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**Impulsivity, Sensation-Seeking, Emotional Neglect, and Delinquent Behavior among Pakistani E-cigarette Users**Fahama Qamar<sup>1</sup>, Ansa Quratulain<sup>2\*</sup>**Abstract**

In a world where smoke meets innovation, a sizzling trend has taken the stage by storm - E-cigarettes! As these sleek devices spark fascination and controversy alike, the rising wave of vaping and its electrifying impact on society is equally enormous. E-cigarette usage continues to grow in Pakistan and there is a scarcity of research examining the specific psychological factors associated with delinquent behavior among users. Therefore, this study investigates the influence of impulsivity and sensation-seeking on delinquent behavior among Pakistani E-cigarette users, while examining the mediating role of emotional neglect. Using a cross-sectional approach, data were collected from a sample of Pakistani E-cigarette-using adolescents aged 11-19 years old. The research employed questionnaires such as Barrat's Impulsivity Scale (BIS), Brief Sensation Seeking Scale (BSSS), revised Self-reported Delinquency Scale (SRDS), and Emotional Neglect Scale (ENS) to gather quantitative data, respectively. Statistical software (SPSS) was used to analyze quantitative data. The findings reveal a significant positive correlation between sensation seeking and impulsivity and sensation seeking and delinquency. However, with delinquency, impulsivity had an insignificant, positive relationship. Moreover, emotional neglect was found to mediate the relationship between impulsivity and delinquent behavior. However, no mediation was found between sensation seeking and delinquent behavior. In conclusion, the current study provides valuable insights into the predictive role of impulsivity and sensation-seeking in delinquent behavior among Pakistani E-cigarette users. The mediating role of emotional neglect highlights the complex interplay between individual characteristics and environmental factors in the context of E-cigarette use and delinquency.

**Keywords:** Delinquent Behavior, E-Cigarette Users, Emotional Neglect, Impulsivity, Sensation Seeking

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**Introduction**

Recently, E-cigarette use has surged in popularity among young adults globally. Vaping by any other name is still the same

device – an e-cigarette by any alias. In Pakistan, E-cigarettes are heavily promoted. In many stores and supermarkets in Pakistan's major cities, including Karachi, Lahore, and Islamabad, electronic cigarettes are sold to people of all ages. Many tobacco businesses openly promote these new tobacco products to Pakistani young because there is no legislation governing E-cigarettes (Khan, 2015). Considering this, the Pakistan Medical Association (PMA) has raised several concerns about health risks and advocated for stricter regulations (Sarfraz et al., 2018).

Studies suggest various short-term and long-term physical and psychological effects of e-

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cigarette usage. Some research suggests that e-cigarettes may have harmful effects on the respiratory and cardiovascular systems and may also serve as a gateway to traditional cigarette use (Miyashita & Foley, 2020; Zhang et al., 2018). Others suggest that E-cigarettes can serve as a gateway to traditional cigarette use, particularly among young people who may become addicted to nicotine through e-cigarette use (Chapman et al., 2018). In addition to this, some behavioral disturbances are also reported including delinquent behaviors among adolescents (Moreno et al., 2014).

Delinquent behavior is a widespread issue in society, with impulsivity and sensation-seeking identified as key factors driving illicit behavior. Delinquent behavior encompasses a wide range, from vandalism to aggression and violence at school (Moreno et al., 2014). Although some level of criminal behavior may be a normal part of adolescence, repeated or continued delinquency can have serious consequences, such as legal sanctions, social stigma, and imprisonment (Kim & Fletcher, 2018). Delinquent behavior can result in mental health issues and social isolation. It is recognized as a significant social problem with both immediate and long-term effects on individuals (Moffitt et al., 2002; Nilsson & Estrada, 2011). Adolescent delinquency harms individual human capital accumulation, leading to reduced academic achievement, higher school dropout rates, and fewer completed years of education (Hirschfield, 2009; Hjalmarsson, 2008; Ou et al., 2007). Contributing factors to delinquent behavior include poor family relationships, school challenges, peer pressure, and psychological and behavioral issues (Mohideen et al., 2016).

