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Research Paper

Impulsivity and Vaping Dependence in Young Adults: A Comparative Study of Vapers and Non-Vapers

Himani Gawri[1]*, Dr. Puneet Sandhu[2]

ABSTRACT

Background and Objectives: The use of E-cigarettes is increasing among young adults at an alarming rate. It was observed that high impulsivity levels are associated with the initiation of e-cigarette use at an early age. Additionally, it was found that individuals with high impulsivity levels are more likely to develop dependence on usage of e-cigarettes i.e. vaping. The objective of this study is to explore the association between impulsivity and vaping dependence and also to explore the difference between impulsivity levels among vapers and non-vapers. **Methods:** The present study includes a sample size of 200 young adults, aged between 18 to 30 years, from different urban and sub-urban areas of North India. The objective of this study is to explore the association between impulsivity and vaping dependence and also to explore the difference between impulsivity levels among vapers (n=100) and non-vapers (n=100). **Results:** The study finds a moderate positive correlation between impulsivity and vaping dependence ($r=0.398$, $p<0.001$). Additionally, impulsivity levels are higher among vapers compared to non-vapers ($p<0.001$). **Conclusions:** The findings highlight impulsivity as a significant psychological factor associated with vaping behaviour among young adults, suggesting its relevance as a target for prevention and intervention strategies.

Keywords: *Impulsivity, Vaping Dependence, Young Adults, E-Cigarette Use, Nicotine Dependence, Clinical Psychology*

Vaping is the use of electronic cigarettes, which are "devices that typically emit an inhalable aerosol, often containing nicotine, flavorings, and other chemicals" (Creamer et al., 2019). Unlike other cigarettes, the devices used in the case of vape and e-cigs are customizable, which is an added advantage and hence leads to an increased rate of consumption. E-cigs are considered to be less harmful, and hence their popularity among the young generation is on the rise (Paek et al., 2014).

The popularity of electronic cigarettes among the adolescent age group is on the rise worldwide. At the age of puberty, the influence of peers is also significant, and hence the rate of consumption is high. (Kurdi et al., 2021). The public health sector is alarmed by the

[1]B.Sc. Clinical Psychology Student, Chitkara School of Psychology and Counselling, Chitkara University, Punjab, India.
[2]Assistant Professor, Chitkara School of Psychology and Counselling, Chitkara University, Punjab, India.
*Corresponding Author

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growing rate of dependency on the use of electronic cigarettes, especially among the young adult age group, as this is considered to be the sensitive age group.

Considering the growing rate of popularity, with the increase in the rate of consumption of vape, the long-term effects, whether psychological or physiological, have increased over the years. The health hazards and the side effects of the use of electronic cigarettes have already been documented by this time. The relationship between the use of electronic cigarettes was found to be related to issues like asthma, lung injury, and an increase in the levels of inflammation and oxidative stress, which is considered to be a great risk factor for the occurrence of atherosclerosis. (Kurdi et al., 2021). Apart from the physiological effects, the psychological effects have also been documented. The relevant literature suggests that the people found to be dual consumers of nicotine and cannabis are not only found to be more impulsive but also have more depression and anxiety symptoms as compared to all other consumers. (Shortrede et al., 2021).

Considering this, it becomes significant to consider various behavioral factors associated with the dependence on vape. It is imperative to study the association of the dependence on vape with various behavioral factors like impulsivity, which is a personality trait characterized by sudden, unthoughtful actions. Impulsivity is associated with various substance-use behaviors. It can be considered a primary factor in the initiation and continuation of various substance-use behaviors. Impulsivity is considered to be a proneness to act on impulse without taking consideration for any negative consequences (Moeller et al., 2001). This is to be one of the main points for consideration while studying the dependency on vaping. The behavioral factors of impulsivity considered here are acting without thinking, which can be considered to be associated with other behaviors like trying new flavors of e-cigarettes and trying new devices. An increased number of flavors and devices can position youth in proximity with products that they find attractive and thus can increase the probability of continued use of them. This is supported by previous researches that have found that high levels of impulsivity can be associated with more flavors and devices of e-cigarettes ever used and increased frequency of using them, i.e., number of days. (Davis et al., 2022)

