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EXPLORING THE MEDIATING ROLE OF IMPULSIVITY IN THE RELATIONSHIP BETWEEN ADVERSE CHILDHOOD EXPERIENCES AND NICOTINE ADDICTION

Amna Lakhani & Nooreen Begum*
Shaheed Zulfiqar Ali Bhutto Institute of Science
and Technology University, Karachi, Pakistan

ABSTRACT

The study aimed to investigate the meditational role of impulsivity between relationship of Adverse Childhood Experiences (ACEs), and the most used psychoactive substance classified in DSM 5-TR, tobacco use which includes all nicotine and tobacco-related products (American Psychiatric Association, 2022). Adverse Childhood Experiences International Questionnaire (World Health Organization, 2018) and Barratt Impulsiveness Scale-11 (Patton et al., 1995) were used. The sample size comprised of 102 participants screened for nicotine use. The Pearson Correlation Coefficient and Hayes Process Macro were used to analyze the data. It was found that ACEs did not significantly correlate with nicotine addiction but there was a significant positive correlation between impulsivity and nicotine addiction. Furthermore, impulsivity mediated the relationship between ACEs and Nicotine addiction. The study has implication for intervention programs for individuals with ACEs, hence improving the lives of individuals.

Keywords: *Adverse Childhood Experiences, Emotional Neglect, Nicotine Addiction, Impulsivity*

* Correspondence Address: Noreen Begum, PhD; Assistant Professor, Saheed Zulfiqar Ali Bhutto Institute of Science and Technology University, Karachi-Pakistan.
Email: nooreennbegum@gmail.com

INTRODUCTION

Adverse childhood experiences or ACEs are the negative experiences faced during early childhood which include neglect, abuse and household dysfunction, there are several risky outcomes associated with adverse childhood experiences which also include the use of psychoactive substances, chronic diseases, cancer, death and other physical and social health problems (*What Are ACEs? And How Do They Relate to Toxic Stress?*, 2020). Several studies have found a strong correlation between early childhood experiences and lifelong impact on physical as well as emotional well-being. It can also increase vulnerability to adopting health-harming behaviors. Adolescence is a crucial period of life which is followed by substantial experimentation which differs from person to person. These differences are due to childhood experiences causing neurological changes which can help predict risk for substance use disorder in later life (Hughes et al., 2021). ACEs can have a lifelong impact on the individual in several aspects of society (NHS inform, 2023).

Impulsivity is the tendency to take action without considering the consequences associated with that action. Individuals with high impulsive traits are faced with two possible outcomes i.e. immediate benefit or delayed benefit, impulsive individuals tend to prioritize immediate benefits like substance abuse, gambling or infidelity over delayed benefits without encountering the possible future consequences associated with it (Madden & Bickel, 2009). ACEs are one of the environmental factors associated with impulsivity. Impulsivity has several traits and can be assessed through different measures. Barrot's impulsivity scale identified three different impulsivity traits which include motor impulsivity, non-planning impulsivity and cognitive impulsivity (Kapitány-Fövény et al., 2020). Motor impulsivity is defined as the ability to take action without giving thoughtful consideration while cognitive impulsivity is the inability to delay gratification (Arce & Santisteban, 2006), and non-planning impulsivity is the act of focusing on the present without planning for the future (Dunne et al., 2018).

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition-Text Revision (DSM-5 TR) recognizes tobacco use disorder under substance use disorder which includes the use of all kinds of tobacco products as well as nicotine-related products (American Psychiatric Association, 2022). In recent years researchers have been focusing on the increased use of Electronic delivery systems (ENDS) which consist of not only nicotine but propylene glycol, flavorings and other additives. According to Food and Drug Administration (2023) Vapes,

vaporizers, vape pens, hookah pens, electronic cigarettes (e-cigarettes or e-cigs), e-cigars, and e-pipes are included under the category of ENDS. There has been an increased use of ENDS which is a rising concern for youth. Research has found that it can lead to anxiety, depression, mood disorders and suicidal ideation (Walia, 2021). It has also been found that vaping and the use of nicotine-related products can cause long-term damage to heart and lung disease and an increased risk of seizures (Weinstein, 2023).

Research has shown several risk factors associated with nicotine dependence which include the personality traits associated with addiction-related behaviors, the most common personality trait associated with substance abuse is impulsivity (Hinders, 2017). Impulsivity is a key feature found in several personality disorders, substance abuse disorders and bipolar disorder. Impulsivity is a personality trait characterized by difficulty in controlling the behavioral response to any stimulus (Spoont 1992). It has a strong association with substance use problems, specifically tobacco and the onset of tobacco addiction. Nicotine dependence, especially the use of ENDS, is commonly found in adolescents. According to the CDC (2012), there has been a strong correlation between the mental health of youth and the onset of smoking at an early age. Despite knowing the harmful consequences of the addictive behavior some people continue to smoke while some people don't. Research has found that maltreatment during childhood can lead young adults to adopt risky behavior leading to disease disability or social problems causing lifelong impairments in various domains (Edwards et al., 2007).