Among behavioral issues, impulsive behavior can stem from various factors such as genetic predisposition, environmental stressors, and psychological conditions like

ADHD. While spontaneity can be adaptive, excessive impulsiveness can have adverse effects on relationships, careers, and mental health. High levels of stress and anxiety can also contribute to impulsive behavior as a coping mechanism. However, unchecked impulsivity can lead to financial issues, substance abuse problems, difficulties in maintaining relationships, and social isolation (Cacioppo & Cacioppo, 2014; Simon et al., 2021; Winstanley et al., 2006). Also, it may lead an adolescent towards delinquent behavior.

Impulsivity interacts with risk factors for delinquency and antisocial conduct. In economically underprivileged youth, impulsivity increases the likelihood of delinquency (Meier et al., 2008). Impulsivity also moderates the relationship between drug use and risky sexual behavior, with higher impulsivity levels associated with a higher likelihood of engaging in unsafe sexual practices during drug use (Semple et al., 2005). Impulsivity is strongly linked to psychiatric disorders like personality disorders, substance use disorders, and bipolar disorders, with biological substrates playing a significant role.

In Pakistani literature, several studies investigated the relationship between impulsivity and various psychological factors among adolescents. A study by Masood et al. (2018) compared Pakistani adolescent suicide thinkers and non-thinkers on anger, impulsivity, and academic stress. Significant differences were found between the groups, with anger, impulsivity, and academic stress identified as significant positive predictors of suicide ideation. Another study in Karachi focused on art therapy's efficacy in reducing impulsive behaviors among children with comorbid ADHD and Intellectual Disability (ID). The experimental study showed that art therapy sessions helped in controlling impulsive behaviors in these children (Habib & Ali, 2015). Hence, it is vital to develop and

validate accurate measures that capture its core nature. These measures should be tested on ideologically neutral models to ensure reliability and validity for further research on impulsivity treatment (Moeller et al., 2001). In addition to impulsivity, adolescent egocentrism may lead to risk-taking behaviors, with sensation-seeking being a significant predictor of delinquent behavior (Greene et al., 2000). Peer deviance and inadequate parental supervision mediate the impact of sensation-seeking and parental supervision on adolescent delinquency (Mann et al., 2015). Two indigenous studies explored different aspects of adolescent behavior. The first study focused on sexting among young adults, finding a positive association between sexting, emotional promiscuity, and sexual pleasure seeking. Sexting was significantly predicted by the desire for sexual gratification, and women reported higher rates of sexting (Bilal, 2021). The second study found that sensation-seeking and peer influence independently predicted risk-taking behavior in adolescents, with no significant interaction between the two. Gender differences were observed in the study (Siraj et al., 2021).

Furthermore, emotional neglect, a form of parental neglect impacting emotional well-being, can also exacerbate the impact of impulsivity and sensation seeking (Cohen et al., 2017). Emotional neglect is a pattern of inadequate emotional support and care towards a child or dependent adult, leading to lasting effects on emotional and social development. It can result in low self-esteem, challenges in forming healthy relationships, and increased vulnerability to mental health issues like depression and anxiety later in life (Bolger et al., 1998; Lee et al., 2018; Lippard & Nemeroff, 2020; Nanda et al., 2015). Emotional neglect has long-lasting detrimental effects on adolescents, including poor academic performance, low self-esteem, anxiety, depression, and substance abuse

(Cohen et al., 2017; Hadland et al., 2015; Jessar et al., 2017). Additionally, studies have shown that emotional neglect in teenagers differs significantly across the sexes. Boys typically perceive more emotional abuse than girls (Hagborg et al., 2017).

Hence, emotional neglect can lead to an emotional void, making individuals more prone to impulsivity and seeking excitement through socially unacceptable or criminal behaviors. On the other hand, some individuals who experience emotional neglect may develop coping strategies to control their impulses, find healthier ways to achieve their goals and foster stable emotional well-being. An indigenous study in Pakistan on street children found a significant proportion showing high levels of impulsivity, overt aggression, immaturity, helplessness, withdrawal, inadequacy, and depression (Iqbal, 2012). Another inquiry revealed that addicts were more likely to have experienced emotional neglect, severe emotional abuse, and severe physical abuse during childhood compared to non-addicts (Ashraf & Moaz, 2013). In a related study, emotional neglect and self-harming behaviors were found to fully mediate the relationship between family satisfaction and depressive symptoms among college students (Saleem et al., 2021).

