Neuropsychiatr Invest. 2023;61(2):49-56

Original Article
10.5152/NeuropsychiatricInvest.2023.22016

The Relationship between Traumatic Life Events and Autobiographical Memory Characteristics and Smoking

Sabina Huseynbalayeva[1], **Gun Pakyurek**[2]

[1]*Department of Psychology, Dokuz Eylul University, Graduate School of Social Sciences, İzmir, Turkey*

[2]*Department of Psychology, Aydın Adnan Menderes University, Faculty of Humanities and Social Sciences, Aydın, Turkey*

ABSTRACT

Objective: The Basic Systems Model of Autobiographical Memory argues that when traumatic or stressful experiences become central to an individual's daily life, the accessibility to the experience in autobiographical memory increases, which triggers posttraumatic stress disorder by activating rumination. Smoking may be correlated with autobiographical memory in traumatic or stressful experiences. Thus, the autobiographical memory characteristics of individuals who experienced traumatic life events and the role of smoking in this relationship were investigated.

Methods: A total of 453 people, 336 women and 117 men, participated in the study. Memory form and 4 self-report scales (Fagerström Test for Nicotine Dependence, Life Events Checklist-5, Posttraumatic Stress Disorder Short Scale, Autobiographical Memory Characteristics Questionnaire) were applied to the participants.

Results: Results show that trauma is highly correlated with emotional valence, belief in accuracy, emotional intensity, and sensory details. Smoking correlates with sensory details, preoccupation with emotions, belief in accuracy, and emotional valence. Smoking moderates the relationship between trauma and emotional distance. Lastly, the accessibility which reveals trauma moderates the relationship between vividness and smoking.

Conclusion: The findings are discussed in the context of the relevant literature.

Keywords: Trauma, smoking, autobiographical memory, memories, addiction

INTRODUCTION

Autobiographical memory is described as memories that include personal experiences or images related to these experiences.[1] The interaction and synchronization of basic systems such as sensory organs, language, emotion, and narrative are important in recalling autobiographical memories.[1] In the Basic Systems Model of Autobiographical Memory developed by Rubin et al.[2] the importance of 3 factors has been emphasized the characteristics of the traumatic event, its reflection in memory, and personal differences in the progress of posttraumatic stress disorder (PTSD) after stressful or traumatic life events.[2] The memory of the event rather than the event is effective in the progress and maintenance of PTSD.[2] Based on this, the relationship between the characteristics of the event and the remembering process determines whether PTSD will occur. Traumatic life events are not weakly

Corresponding author:
Sabina Huseynbalayeva

E-mail:
sabinamyb@gmail.com

Received: July 3, 2022
Accepted: April 20, 2023
Publication Date: June 26, 2023

Cite this article as: Huseynbalayeva S, Pakyurek G. The relationship between traumatic life events and autobiographical memory characteristics and smoking. *Neuropsychiatr Invest.* 2023;61(2):49-56.

encoded into memory but, on the contrary, strongly when PTSD occurs.[3] The representation of traumatic or stressful life events is also related to autobiographical content. In the model, the 3 most important factors that increase the accessibility of traumatic memories are indicated: the emotional intensity of the event (1), when and with what frequency the memories of the traumatic life event are recalled voluntarily and involuntarily (2), and the centrality of the event in the life and identity of the individual (3).[4] The frequent occurrence of these factors causes PTSD to persist. For this reason, the current study focused on the emotional dimension of memories, which is thought to be associated with PTSD. The current study examined vividness, accuracy, sensory details, accessibility, intensity, emotional distance, and emotional preoccupation with emotions. Bernstein and Rubin[5] stated that PTSD symptoms might emerge when the accessibility level of negative memories increases. It is also known that individuals resort to suppression and maladaptive coping strategies to avoid these symptoms[6] and that these strategies paradoxically cause PTSD.[2] Smoking, which is known to be one of the maladaptive coping strategies used by individuals in stressful situations, was handled.[7]

