smokers. This study has proved those negative feelings partially mediated the link between vaping and physical aggression of e-smokers. This research may help the academic researchers, public and private healthcare practitioners and policymakers in the field of psychology.*

INTRODUCTION

Tobacco cigarettes as traditional nicotine inhaling tools lead to addiction and chronic diseases like cancer. This is now a widely studied subject with proven effects on human body organs, and high-level awareness around the world is stamped, but e-cigarettes were introduced as nicotine replacement therapy that created doubts and ambiguity in the promised effects (Santoro et al. 2019).

The electronic cigarette is a smoke-inhaling device that consists of an atomiser, a power battery and a tank for the liquid with a low level of nicotine. From their introduction with a traditional cigarette-like shape, vapes are transformed to make them more attractive in their appearance, as well as their liquids and nicotine variants being subject to change and upgrades. In this respect, the e-cigarettes are categorised into four generations, i.e., cigalikes, larger, mechanical and sub-ohm tanks (Williams & Talbot, 2019).

Although the fourth-generation e-cigarette contains protonated nicotine rather than freebase and has lesser effects on human body organs, its psychological effects are visible in the youngsters using vapes. This research study is devoted to the psychological effects that are badly inducing negative impacts in the new generation (Toumbis, 2016).

The concept of e-cigarettes emerged from China in 2003, and mostly youngsters have more attraction toward this new smoking device (Xu et al., 2016). It is found in the recent era that vaping is getting hype and more popular trends among youth as a cheap and favorite smoking fashion (Arrazola et al., 2015), which contains nicotine and is considered an alternative to traditional smoking (Singh et al., 2016).

Since the advent of e-cigarettes, the majority of youngsters have shifted from traditional smoking to vaping because they believe that e-cigarettes are less detrimental to both their mental and physical health (Jackler & Ramamurthi, 2019; Cantrell et al., 2019). Vaping, a new form of substance use, is gaining popularity among young people every day (Miech et al., 2020). Basically, vaping started in 2006 (Farzal et al., 2019), and numerous studies have suggested that vaping has a substantial and adverse impact on children's aggression, attitudes, and behaviors (Wang et al., 2016; Helen & Eaton, 2018; Bjurlin et al., 2020). Easy, flavors, tastes, and other factors that attract young people to vaping were assessed by Evans-Polce et al. (2018). They found that vaping increases their pleasure and delight and triggers their feelings more than that traditional cigarette does. That’s the reason that people rely more on e-cigarettes than on traditional cigarettes. As many of the past studies have proved, vaping brings significant change in aggression, attitude and health-related behaviors in youngsters. However, insufficient research is conducted in this neglected area in Pakistan on how vaping brings change in the physical aggression of the e-smokers and how the negative feelings are affected due to exposure to vaping and how the negative feelings have direct and indirect effects on the physical aggression of e-smokers. The results of the current study will be helpful for the academicians, researchers, public and private healthcare practitioners and policymakers in the field of clinical and social psychology.

Objectives of the study

1. To assess the impact of vaping on physical aggression of e-smokers.
2. To examine the mediating role of negative feelings in the relation of vaping and physical aggression.
3. To measure the moderating role of feelings in the relation of vaping and physical aggression.

Research Questions

1. What is the impact of vaping on the physical aggression of e-smokers?
2. What is the mediating role of negative feelings in the relation of vaping and physical aggression?
3. What is the moderating role of negative feelings in the relation of vaping and physical aggression?