Thus, impulsivity leads to rash actions and a lack of consideration for consequences (Barratt, 1993), while sensation seekers actively pursue intense experiences (Zuckerman, 1994). Both traits have been linked to a higher likelihood of engaging in criminal activities. Prior research has shown that e-cigarette usage is positively correlated with sensation seeking (Hoffmann, 2021; Krishnan-Sarin et al., 2015), and flavored e-cigarettes are linked to increased teen vaping (Leventhal et al., 2015). Emotional neglect, in addition to this, has also been suggested to affect delinquent behavior. So, adolescents

engaging in initial minor delinquent acts may escalate to more serious and harmful behaviors if not addressed promptly (Almutham et al., 2019).

Therefore, this study was proposed to fill the research gap in this area and provide insights to mitigate e-cigarette use and its associated adverse effects in young Pakistani adults. Conducting such a study in a Pakistani context is essential for understanding unique cultural influences and tailoring interventions that are effective in combating delinquency associated with E-cigarette use. For this purpose, the main objective proposed was to investigate the association between impulsivity, sensation seeking, emotional neglect, and delinquent behavior among young Pakistani E-cigarette users. The sub-objectives were to speculate the relationship between impulsivity and delinquent behaviors among E-cigarette users; to examine the relationship between sensation seeking and delinquent behaviors among E-cigarette users; to investigate the mediating effect of emotional neglect on delinquency and how it triggers impulsivity and sensation seeking among adolescents.

## **Method**

### **Research Design**

The study follows a cross-sectional study design with a quantitative research approach to gather information about all the variables required for the study. The duration of the study was about six months from January 2023 to June 2023.

### **Sample**

The study collected data from 150 frequent E-cigarette users (adolescents) in the twin cities of Rawalpindi and Islamabad, Pakistan, using convenience sampling for easy accessibility. Snowball sampling was also utilized to involve participants with similar characteristics referred to by existing participants. Sample size determination was conducted with G-power software (Faul et

al., 2007). The inclusion criteria for this research study encompasses adolescents aged 11-19 years who engage in e-cigarette use, ranging from always to occasional, often, or sometimes users. Participants attending English medium educational institutions, be it schools, colleges, or universities, are eligible, with no distinction based on socio-economic status. Exclusions pertain to individuals outside the 11-19 age range and those who do not regularly use E-cigarettes. Additionally, participants with comorbidities, physical disabilities, or pre-existing psychopathological conditions are not considered for inclusion in the study.

## **Measures**

### **Demographic Sheet**

Demographic sheets were used to gather basic socio-demographic information like age, gender, education level, and usage of e-cigarettes.

### **Barratt Impulsiveness Scale (BIS-11)**

The questionnaire was developed by Barratt et al. (1985). The initial version of the instrument consisted of 34 items, each scored on a four-point scale ranging from "rarely/never" to "almost always/always" (Patton et al., 1995). The questionnaire assessed impulsivity through three factors: attentional impulsiveness, motor impulsiveness, and non-planning impulsiveness. The total score was calculated as the sum of all items. The BIS-11 questionnaire exhibited good validity and reliability. Cronbach's alpha scores for the first-order and second-order factors were typically higher than 0.7, while the total BIS score ranged between 0.62 (von Diemen et al., 2007) and 0.80 (Huang et al., 2013). In the present study, the Urdu version of the scale was employed with the alpha reliability of .83 (Abdullah et al., 2023).

### **Brief Sensation Seeking Scale (BSSS)**

The Brief Sensation Seeking Scale (BSSS) developed by R. H. Hoyle in 2002 is a concise questionnaire with eight items,

assessing four primary scales and a total score. It measures the single dimension of sensation seeking in both adolescents and adults using a 5-point Likert scale. Previous studies have demonstrated good internal consistency, with reliability higher than 0.70. (Hoyle et al., 2002). For this study the Urdu version of the brief sensation seeking scale with the alpha reliability of .76 was used (Siraj et al., 2021).

### **Revised Self-reported Delinquency Scale (R-SRDS)**

The Self-Reported Delinquency Scale (SRDS) developed by Naqvi and Kamal consists of 27 positive statements, measuring delinquent acts on a 5-point Likert scale. The scoring ranges from 0-108 with a high score indicating higher delinquency. The scale has good internal consistency, with an alpha reliability coefficient of .92. For the study, four out of the original six subscales were used, with permission from the author, to ensure relevance (Kamal, 2019).