Berntsen[6] emphasizes that posttraumatic memories are strong recordings of autobiographical memory. Involuntary memories differ in content and frequency and are autobiographically highly detailed. In addition, involuntary memories can be quickly recalled, which reveals the effect on the mood of the person.[6] Among the PTSD risk factors, previous trauma history, gender, ethnic characteristics, negative life events, perceived stress, coping strategies, and addiction, which are included in mental disorders, are noteworthy. Past studies on the relationship between addiction and PTSD show that a large proportion of addicted individuals have traumatic experiences.[8] When individuals who develop addiction cannot reach the substance they are addicted to, they experience severe stress along with deprivation, which inhibits their emotion regulation skills. At the same time, stress and addiction cycles occur in addicted individuals.[9] Stress caused by substance use seems to play a crucial role in pathologies arising from addiction.[10] People may turn to addictive substances to eliminate the resulting stress.

The interaction between addiction, PTSD, and memory is complex but intertwined. Stress may affect the reward mechanisms of addictive substances, and the change of this mechanism may result in substance-seeking behaviors, which is a high-risk factor for relapse.[9] The effects of addictive substances can bring about memory problems, and when trauma and addiction are accompanied by memory problems, life becomes more difficult for addicted individuals.

Past studies on addiction and memory disorders have explored how people recall memories. Studies have shown that addiction can lead to impaired autobiographical memory.[11-16] Pillersdorf and Scorbia[15] reported in their study that cannabis use leads to a less fading effect in negative memories, meaning that cannabis users remember negative life events more vividly. At the same time, similarly, it has been observed that they remember memories more vividly as alcohol use increases. Eiber et al[12] conducted a study on heroin users and showed that these individuals experience holism in autobiographical memory. Gandolphe et al[14] stated that substance-addicted individuals have difficulty accessing memories and that there is overgeneralization in memory. Nandrio et al[16] stated in their study that alcohol use has a negative effect on memory recall. Pizzimenti and Lattal[17] stated in their study that substance disorders cause impairment in autobiographical memory. In addition, it has been shown that there are differences in memory recall and memory content.[18] The relationship between addiction and autobiographical memory has shown that addicted people have difficulties in accessing memories, they experience memory disorders, and there are differences in the content of memories with the non-addicted group.[18] On the other hand, legally, smoke is known as the most used addictive substance in the world. The common finding of previous studies is that nicotine, the active ingredient of cigarettes, has a negative effect on cognitive functions such as memory and attention.[19-23] Gould[21] stated that addiction and cognitive functions such as learning, memory, and attention are located in the same brain regions and have a significant effect on each other. Substance use is considered to have a negative effect on the normal functioning of these regions. Pakyürek and Şenyüz[22] stated that smoking affects the brain systems associated with prospective memory, and these negative effects occur in attention and memory processes. In addition, smoking has been determined to directly affect collective cognition, vocabulary, learning, executive functions, and memory.[23]

Considering all these, it seems that memory disorders that occur together with smoking and PTSD should be handled together. As a result of the current study, it is expected that the level of trauma will predict vivid recall of memories. Another expectation of the study is that autobiographical memory characteristics as a modulatory variable predict smoking in individuals who have experienced traumatic life events. In addition, smoking as a modulatory variable is expected to predict autobiographical memory characteristics in individuals who experienced traumatic life events.

METHODS

Participants

It is aimed to ensure the participation of people over the age of 18 who have experienced a traumatic life event. The sample consists of a total of 453 participants, 336 women (74.2%) and 117 men (25.8%). The ages of the participants ranged from 18 to 61 ($M = 26.64$; $SD = 10.13$).

Measurement Tools

An information form about the demographic characteristics of the participants, a memory form, and 4 self-report scales were used. The scales used in the study are as follows, respectively: Fagerström Test for Nicotine Dependence, Life Events Checklist-5, Posttraumatic Stress Disorder Short Scale (PTSDSS), and Autobiographical Memory Characteristics Questionnaire.