It was observed that the youth tends to have more impulsiveness as compared to other age groups and are more likely to initiate the use of e-cigarettes (Leventhal et al., 2015), and the more likely they are to initiate the use of e-cigarettes at an early age (Bold et al., 2017), the more likely they are to be using e-cigarettes (Audrain-McGovern et al., 2021; Hanewinkel & Isensee, 2015; Wills et al., 2015). This usage may further lead to getting dependent on it. Another study states that dual users of nicotine and cannabis vaping are high in impulsiveness and depression and anxiety symptoms (Shortrede et al., 2021). A study on the relationship between mood, cannabis and alcohol use examined the relationship between impulsivity and mood and cannabis and alcohol use and found that high impulsivity eliminated the effect of mood on alcohol use, indicating the importance of impulsivity in substance use and abuse. (Fox, 2023). In light of the above findings**,** after understanding the growing craze among the youth to use vape, the need to explore the relationship between impulsiveness and the use of vape is the need of the hour. The literature suggests that impulsiveness is related to the number of e-cigarette flavors, the number of e-cigarette devices, and the number of days of e-cigarette usage (Davis et al., 2022). However, the relationship between impulsiveness and the dependence on the use of vape is yet to be explored. Although, the previous studies have shown the relationship between impulsiveness

and other substance use, the relationship between impulsiveness and the dependence on the use of vape and the comparison between the impulsiveness levels in the case of vapers and non-vapers is yet to be explored.

In order to fill this gap, therefore, this study seeks to establish whether the relationship is vice versa too and whether impulsiveness is induced due to an increase in the use of vape. This study seeks to find out whether individuals with high impulsiveness are more likely to develop dependency on vaping and whether dependency on vaping induces impulsiveness. To achieve this, other confounding factors such as the age, gender, socio-economic status, and place of residence of the participants will be taken into consideration.

METHODS

Participants and Procedure

A sample of 200 young adults ranging from 18 to 30 years was collected from different urban and sub-urban areas in North India. The participants were collected through the convenience sampling method and the snowball sampling method. A google form was sent to various people and they sent it to the people related to them and known to them. The data was collected through the online survey method and the data collection method was convenient, cost-effective and private.

All the participants were explained the details of the study, and their consent was taken before the data collection. Ethical approval for the study was obtained from the concerned Institutional Human Ethical Committee.

Measures

Vaping dependence

Vaping dependence was measured through the Penn State E-Cigarette Dependence Index (PSECDI). The scale was developed to assess the dependence on nicotine through all types of nicotine products. The scale consists of 10 items related to the frequency, amount, craving, withdrawal, need, control and time of first use after waking. The items are scored on the scale to find the total score ranging from 0 to 20, which indicates the degree of dependence on nicotine/electronic cigarettes, ranging from low, moderate and high dependence. The PSECDI has demonstrated good reliability and validity in previous research, supporting its use in assessing e-cigarette dependence among users. (Foulds et al., 2015).

Impulsivity

The impulsivity levels were measured through the use of the Impulsive Behavior Scale-8 (I-8), a reliable scale for assessing important aspects of impulsive behaviors. This scale contains eight items reflecting four factors associated with impulsivity including urgency, lack of premeditation, lack of perseverance and sensation seeking. Answers are obtained using a 5 - point Likert scale, where the higher the scores, the higher the level of impulsivity exhibited by individuals. The scale has shown adequate validity and reliability, showing a four-factor construct and correlations with other relevant psychological traits. The translated version into English has been fully validated (Groskurth et al., 2022).

Demographic Information

Demographic information such as age, gender, area of residence, vaping status and socio-economic status was collected using a self-reported structured questionnaire.

Analyses

- Descriptive statistics such as frequencies, percentages, means, and standard deviations for variables such as age, gender, area of residence, vaping status, socio-economic status and the score for Impulsive Behavior Scale – 8 (I-8) and Penn State E - Cigarette Dependence Index (PSECDI) were calculated.
- Before carrying out inferential statistical analysis, assumptions of normality, homogeneity of variance and linearity were checked using Shapiro-Wilk test, Levene's test and scatter plots. The data met all assumptions for carrying out inferential statistical analysis.
- Independent Sample T-test was conducted to determine if there was a significant difference in the means of impulsiveness levels between vapers and non-vapers.
- Pearson's Correlation Coefficient was used to check for the strength and direction of the linear relationship between impulsiveness and dependence on vaping.
- The significance level for all statistical tests was set at 0.05. The results with a p-value lower than 0.05 were considered to be statistically significant.
- At the beginning of the google form, the participants were given an information sheet about the purpose of the study, the need to give informed consent to participate in the study, and the rights of the participants to withdraw at any time. Only the participants who gave informed consent were allowed to participate in the study.
- No identifiable information was collected. The study was used for academic purposes. Permission to use the Impulsive Behavior Scale - 8 (I-8) and Penn State E - Cigarette Dependence Index (PSECDI) was sought and granted by the authors.