### **Emotional Neglect Scale (ENS)**

The Emotional Neglect Scale (ENS) is a 29-item questionnaire with two factors: dominance and control (16 items) and lack of attention (8 items) developed by Karamat and

Saleem in 2021. It has good internal consistency, construct validity, and a reliability coefficient of .92. Each item is measured on a 4-point rating scale, and the total score ranges from 0 to 87, indicating the level of emotional neglect experienced by the individual. The scale effectively assesses emotional neglect within the study population (Saleem et al., 2021)

### **Procedure**

Participants who were frequent users of e-cigarettes in the age range of adolescence were selected for the study. Each participant was informed about the purpose and protocols of the study before they signed the consent form. The data collection phase consisted of collecting the data from the required participants after which the data was calculated, and results were concluded. The responses were analyzed using the regression analysis from the statistical package for social sciences program (SPSS) version 22.0. The data was tabulated, and results were compiled in frequencies and percentages. Correlations for relationships and regression and mediation analysis were done for the mediating role of the mediator.

## **Results**

**Table 1**

*Descriptive Statistics of Demographic Variables (N=150)*

<b>Characteristics</b>	<b><i>n</i></b>	<b>%</b>	<b><i>M</i></b>	<b><i>SD</i></b>
<b>Age (years)</b>			15.95	2.43
11-19	150	100.0		
<b>Qualification</b>			.85	.75
Middle school	56	37.3		
High school	61	40.7		
Undergraduate	33	22.0		
<b>Gender</b>			.38	.48
Male	93	62.0		
Female	57	38.0		
<b>Usage of E-cigarettes</b>			1.60	1.16

Occasionally	37	24.7
Sometimes	32	21.3
Often	35	23.3
Always	46	30.7

Note. *N* = frequency, % = percentage, *M* = mean, *SD* = standard deviation

Table 1 reveals that in a sample of 150 individuals, 100% were adolescents ranging from age 11-19. Out of the total sample, 62.0% (*n*= 93) individuals were males whereas 38.0% (*n*= 57) were females. The table also illustrates that 37.3% of adolescents were in middle school (*n*= 56), 40.7% were high schoolers (*n*= 61), and 22.0% were undergraduates (*n*= 33).

Out of the total 150 samples it was found that 30.7% (*n*= 46) of the people were using e-cigarettes all the time, and 24.7% which accounts for (*n*= 37) of the individuals were occasional users. 23.3% (*n*= 35) of users often used e-cigarettes and 21.3% (*n*= 32) people sometimes used electronic cigarettes.

**Table 2**

*Descriptive Statistics and Psychometric Properties of the Study Variables (N=150)*

Scales	<i>K</i>	<i>M</i>	<i>SD</i>	Cronbach's $\alpha$
BIS-11	21	2.48	0.01	.74
BSSS	8	3.12	0.00	.75
ENS	29	0.65	0.00	.96
SRDS-R	19	0.57	0.02	.84

Note. BIS-R = Barratts impulsivity scale (revised), BSSS = brief sensation seeking scale, ENS = emotional neglect scale, SRDS-R = self-reported delinquency scale, *K* = no of items

Table 2 shows the psychometric properties of the instruments that are used in this study. The Cronbach's  $\alpha$  value for Barratts Impulsivity Scale (revised) was .74 (>.70) which indicates relatively good internal consistency. For the brief sensation-seeking scale the  $\alpha$  reliability turned out to be .75

(>.70) which also indicates good internal consistency. For the Emotional Neglect Scale, Cronbach's  $\alpha$  value was .96 (>.70) which indicates excellent reliability, similarly for the self-reported delinquency scale, the  $\alpha$  value was .84 (>.70) which also indicates good reliability.

**Table 3**

*Pearson Product-Moment Correlations of Study Variables (N-150)*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4
1: Sensation Seeking	25.00	6.24	-	.280**	.081	.227**
2: Impulsivity	52.10	8.02	-	-	.229**	.049
3: Emotional Neglect	19.12	18.71	-	-	-	.322**
4: Delinquency	10.86	10.37	-	-	-	-

Note. \* $p < .05$ , \*\* $p < .01$

Table 3 shows the results of correlations of all the used variables. It was found that there was a significant small positive correlation between sensation seeking and impulsivity ( $r = .28, n = 150, p < .001$ ). A similar result was also seen in a correlation of sensation seeking and delinquency ( $r = .22, n = 150, p < .001$ ), and in sensation seeking and emotional neglect the relationship here was found to be insignificant ( $r = .08, n = 150$ ).