Fagerström Test for Nicotine Dependence

Fagerström Test for Nicotine Dependence, created in 1991 as a reconstructed version of The Fagerström Tolerance Questionnaire (FTQ), prepared by Fagerström in 1978, was used to determine the smoking addiction levels of the participants.[24] Some of the 6 items within the scope of the scale were designed in such a way that yes or no answers can be given to some multiple-choice questions. The test's theoretical range is 0 to 10, with high scores indicating high smoking addiction. The standardization study of the test for the Turkish context was conducted by Uysal et al[25] and was found to be moderately reliable due to the internal reliability study (Cronbach's alpha 0.56). Within the scope of this study, this test was applied only to smokers.

Life Events Checklist-5

Life Events Checklist-5[26] is a checklist for obtaining comprehensive information about how people experience each traumatic experience

with very stressful/traumatic events that they experience and which is handled together with measurement tools that evaluate the symptoms of PTSD. This checklist aims to determine whether the participants have "exposure to a traumatic event," which is among the PTSD diagnostic criteria in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) . It consists of a 16-item list covering events that are called very stressful or traumatic, and a total of 17 items that are not included in this list but identify "other" very stressful and traumatic events experienced by the participants. Each of the 17 events on the list can be answered by marking one or more than one of the responses of "I experienced the event," "I witnessed the event," "I learned that the event happened," and "I encountered the event due to my job," "I am not sure," and "I have never experienced such an event." By doing so, the participants determine how they have experienced the event. A numerical scale score is not obtained from this checklist.

Posttraumatic Stress Disorder Short Scale

The PTSDSS was developed by Kilpatrick et al.[27] The scale is used to evaluate PTSD and to determine its severity. It consists of 9 items measuring PTSD symptoms in DSM-5. The scale is evaluated by scoring between 0 and 4 (never = 0, a little = 1, moderate = 2, quite = 3, and extremely = 4). As a result of this evaluation, the scores to be obtained from the scale vary between 0 and 36, and 24 points are considered as the cut-off point, and 24 points and above are accepted as a statistically significant value for PTSD. The Turkish adaptation of the scale was done by Evren et al.[28] and the Cronbach's alpha internal consistency coefficient was calculated as 0.87.

Autobiographical Memories Form

The Autobiographical Memory Form was created by the researcher and it was aimed to recall the memory contained in the Autobiographical Memory Characteristics Questionnaire instruction. Each participant was asked to recall a negative memory and write it down on the open-ended form. A numerical scale score cannot be obtained from this form.

Autobiographical Memory Characteristics Questionnaire

The questionnaire developed by Boyacioglu and Akfirat[29] evaluates the phenomenological characteristics of memories. The questionnaire consists of 63 questions and 14 subscales (vividness, belief in accuracy, place details, sensory details, accessibility, sharing, observer perspective, field perspective, narrative coherence, recollection, emotional valence, emotional intensity, emotional distancing, and preoccupation with emotions). The Cronbach's alpha value from the reliability and validity study of the scale was found to be between 0.74 and 0.96. Before completing the form, and participants are asked to mark on a 7-point Likert-type scale to what extent they describe the items in the scale based on the memory they are asked to remember and write on the memory form presented (1 = strongly disagree, 7 = strongly agree). In this study, vividness, belief in accuracy, sensory details, accessibility, emotional valence, emotional intensity, emotional distancing, and preoccupation with emotions were examined to focus on the emotional dimension of traumas.

Procedure

In the first stage, Ethics Committee (protocol no: 050.04.04-08/57) was obtained. The questionnaires were sent online via Google Forms to volunteer participants residing in different provinces of Turkey. It took approximately 15 minutes to complete the questionnaire forms. Initially, 543 individuals were recruited to participate in the study. Ninety individuals were excluded as outliers and also for not complying with the research conditions and not completing the scales. As a consequence, the final sample consisted of 453 participants.

Statistical Analysis

Before analysis, missing values and extreme values were analyzed, and normality and homogeneity were assessed. According to the Boxplot method, the participants determined as outliers were excluded from the data set. Correlation analysis was performed to examine the relationship between PTSD levels, smoking addiction levels, and autobiographical memory characteristics (sensory details, preoccupation with emotions, belief in accuracy, and emotional valence). Simple linear regression analysis was performed to determine AM, which predicts smoking. The PROCESS application was used to examine the moderator role of smoking in the relationship between autobiographical memory features and PTSD level and the moderator role of traumatic life experiences in the relationship between smoking and autobiographical memory characteristics. The variables thought to be related to the Basic Systems Model of Autobiographical Memory were examined.