The prevalence of adverse childhood experiences worldwide is 60% (Goldberg, 2023). While in Pakistan research on Adverse Childhood Experiences has been neglected, A study on ACEs in rural areas of Pakistan found that 58% of the women had at least one of the ACEs (LeMasters et al., 2021). The prevalence of nicotine use, specifically tobacco use in the rural areas of Pakistan was found to be 11.7% and in urban areas of Pakistan was found to be 16.3% in 2016-2017 (Basit et al., 2020). The statistics in Pakistan show an increase in the use of nicotine-related products specifically among young adults. Despite awareness regarding the negative impact of one of the most commonly used psychoactive substances, the prevalence is still increasing.

Research has shown that adverse childhood effects can lead to adopting health-harming and risk-taking behaviors in day-to-day life. Separate lines of research have suggested that personality traits like impulsivity have an impact on

addiction, specifically psychoactive substances. While there is empirical evidence to support the relationship between ACEs and substance use disorders there is little research emphasizing on nicotine-related substances which are most commonly used by young adults. Although there is research focusing on the personality traits involved in addiction and the effects of adverse childhood experience as a risk factor for developing substance abuse disorder or dependence on psychoactive substances, there is a lack of research on how nicotine dependence is linked to adverse childhood experience and whether impulsivity is a mediating factor impacting the relationship between the two. It was found that emotional abuse in childhood was related to impulsivity which ultimately result in frequent use of alcohol use in adults (Shin et al. 2015). Further exploration by Shin et al. (2019) found that impulsiveness and restlessness bridge the associations of emotional abuse in childhood and indulgence in alcohol and related problems adults. To generalize such a role of mediation of impulsivity need comprehensive studies. Understanding the effect of ACEs will provide a comprehensive understanding of the lifelong impact it can have on the individual which can help in developing intervention strategies for individuals facing problems in their life due to increased consumption of nicotine and for the development of effective prevention programs. Identifying the mediating role of impulsivity can help plan therapeutic strategies to improve self-regulation and include impulse control as a part of the therapeutic process in nicotine use. Hence, contemplating the gap in exiting literature particularly in Pakistani cultural context, this study was an attempt to examine the mediating role of impulsivity between adverse childhood experiences and nicotine dependence.

METHOD

Participants

The participants for this study were aged 19 to 25 years recruited via purposive sampling to ensure the accurate representation of this age group who uses nicotine and a total of 102 participants were taken for this study. The research is quantitative to provide empirical evidence and valid generalizability for the results of the primary data that was collected through the survey method.

Measures

Demographic Sheet

A demographic form is used to collect the demographic data such as the participant's age, gender, work status, education, socioeconomic and marital status.

Adverse Childhood Experiences International Questionnaire

Adverse Childhood Experiences International Questionnaire (ACE-IQ) published by the World Health Organization in 2018 measures ACEs. It is intended to be used for individuals above 18. The questionnaire includes 13 different adverse childhood experiences including Emotional neglect, Domestic violence, Household mental illness, Household substance abuse, Emotional abuse, Incarcerated Household members, Parental divorce, Sexual abuse, Verbal abuse, Physical abuse, Peer violence, Collective violence and Community violence (World Health Organization, 2018). Rating is done on a 2-point Likert scale of yes or no. The total score is calculated by summing up responses on all 13 subscales and score can range from 0 to 13. The validity of the scale is .85 and the reliability of the scale was found to be .85 (Christoforou & Ferreira, 2020).

Barratt Impulsiveness Scale

Barratt Impulsiveness Scale Version 11 (BIS-11) is a 30-item scale created by Dr. Barrot and the International Society of Research on Impulsivity which measures three subscales of motor impulsiveness consisting of 11 items, non-planning impulsiveness consisting of 11 items and cognitive impulsiveness consisting of 8 items. The scoring is done on a 4-item Likert scale of *never, occasionally, often* and *always*. The scoring ranges from 30-120. Reliability is .83 and internal consistency is .83 (Patton et al., 1995).