Likewise, impulsivity was found to have a significantly small positive relationship with emotional neglect ( $r = .22, p < .001$ ), however, with delinquency, impulsivity had an insignificant, small positive relationship ( $r = .04$ ). The relationship of emotional neglect with delinquency was discovered to be significant, medium, and positively correlated ( $r = .32, p < .001$ ).

**Table 4**

*Regression Coefficients of the Impact of Impulsivity, Sensation Seeking, and Emotional Neglect on Delinquency (N=150)*

Variables	B	SE	t	p	95% CI
constant	3.99	5.51	.72	.47	[-6.91,14.89]
BSS	.37	.13	2.84	.00	[.11,.63]
BIS	-.11	.10	-1.08	.27	[-.32,.09]
ENS	.18	.04	4.13	.00	[.09,.26]

Note. BSS= brief sensation seeking scale. BIS= Barrat’s Impulsivity Scale. ENS= Emotional Neglect Scale. B= unstandardized coefficient, SE= Standard error, CI= Class limit, p= significance level ( $p < .05$ )

Table 4 showed the impact of Impulsivity, Sensation seeking, and Emotional Neglect on Delinquency. The  $R^2$  value of .15 illustrated that the predictors (impulsivity, sensation seeking, and emotional neglect) explained 15% of the variance in the outcome variable (delinquent behavior) with  $F(3, 146) = 8.67, p < .05$ . The findings also depicted that impulsivity negatively predicted delinquent behavior ( $\beta = -.08, p > .05$ ). Whereas

sensation-seeking positively predicted delinquency ( $\beta = .22, p < .05$ ). On the other hand, emotional neglect also significantly and positively predicted delinquent behavior ( $\beta = .32, p < .05$ ) in adolescents. In conclusion, the regression analysis suggested that BSS and ENS have significant effects on the dependent variable (delinquent behavior), whereas BIS did not have a statistically significant effect.

**Table 5**

*The Mediating Effect of Emotional Neglect on Impulsivity and Sensation seeking with Delinquent Behavior (N=150)*

Predictors	Emotional Neglect		Impulsivity		Sensation seeking	
	$\beta$	SE	$\beta$	SE	$\beta$	SE
Emotional Neglect	-	-	.22**	.18	.08	.24
Delinquency	.31***	.04	-.02	.10	.20**	.12
$R^2$	.12		.05		.00	
F	10.47***		8.21**		.96	

Note.  $\beta$  = beta, SE= Standard Error

Table 5 shows the findings of the mediation analysis done by Process Macro. Results revealed that delinquency positively and significantly predicted sensation seeking whereas it negatively predicted impulsivity. Delinquency was also found to be positively predicting emotional neglect, which was also highly significant. Whereas emotional neglect was discovered to be a positively

significant predictor of impulsivity while positively predicting sensation seeking. In addition to this, emotional neglect accounted for 12% of the variance in delinquency. Similarly, impulsivity accounted for 5% of variance in emotional neglect and delinquency whereas sensation seeking did not validate much variance (.6%) in emotional neglect and delinquency.

**Table 6**

*An Indirect Effect of Emotional Neglect between Impulsivity and Delinquent Behavior (N=150)*

<b>IV</b>	<b>Predictor</b>	<b>DV</b>	<b>Effect</b>	<b>Boot SE</b>	<b>Boot LL CI</b>	<b>Boot UL CI</b>
impulsivity	Emotional Neglect	Delinquent Behavior	.09	.04	.01	.18

Table 6 displays that the indirect effect of emotional neglect between impulsivity and

delinquent behavior was found to be positive which demonstrates that mediation exists.

**Table 7**

*An Indirect Effect of Emotional Neglect between Sensation Seeking and Delinquent Behavior (N=150)*