LITERATURE REVIEW

The consumption patterns of vaping are increasing day by day among youth all over the world, and the level of traditional smoking is down (Cornelius, 2022). The study by Jackson et al. (2020) asserted that vaping exposure causes harmful health behaviours such as poor sleep, angry feelings, and mental health issues, whereas the study by Cullen et al. (2019) pointed out that the prevalence of e-cigarettes among teenagers is rising quickly. Numerous recent research studies have focused on the relationship between youth aggression and vaping. According to Ganson et al. (2022), there is a significant relationship between vaping and e-smokers' physical aggression. Similar findings were reported by Fite et al. (2021), who found a high relationship between student vaping and physical aggressiveness. In similar lines, Tobore's (2019) study reported that vaping exposure is a strong predictor of physical aggression as well as other health problems that ultimately impact young people. According to Pan (2013), negative emotions are those that make people unhappy and uncomfortable. According to Wu et al.'s (2023) study, aggressive feelings influenced young people's decision to vape. While using complex indirect effects, Kittaneh et al. (2021) statistically confirmed the relationship between vaping and negative feelings. It was found that vaping significantly affects e-smokers' negative feelings; at this point the relationship is significant owing to the involvement of other factors. Further, previous research suggests that negative feelings are a strong predictor of youth smoking initiation (Leventhal et al., 2015), leading to the conclusion that a high degree of negative feelings increased the desire to smoke. Moreover, the study of Judy et al. (2025) indicated that there is no link between vaping and any type of delinquency of youngsters. The study by Ganson et al. (2022) also found that there is a positive and significant relationship between vaping and aggression in youth having exposure to e-cigarettes. With the help of survey-based data, it was found that vaping is directly linked with aggression of smokers, and it was also found that demographics also played a significant role in this relationship (Hansen et al., 2021). In addition, the study of Grimo et al. (2025) also indicated that vaping is a strong predictor of aggression in smoker youth, which leads to some sort of bullying. According to most of the earlier research, vaping significantly impacts children's attitudes, aggression, and health-related behaviours. However, little study has been conducted in this understudied area of Pakistan on how vaping affects e-smokers' physical aggression, how vaping exposure affects their negative feelings, and how these negative feelings both directly and indirectly affect e-smokers' physical aggression. Thus, this study analyses the impact and relationship between vaping and e-smokers' physical aggression. Academic researchers, practitioners in both public and private healthcare, and policymakers working in the field of psychology may find the study's findings useful.

Hypotheses of the Study

H_1. Vaping has a positive and significant impact on the physical aggression of e-smokers.

H_2. Negative feelings partially mediate the relationship of vaping and physical aggression of e-smokers.

H_3. Negative feelings negatively moderate the relationship between vaping and physical aggression of e-smokers.

MATERIAL AND METHODS

The cross-sectional survey research design is used in this study to collect up-to-date and fresh data. The current study focuses on documenting the views of the people concerning exposure to e-smoking with different demographic statuses. There are four sections in the data collection tool, and the initial part is about the demographic profile of the e-smokers. This part covered the information about gender (male: female), age (18-37), education (BS-PhD), and area (urban-rural). “Exposure to Vaping” is an independent variable, and this scale is taken from the study of Soule et al. (2020). This scale has 10 items and an alpha value of .91 and is measured through a 5-point Likert scale. The second variable is Physical Aggression”, which is dependent in nature, and this scale is taken from Buss and Perry (1992), and the alpha value of this scale is .92 and measured through a 5-point Likert scale. In the mediating and moderating variable, the negative “feeling” is taken from the PANAS (Watson et al., 1988) and has 10 items with an alpha value of .86 and is measured through a 5-point Likert scale.

Sample Size and Sampling Technique

In Pakistani society, the current study is unique because not many people are exposed to vaping. It was challenging to find a large sample size; thus, 200 respondents were contacted using the snowball sampling technique, as suggested by Baltar and Brunet (2012). Of these, only 152 completed the questionnaire, meaning that there are 152 people who have been exposed to vaping. Other than that, sampling techniques might be employed to collect data, but they are less reliable because of the possibility of bias in the data. This makes it one of the most relevant methods to collect data for this type of study.