RESULTS

Descriptive statistics for the demographic and study variables are shown in Table 1. Means and standard deviations were calculated. These were useful in understanding the nature of the sample. The values of skewness and kurtosis declare the normal distribution of the data.

Table 1 Descriptive Statistics for Demographic Variables

Statistic	Age	Gender	SES	Area of Residence	VD	Impulsivity
Mean	1.48	1.43	2.36	1.09	0.51	24.10
SD	0.66	0.50	0.80	0.30	0.50	4.70
Skewness	1.04	0.03	1.13	3.42	-0.02	-0.32
Kurtosis	-0.07	-1.93	0.94	11.70	-2.02	3.36

Note. SES = socioeconomic status; SD = standard deviation; VD = vaping dependence.

The group descriptives for the impulsivity scores of the vapers and the non-vapers are shown in Table 2.

Table 2 Group Descriptives for Impulsivity Scores

Group	N	Mean	SD	Mean difference	t	p	cohen'd
Vapers	100	25.60	4.67				
Non – Vapers	100	22.60	4.26	2.97	t(198) = 4.69	<0.001	0.66

Note. SD = standard deviation.

An Independent sample t-test was conducted to find out whether there is a statistically significant difference in the impulsivity levels of the vapers and the non-vapers. The results revealed a significant difference in the impulsivity levels of the vapers (Mean = 25.60, SD = 4.67) and the non-vapers (Mean = 22.60, SD = 4.26), t (198) = 4.69, p<0.001, Cohen's d = 0.66. These findings suggest that vapers exhibit significantly higher levels of impulsivity compared to non-vapers.

A Pearson correlation analysis was done to find out the relationship between impulsivity and vaping dependence among the vapers. The results revealed a moderate positive correlation between impulsivity and vaping dependence (r = 0.398, p < 0.001), indicating that as impulsivity increases, the level of vaping dependence also increases among the vapers.
The correlation results are shown in Table 3.

Table 3 Correlation between Impulsivity and Vaping Dependence

Variables	r	p
Impulsivity and Vaping Dependence	0.40	<0.001

Note. r = Pearson correlation coefficient; analysis conducted among vapers (n=100).

Figure 1 demonstrates a scatterplot showing the positive linear relationship between impulsivity and vaping dependence among vapers.

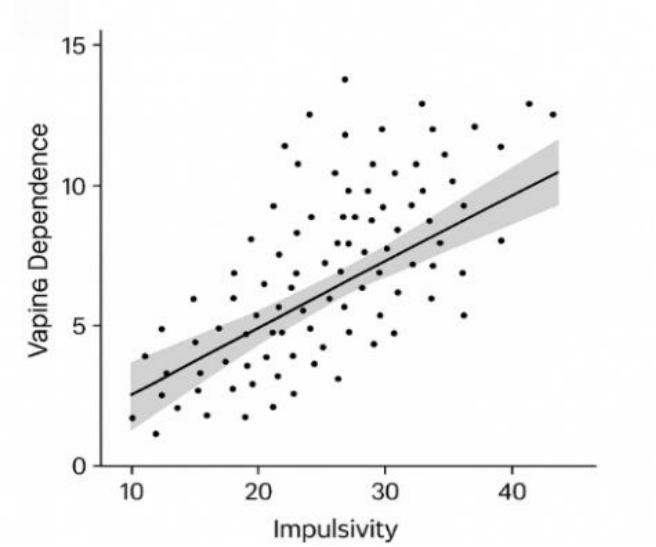

Figure 1 Scatterplot showing the positive linear relationship between impulsivity and vaping dependence among vapers.

DISCUSSION

The present study aimed to explore the relationship that exists between impulsivity and vaping dependence among young adults, as well as to examine the levels of impulsivity that exists among vapers and non-vapers. The findings of the study indicate that impulsivity plays a significant role in vaping behaviour.