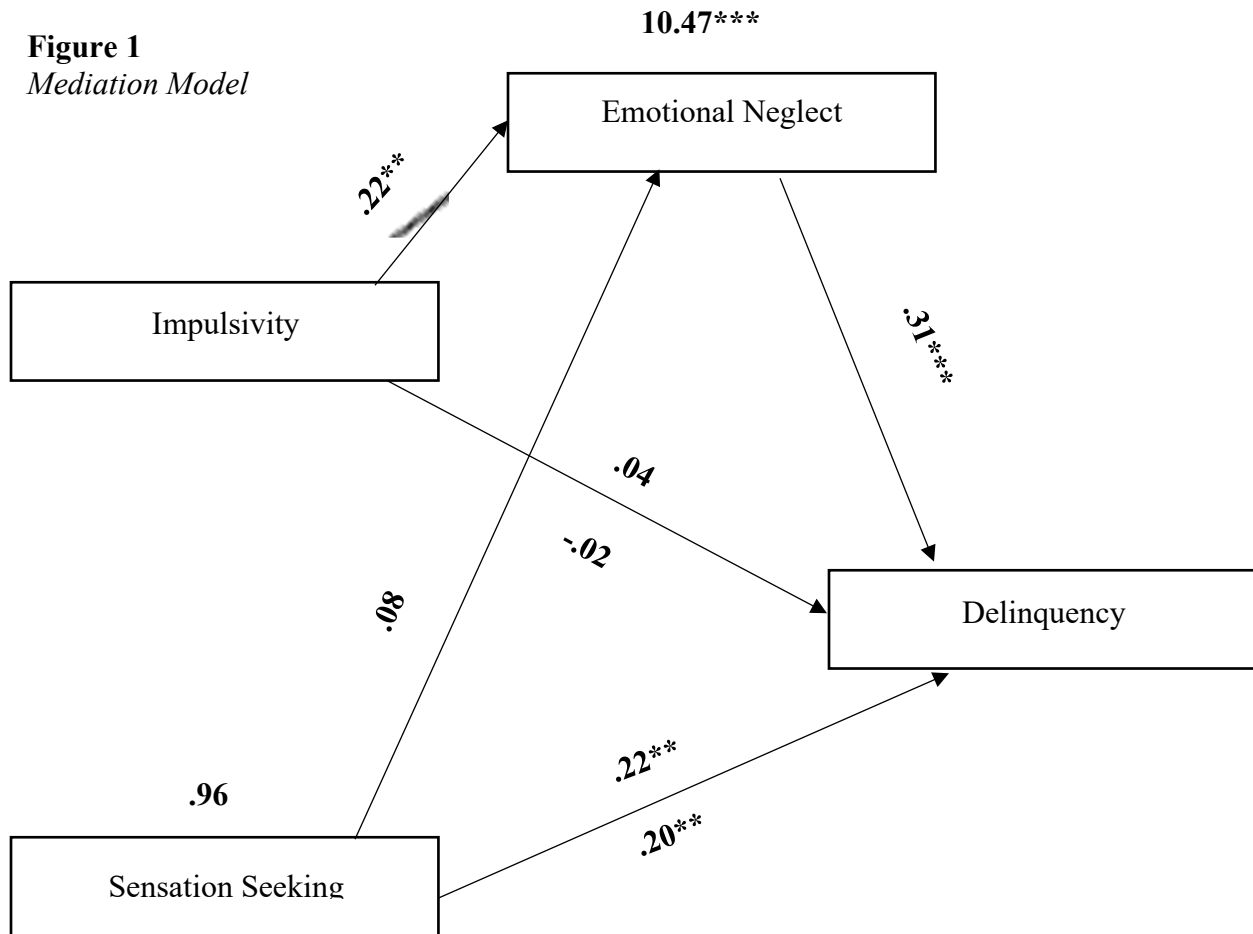
<b>IV</b>	<b>Predictor</b>	<b>DV</b>	<b>Effect</b>	<b>Boot SE</b>	<b>Boot LL CI</b>	<b>Boot UL CI</b>
Sensation Seeking	Emotional Neglect	Delinquent Behavior	.04	.04	-.06	.13

Table 7 indicates that the indirect effect of emotional neglect between sensation seeking,

and delinquent behavior was found to be negative.



**Figure 1**  
*Mediation Model*



**Discussion**

The current study aimed to assess the mediating role of emotional neglect with impulsivity and sensation seeking on delinquent behavior among the youth of Pakistan through a cross-sectional investigation. For this purpose, Impulsivity and Sensation Seeking were taken as an independent variable that would not change with other variables while delinquent behavior was taken as a dependent variable. Moreover, to check the mediating role of emotional neglect, the variable was taken as a mediator to define the relationship more evidently. The study aimed to focus on the mediating role of emotional neglect with impulsivity and sensation seeking on

delinquency in the E-cigarette using adolescents of Pakistan.