Cigarette Dependence Scale

Cigarette Dependence Scale (CDS-12) is developed by Etter et al. (2003). It is a 12-item self-administered scale which includes questions from the diagnostic criteria of DSM-IV and ICD-10 and may be helpful in determining the degree of adolescent nicotine use and dependence. The responses are rated on a 5-point Likert scale. The Internal consistency value for CDS-12 is found to be .84 whereas test-retest value is .77 which indicates psychometric soundness of the scale.

Procedure

Prior to data collection permission was taken from the authors of the scales. The participants were asked about their nicotine dependence before administering the questionnaire from different colleges and universities in Karachi, Sindh. The sample comprised of 102 participants with age ranging from 19-25 years. A detailed objective and purpose of the study were explained to the participant; they were provided an informed consent form and were made aware of the confidentiality of their personal information. For privacy, the name and personal details were not collected so the participant's identity could not be revealed. Furthermore, they were also informed about the right to withdraw at any point in time during the research study. After agreeing to participate in the study the participants were first given a demographic form which included gender, age, employment, education status, socioeconomic background and marital status. The demographic form was followed by the screening of nicotine use to determine the extent of the use of nicotine after which the ACE questionnaire and impulsivity questionnaire followed. The participants then expressed gratitude for participating in the research survey.

The ethical guidelines were followed throughout the research process set forth by the American Psychological Association (APA) and as per the Research policy at SZABIST. Informed consent was taken and the participant's willingness was also ensured. The identity of the participant is hidden and their right of confidentiality is assured. The participants were also informed about the detailed goals and purpose of the research. Academic integrity in reporting the results was also maintained.

Statistical Analysis

After the collection of the data, statistical techniques were used to represent the data. Descriptive statistics was used to represent the summary of the data. Furthermore, a correlational analysis was applied to investigate the relationship between adverse childhood experiences, impulsivity and nicotine use. Hayes PROCESS Macro was done to determine the meditation role of impulsivity between adverse childhood experiences and nicotine use. The statistical analysis was done using the statistical software SPSS (Statistical Package for Social Sciences).The analysis is represented in the form of tables.

RESULTS

Table 1
Descriptive Statistics forParticipants' Demographic Characteristics (N=102)

Variables	*f*	*%*
Age		
18-19	15	14.7
20-21	09	8.8
22-23	50	49.0
24-25	28	27.5
Gender		
Male	55	53.9
Female	47	46.1
Marital Status		
Single	92	90.2
Married	04	3.9
Other	06	5.9
Education		
High school	01	1.0
College	13	12.7
Undergraduate	74	72.5
Graduate	14	13.7
Employment		
Student	78	76.5
Employed	21	20.6
Unemployed	03	2.9
Socio-economic Status		
Upper Class	10	9.8
Upper Middle Class	46	45.1
Middle Class	41	40.2
Lower Class	05	4.9

Table 2
Descriptive Statistics of the Variables (N=102)

Scales	*M*	*SD*
Adverse Childhood Experiences	22.24	2.79
Impulsivity	71.96	12.18
Nicotine Addiction	27.89	11.24

Table 3
Intercorrelations between Adverse Childhood Experiences, Impulsivity and Nicotine Addiction (N=102)

Variables	1	2	3
1. Adverse Childhood Experiences	1.00		
2. Impulsivity	.02	1.00	
3. Nicotine Addiction	.01	.44*	1.00

*p <.05

Table 4
Model Analyses for Impulsivity as Mediator in the Relationship between Impulsivity and Nicotine Addiction

Model	*B*	*SE B*	*t*	*p*	*95% LLCI*	*95% ULCI*
ASE	.02	.36	.07	.95	-.70	.74
Impulsivity	.41	.08	4.91	.00	.24	.57

Note. ASE = Adverse Childhood Experiences

Table 5
Indirect Effects of Impulsivity on Nicotine Dependence

	Effects	*Boot SE*	*95% LLCI*	*95% ULCI*
Impulsivity	.03	.17	-.30	.37

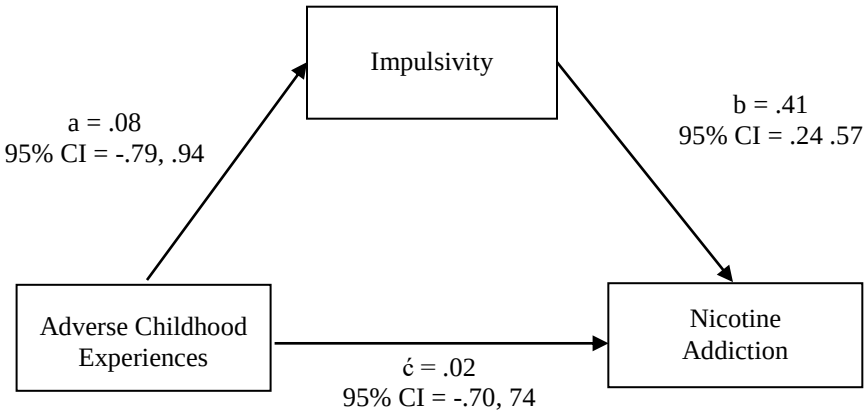

Figure 1. Mediation Model of Impulsivity (M) in the relationship between Adverse Childhood Experiences (X) and Nicotine Addiction (Y)