Data Collection Method

An online survey was developed on Google Docs following a thorough review of the study's adopted and adapted measures. The study's measures, including all of the items and scoring, are explained in detail. Concerned respondents were given access to a thorough recheck of the data collected from the online survey. Therefore, an online survey was used to collect the data. Additionally, data was gathered in May and June of 2023 from respondents who resided in different Pakistani cities, keeping in view the needs and requirements of the study design. Respondents did not need to be from a particular region of the country.

RESULTS

The data was imported into SPSS-25; the outliers were checked out and deleted from the sheet. Descriptive analysis was used to examine the demographic variables. Cronbach's alpha values were tested using the reliability analysis. Next, the relationship between exogenous factors was examined using a Pearson correlation test, and the direct and indirect effects were examined using mediation and moderation tests. Four different tables were used to present the results.

Table 1: Demographic Characteristics of Respondents

Variable	Category	f(%)	Mean	SD
Gender			1.13	.332

	Male	133(87.5)		
	Female	19(12.5)		
Age			3.04	.788
	18-22	4 (2.6)		
	23-27	32(21.1)		
	28-32	70(46.1)		
	33-37	46(30.3)		
Education			2.13	.519
	BS	12 (7.9)		
	Masters	109 (71.7)		
	MS	31(20.4)		
Area			1.09	.281
	Urban	139(91.4)		
	Rural	13(8.6)		
Total		152 (100.0)		

The demographic information of the respondent showed that 133 (87.5%) are male, while 19 (12.5%) are female. It is evident from the data that 4 (2.6%) are in the age group of 18-22 and 32 (21.1%) are in the age group of 23-27. Moreover, 70 (46.1%) are in the age range of 28-32, and 46 (30.3%) are in the age range of 33-37. 12 (7.9%) respondents completed BS-level education, and 109 (71.7%) completed master's-level education. In addition, 31 (20.4%) have completed an MS level of education. The data further revealed that 139 (91.4%) belong to urban areas and 13 (8.6%) belong to rural areas.

Table No 2: Correlation among Exogenous Variables

	VP	**PH**	**NF**	**M**	**SD**	**Skewness**	**Kurtosis**
VP	1			36.68	7.88	-.765	-.800
PH	.801**	1		24.45	6.66	-.606	-1.070
NF	-.823**	-.740**	1	19.36	5.39	1.35	1.03

Note: VP=Vaping; PH=Physical Aggression; NF= Negative Feeling;*$p \leq 0.01$;

The univariate analysis indicated that there is no issue of normality of data, and the values of skewness and kurtosis are between ±1.5. Moreover, elliptical distribution is observed, and the data set meets the multivariate normality assumptions. In addition, the correlation coefficient results showed that there is a significant relationship that exists among all the variables at the level of *$p \leq 0.01$. The outcome of the test indicated that vaping has a positive and significant relationship with the physical aggression of e-smokers as indicated by (r=.801), and vaping has a highly negative but significant relationship with negative feelings (r=.-823).

Table 3: Mediation Analysis

Effects	**Paths**	**B**	**T**	***P***	**ULCI**	**LLCI**
Total Effects	VP→PA	.67	16.406	.000	.5955	.7586
Direct Effect	VP→PA	.50	7.104	.000	.3627	.6421

Indirect Effects	VP→NF→PA	.17	.0510	.3109

Note: β= path coefficient; *$p \leq .05$; LLCI; Lower Limit Confidence Interval; ULCI= Upper Limit Confidence Interval

Table 3 indicated the test results of mediation analysis, which was run to check the mediating role of negative feelings (NF) between the linkage of vaping (VP) and physical aggression (PA) of e-smokers. The outcomes of the mediation test revealed that the total effects of vaping on physical aggression were positive and significant (β=.677; t=16.40; *p*>.000), and it also exposed that the direct effects of vaping (VP) on physical aggression were positive and significant (β=.50; t=7.10; *p*>.000). After the adding of the mediating variable of negative feelings, the relationship between vaping and physical aggression was positive and significant (β = .17; ULCI = .0510; LLCI=.3109; *p*>.05), which means that in the presence of the mediating variable (negative feelings), vaping has a positive and significant impact on the physical aggression of e-smokers. So, negative feelings partially mediated this relationship. In addition, direct and indirect effects are significant, so the mediating variable partially mediates the relationship.