Table 2 in the results section indicates the psychometric properties of the scales used and their respective reliability in the current study. The Cronbach’s alpha reliability of (BIS-11) Barratts impulsiveness Scale was .74 whereas (BSSS) Brief Sensation Seeking Scale was .753. Similarly, (ENS) Emotional Neglect Scale had an alpha reliability of .96 and (the SRDS-R) Self-reported delinquency scale had a value of .847 as its reliability.

Furthermore, the study also illustrated the relationship of the study variables between themselves. Table 3 indicates the relationships among variables which were calculated using Pearson product-moment correlation. It indicated that Impulsivity and Sensation seeking had a significant and positive relationship. This finding is

supported by several studies done previously, one of which shows genetic evidence that high sensation seekers tend to show fast impulsive reactions. It has also been discovered that sensation-seeking traits and impulsivity have similar biological correlates. It can further be described as both impulsivity and sensation seeking have common biological indicators, the positive correlates were found highest in delinquents and deviant groups of people due to the genetic predisposition among impulsivity and sensation seeking (Hur & Bouchard, 1997). In a separate investigation focusing on the prediction of reactive and proactive aggression in adolescents, the analysis revealed notable positive correlations between impulsivity and sensation-seeking (Pérez Fuentes et al., 2016). From the psychological aspect, another study has validated the relationship between sensation-seeking and impulsivity (Whiteside & Lynam, 2001).

As for the relationship of Impulsivity and delinquency it was revealed in the current study to be also positively correlated (H1). Existing research has shown that at ages 10 and 12-23, behavioral impulsivity was more closely associated with delinquency than cognitive impulsivity. Results also showed that behavioral impulsivity was particularly connected to significant delinquency that is constant over time, which was consistent with the theoretical hypothesis (White et al., 1994). Several existing pieces of literature (Loeber & Farrington, 2012; Meier et al., 2008; Thompson et al., 2006) have found similar results where impulsivity was found to have a strong relationship with delinquent behavior.

Furthermore, sensation seeking was found to have a positive relationship with delinquency in the current study (H2). This finding can be validated by a study that was done to check if individual variations in the rate at which sensation-seeking changed predicted

individual variations in delinquent behavior and whether genetic variations in the rate at which personality changed explained this association. It was evaluated that sensation seeking was significantly and positively correlated with delinquency from childhood to adolescence (Harden et al., 2012). Similarly, in another study checking the gender differences in the relationship between sensation seeking, trait emotional intelligence, and delinquent behavior, a greater increase in delinquency was seen in line with a rise in sensation seeking (Bacon et al., 2014). Existing literature (Dahlen et al., 2005; Mann et al., 2015; Peach & Gaultney, 2013; Siraj et al., 2021) has also found similar results in the relationship between sensation-seeking and delinquent behavior.

Moreover, findings reveal that impulsivity has a positive correlation with emotional neglect as well this is validated by the fact that an increase in impulsivity increases emotional neglect by not being able to socially integrate. A key component of the lack of such skills is impulsivity (Rees, 2008). Similarly, sensation-seeking was found to be positively correlated with emotional neglect. To support this an existing literature was found to have proven similar results depicting that childhood abuse was positively correlated to sensation seeking (Bornoalova et al., 2008). Since emotional neglect is a fundamental part of child abuse, we can say that the same relationship was found to exist. Whereas the study revealed the positive relationship between delinquency and emotional neglect, it can be justified as Rees (2008) claimed in the study that emotional neglect causes avoidant and disorganized attachment style which in turn leads to the use of drugs, alcohol, and other illicit behaviors which are characterized as delinquent behaviors.

Furthermore, Table 4 of the current study depicts that the predictors (impulsivity, sensation seeking, and emotional neglect)

explained 15% of the variance in the outcome variable (delinquent behavior) with  $F(3, 146) = 8.67, p < .05$ . The findings also depicted that impulsivity negatively predicted delinquent behavior, whereas sensation seeking positively predicted delinquency. On the other hand, emotional neglect also significantly and positively predicted delinquent behavior in adolescents. In conclusion, the regression analysis suggested that BSS and ENS have significant effects on the dependent variable, whereas BIS did not have a statistically significant effect.