The results reveal that vapers exhibited a significantly higher level of impulsivity as compared to non-vapers. This indicates that individuals with high impulsivity levels are likely to participate in vaping behavior. Individuals with high impulsivity levels are likely to

act without thinking about the outcomes that may occur after a particular action. This may make them highly susceptible to vaping behavior, as vaping is a behavior that may be started and maintained without any consideration for future outcomes. The results obtained are also consistent with those obtained in previous studies, indicating that impulsivity is related to arrangement in risky health behaviors such as substance use, including vaping (Doran et al., 2009; Leventhal et al., 2015). The high impulsivity levels that are observed among vapers may indicate a proneness to instant gratification and risky behaviors, which are commonly involved in addictive behaviors (Evenden, 1999).

The results also show a moderate positive correlation that exists between impulsivity and vaping dependence among vapers. This indicates that as impulsivity levels among vapers increase, the level of dependence that exists, also increases. This is an indication that impulsivity plays a significant role in vaping behavior, as it is a potential psychological factor that may contribute to the continuation and maintenance of vaping behavior. The results obtained are consistent with the dual-systems theory of adolescent risk-taking, which postulates that impulsivity and sensation-seeking tendencies may override cognitive control in decision-making among young people and young adults (Steinberg, 2008). Vaping may function as a coping mechanism as well as a source of immediate gratification, therefore, being appealing to individuals with elevated impulsivity traits.

The analysis of the scatterplot result in a significant upward trend, which visually validates the presence of a linear relationship between the variables. This type of correlation is consistent with the findings of the previous study (Audrain-McGovern et al., 2009; Mittal et al., 2020), which visually conveys the idea that a greater level of impulsivity can forecast a greater level of risk of developing a nicotine dependence.

Overall, the findings of the present study contribute to the growing body of literature emphasizing the importance of psychological traits, especially impulsivity, in understanding substance use behaviors like vaping and suggest its relevance as a key target for the development of effective prevention and intervention strategies.

LIMITATIONS AND STRENGTHS

Limitations

The findings of the present study should be viewed with certain limitations.

First, the measures of impulsivity and vaping dependence are based on self-report measures and are therefore susceptible to certain biases like social desirability bias and memory and reporting bias. Second, the study is based on a group of young adults between the ages of 18 and 30 and has been conducted by using a non-random sampling technique like convenience and snowball sampling with quota sampling. Thirdly, data was collected using an online survey method, which has an underlying assumption that one has access to internet facilities and digital literacy, thus potentially eliminating some participants from rural areas. Lastly, the research utilized the 8-item short form of the Impulsive Behavior Scale - 8 (I-8). Though this has been proven to be an effective tool, some impulsivity aspects might be left out, given that there is a longer form of this scale.

Strengths

Despite these limitations, the study has a number of important strengths.

The use of standardized and psychometrically validated scales helps to improve reliability and validity. The study includes participants who vape and those who do not vape, and they

are represented equally in the study. The study also deals with a critical public concern, and there is a lack of literature on vaping behavior among young adults in India. Furthermore, the study has employed appropriate statistical tools and has a relatively adequate sample size, which helps to improve its robustness.

CONCLUSIONS

The present study aims to examine the relationship between impulsivity and vaping dependence among young adults. The findings reveal that vapers have significantly higher levels of impulsivity compared to non-vapers, and a moderate positive relationship is seen between impulsivity and vaping dependence.

Individuals with higher levels of impulsivity tend to seek immediate gratification and take risks, and such individuals might be more likely to engage in vaping behavior. The findings are in line with previous researches, which have shown that impulsivity plays a critical role in substance use behavior (de Wit, 2009; Moeller et al., 2001). A study also revealed a positive relationship between impulsivity and vaping dependence, and such a relationship might indicate deficits in self-regulation and executive functions, which are also related to substance use behavior (Bickel, 2012). In an applied sense, this study suggests an early identification of individuals who are high in impulsivity can prevent the development of the habit of vaping. Additionally, as vapers exhibited higher impulsivity, targeted interventions focusing on impulse control and self-regulation may support efforts to reduce vaping dependence and facilitate cessation.

In conclusion, the study contributes to the body of literature that has been building the relationship between personality traits, including impulsivity and addictive behaviors. Future studies can improve the research approach by using longitudinal research designs and more comprehensive research tools to examine the causal relationship between impulsivity and vaping dependence.

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Conflict of Interest
The authors declare no conflict of interest.

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