Table 4: Moderation Analysis

Paths	B	T	*P*	ULCI	LLCI
VP→PA	1.56	5.45	.000	.9603	2.052
NF→PA	.807	3.20	.001	.3100	1.304
Int_1	-.013	-1.176	.241	-.0353	.0900

Note: β= path coefficient; *$p \leq .05$; LLCI; Lower Limit Confidence Interval; ULCI= Upper Limit Confidence Interval;

Model no. 1 suggested by Hayess was used for examining the moderating effect of negative feelings (NF) on the relationship of vaping (VP) and physical aggression (PA) of e-smokers. The test outcomes of model 1 of Hayess indicated that negative feelings negatively moderate the relationship between vaping (VP) and physical aggression (PA) of e-smokers. As the table indicated, the higher the level of negative feelings, the weaker the relationship. Moreover, the outcome of the interaction term indicated that (β=-0.13; ULCI=--.0353; LLCI=-.0900; *p*>.05).

DISCUSSION AND CONCLUSION

The main focus of the current study was to examine the impact of vaping on the physical aggression of e-smokers with the mediating role of negative feelings and the moderating role of negative feelings. Accordingly, a new gap is identified in this context by reviewing previous studies. Chadi (2019) reported that vaping has a significant impact on smokers' mental health (aggression, attitudes, and emotions), which is in line with the current study's findings. Similarly, Liu et al.'s (2023) study findings show that use of substances is a significant predictor of youth physical aggression and aggressive behaviours (Jackson et al., 2020). In addition, the study outcomes of Ganson et al. (2022) and Fite et al. (2021) are in line with the current study findings of the hypothesis. It is also evidenced by the study of Sklenarik et al. (2024) that e-cigarette prevalence is strongly linked to stress and depressive symptoms and is a strong predictor of vaping. Similarly, the study of Kang and Malvaso (2024) found that e-cigarettes are predictors of change in the level of mental health of youngsters. Svicher (2018); Langdon et al. (2018); Mallet et al. (2019); and Erhabor et al. (2023) supported the current notion that smoking

has a significant relationship with the negative feelings and physical aggression of the smokers, but these studies are in the context of traditional smoking, not vaping. Few studies have supported that vaping has a significant link with physical aggression, but a proper study which has tested the mediating role of negative feelings is still absent. So, the current study found that negative feelings partially mediated the link between vaping and physical aggression of young e-smokers, but negative feelings as a moderator have no direct and significant impact.

Moreover, by using quantitative methods and online survey research design, the utmost objective of the study is to check the impact of vaping on the physical aggression of e-smokers with the mediating and moderating role of negativity. The statistical analysis of the data has shown that vaping has positive and significant effects on physical aggression and negative feelings partially mediated by this relationship. Whereas negative feelings act as moderator weekend and negatively moderate the relationship between vaping (VP) and physical aggression (PA) of e-smokers. Furthermore, the current study makes a notable contribution in the context of vaping and physical aggression of e-smokers. As this model is untested in past studies, and with the addition of mediating and moderating variables, this study contributed new knowledge and information in academia as well as in the field of substance use.

Implications and Recommendations

The study is important for parents, educators, medical experts, and government agencies because it suggests ways to prevent teenagers from vaping. The study's limited sample size and cross-sectional research design may limit its generalizability. Future researchers should therefore employ a large, generalizable sample size and a longitudinal study approach. It is recommended as well to employ a variety of demographic characteristics for studying the relationship between vaping and physical aggression among e-smokers. More complex models and untested vaping-related factors should be explored in future studies. Researchers should develop intervention programs that reduce e-smoking behaviors, and parents should be aware of their children's vaping behaviors. It is recommended that governments implement policies prohibiting e-cigarettes in educational institutions.

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