The literature reveals the significance of sensation seeking as an intermediary phenotype for genetic risk for delinquency and shows that adolescents reporting high levels of sensation seeking were more vulnerable to deviant peers, a Person Environment interaction (Mann et al., 2015). Similarly, emotional neglect is a significant predictor of delinquency, Children who are physically abused or neglected tend to become offenders later in life. The follow-up of over 1000 children in the Rochester Youth Development study confirmed that child maltreatment (physical, sexual, or emotional abuse and neglect) predicted later self-reported delinquency (Thornberry et al., 2003). It was discovered that severe emotional maltreatment was associated with higher levels of negative emotions, particularly rage. Yet, a different team of researchers discovered the reverse (Famularo et al., 1990). The aforementioned literature also suggests that despite not being associated with status offenses or nonviolent crime, emotional neglect was able to predict a modest amount of the variance associated with each offense type. (Evans & Burton, 2013)

As for emotional neglect acting as a mediator between sensation seeking and delinquency, no mediation was discovered for the current study which refutes the hypothesis made

(Table 6). Various studies have found significant mediation of emotional neglect with delinquency as one study found that chronic neglect partially and fully mediated with boys and girls respectively (Logan-Greene & Semanchin Jones, 2015). Sensation-seeking has been linked to crime, delinquency, violence, and antisocial behavior in previous research (Jones et al., 2011). On the other hand, there is cause to believe that these characteristics may not fully capture the attitudes that underlie individual variations in delinquent propensity (Armstrong et al., 2020).

The last hypothesis was found to be proven in the study which states that emotional neglect acted as a mediator between impulsivity and delinquency (H4). Laboratory tests of impulsivity have been linked to crime and delinquency, according to meta-analyses (Morgan & Lilienfeld, 2000). People who were abused as children and those who are impulsive seem to have a higher likelihood of committing crimes. Even though there are signs that impulsivity may be the main cause of how child maltreatment (emotional neglect being one of the factors) affects criminal behavior in adulthood, little research has been done on this topic, especially regarding how it affects different types of criminal behavior like fraud, violent crime, and property crime. The links between child abuse, impulsivity, and crime, emotional abuse was linked to urgency, which in turn was linked to fraud (Shin et al., 2016).

Hence, the findings of the study can theoretically contribute to the existing literature on delinquency and e-cigarette use by highlighting the role of impulsivity, sensation seeking, and emotional neglect in this context. Practically, the results underscore the need for tailored interventions and prevention programs that address emotional neglect and target impulsivity and sensation-seeking tendencies among e-

cigarette users. Furthermore, research in diverse cultural contexts and longitudinal studies are recommended to identify additional factors and long-term effects of e-cigarette use on delinquency. Mental health professionals, rehabilitation centers, and medical practitioners can also benefit from this study to better understand and address delinquent behavior in adolescents. Implementing workshops in schools can educate children on avoiding such behaviors and replacing impulsive and thrill-seeking tendencies with healthier alternatives. Besides, there are certain limitations to the current study. First the research only focuses on E-cigarette users without confirming the socioeconomic status. Since these vapes are pricey not everyone can afford them therefore a comparison between lower-class and middle/ upper-class individuals would provide a better understanding of results in terms of demographic variables. Secondly, Causal inferences were prevented by the cross-sectional research approach used in the current study. Additionally, gathering data all at once raises the likelihood that other outside variables may interfere with the analysis. Consequently, the causal connection between variables is weakened. To obtain evidence of a causal association, panel or cohort study designs with time-series analysis should be taken into consideration.

### Conclusion

The current study was proposed to examine the role of impulsivity, sensation seeking, and emotional neglect on delinquent behavior among e-cigarette users. In conclusion, the study findings reveal that there is a positive relationship between Impulsivity and Delinquency as well as between Sensation seeking and Delinquency in e-cigarette users of Pakistani adolescents. Moreover, the study confirms the mediating role of emotional neglect between impulsivity and delinquent behavior. However, no mediating role was found between sensation seeking and

delinquency among E-cigarette using adolescents. Hence, these findings emphasize the necessity of developing tailored interventions and prevention programs targeting underlying factors of delinquent behaviors among adolescents.

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### Contribution of Authors

Fahama Qamar: Conceptualization, Investigation, Methodology, Data Curation, Formal Analysis, Writing – Original Draft  
Ansa Quratulain: Methodology, Writing - Reviewing & Editing, Supervision

### Conflict of Interest

There is no conflict of interest declared by the authors.

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### Data Availability Statement

The datasets of the current study are not available publicly due to ethical reasons but are available from the corresponding author [A.Q.] upon the reasonable request.

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