DISCUSSION

The present study intended to examine the mediating role of impulsivity between adverse childhood experiences (ACEs) and nicotine dependence. The findings reveal no significant correlation between adverse childhood experiences, impulsivity and nicotine addiction (Table 3). Hayes' approach to test mediation doesn't require individual pathways (a and b) to be significant for testing mediation. Hence, mediation role of impulsivity between relationship of ACEs of emotional neglect and nicotine dependence is examined through Mediation Model 4 from the Process Macro. The findings demonstrate that impulsivity fully mediated the relationship between ACEs and nicotine addiction. These findings suggest that adverse childhood experiences on its own didn't increase the risk of nicotine addiction, much of this effect was because of impulsivity which lead to nicotine addiction. So, impulsivity explains why those who face ACEc are more likely to become addicted to nicotine.

The insignificant association between ACE and nicotine addiction in our study does not align with other research. The literature strongly supports a significant correlation between different ACEs ike physical abuse, sexual abuse, parental abuse and substance abuse and nicotine addiction. (Boccio et al., 2022; Choi et al., 2016; Fetting, 2011; He et al., 2022; Penttinen et al., 2019). John Mack's theory of self-medication posits that substances help overcome psychological distress which is primarily due to irresponsible caregiving during the early childhood years leading to ego deficiencies (cited in Fetting, 2011). Theory of self-soothing explains addiction as a means to self-soothe due to caregivers' inability to express a healthy soothing concern to the child and the child adopts an unhealthy self-care mechanism hence failing to learn self-soothing behaviors having a high chance of addiction (Rinsely, 1988). Heinz Kohut's psychoanalytical theory further explains that emotional neglect by caregivers or unable to connect with the child and take interest in their likeness, accomplishments having an emotional connection or a sense of belonging might lead to deficiencies in the internal structure and fill that void due to deficiencies, in later adulthood the individual adopts the path of addiction. The obtained insignificant findings in our study could be attributed to several cultural factors that may prevent individuals from reporting sensitive issues related to trauma. When a trauma occurs an individual's sense of ability to trust and safety is altered and they might not feel safe in reporting the issues. In Pakistan, the social stigma attached to mental health issues particularly family-related as it is a matter of family honor and considered a sign of weak faith individuals are reluctant to report any kind of traumatic

issues (Mansoor & Warsi, 2023). The collectivist culture in Pakistan may also prevent individuals from reporting mental health trauma that is faced by the family to maintain integrity and family honour

Further, our findings regarding meditational role of impulsivity align with previous studies which suggest a strong link between adverse childhood experiences, impulsivity and nicotine addiction and also support the meditational role of impulsivity. For instance, Poulton and Hester (2019) in a review article identified impulsivity as a behavioral factor leading to substance use disorder. Sheikh et al. (2018) found that at least one traumatic event was reported by a significant number of students which was strongly connected with impulsivity. Kale et al. (2018) also found high impulsivity in smokers in a meta-analysis between smokers and non-smokers. Impulsivity appeared as a mechanism that describes the relationship of emotional abuse with substance use behaviors in adults (Brown et al., 2022). In line with earlier study findings, which found that urgency, an aspect of impulsivity, bridges the associations of ACEs of emotional abuse and alcohol use in adulthood (Shin et al., 2015). Study findings by Brown. et al., (2022) also endorsed impulsivity as a tract through which emotional abuse leads to the outcomes of marijuana and tobacco use adults. Hence the findings of this study is bridging the literature gap in identifying pathways through which ASEs can contribute to psychological or behavioral issues

In conclusion, there was no direct relationship between adverse childhood experiences and nicotine addiction however, impulsivity is significantly correlated with nicotine addiction as well as a mediated relationship between ACEs and nicotine addiction. These findings highlight the importance of addressing impulsivity in individuals who have a history of adverse childhood experiences to prevent risk-taking or addictive behaviors. Future research can benefit from exploring various other pathways taking into consideration the moderators and meditators to understand the underlying mechanism of addiction. Additionally, the present stud has utilized the commulative score of thirteen adverse childhood experiences. Future research may also examined the distinct ACEs in relation to nicotine addiction as well as the meditational role of impulsivity between them.

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