RESULTS

In this section, firstly, descriptive statistics about the participants are given. Some information about the demographics and smoking habits of the participants is presented in Table 1.

Table 2 presents the results of correlation analysis on PTSD, smoking addiction level, and autobiographical memory characteristics

Table 1. Information on the Participants

Variables	Frequency (%)	Mean	SD	Range
Gender				
Female	336 (74.2)			
Male	117 (25.8)			
Age	453 (100)	26	10.12	18-61
Do you think you have experienced trauma before?				
Yes	302 (66.7)			
No	151 (33.3)			
Do you smoke?				
Yes	136 (30)			
No	317 (70)			
Have you had previous smoking cessation experience?				
Yes	127 (28)			
No	326 (72)			
How many cigarettes do you smoke daily?	136 (30)	13	7.94	0-40

Table 2. The Correlations between PTSD, Smoking, and Autobiographical Memory Characteristics

Variables	1	2	3	4	5	6
1. PTSD	—					
2. Smoking	.057**	—				
3. Emotional valance	.121**	.152**	—			
4. Belief in accuracy	.158**	.120*	.152**	—		
5. Preoccupation with emotions	.430**	.108*	.425**	.196**	—	
6. Sensory details	.236**	.100*	.301**	.250**	.329**	—

*$p < .05$.
**$p < .01$.
PTSD, posttraumatic stress disorder.

Table 3. Regression Analysis of Autobiographical Memory Characteristics Which Predicts Smoking

Model	Variables	β	t	P	R^2	df	F change
	Sensory details	.100	2.137	.033	.010	1	4.566
	Preoccupation with emotions	.108	2.298	.022	.012	1	5.279
	Belief in accuracy	.120	2.568	.011	.014	1	6.596
	Emotional valance	.152	3.251	.001	.023	1	10.568

(emotional valance, belief in accuracy, preoccupation with emotions, sensory details).

Table 2 shows that the PTSD level has a positive, weak, significant correlation with the emotional valance level ($r = .121$; $p < .05$) and a positive, weak, statistically significant correlation with belief in accuracy ($r = .158$; $p < .05$). There was a positive, moderate, statistically significant ($r = .430$; $p < .05$) relationship between the preoccupation with emotions level of the memories and the PTSD level. There was a positive, weak, and significant relationship between sensory details and PTSD levels ($r = .236$; $p < .05$).

Table 2 shows that the emotional valance variable has a positive, weak, significant correlation with the smoking level ($r = .152$; $p < .05$). There is a positive, weak, and significant correlation between the level of belief in accuracy and the level of smoking ($r = .120$; $p < .05$). There was a positive, weakly, statistically significant ($r = .108$; $p < .05$) relationship between the preoccupation with emotions level of the memories and the smoking level. There was a positive, weak, and significant relationship between sensory details and smoking levels ($r = .100$; $p < .05$).

Table 4. Conditional Effects of the Moderator Variable

Moderator	β	t	p
Smoking			
Yes	.1272	1.2886	.198
No	.3356	4.8472	.000

In Table 3, a simple linear regression analysis was performed to determine AM, which predicts smoking.

In the model, the variables of sensory details, preoccupation with emotions, belief in accuracy, and emotional valance were entered into the regression equation. Table 3 shows that the variables predict smoking addiction statistically ($p < .05$).

When Table 3 is examined, it is seen that the variable of sensory details predicts smoking positively and significantly 0.10% ($t = 2.137$; $\beta = .10$; $p < .05$), preoccupation with emotions variable predicts positively and significantly ($t = 2.298$; $\beta = .10$; $p < .05$), the belief in accuracy variable predicts positively and significantly ($t = 2.568$; $\beta = .12$; $p < .05$), and finally, the emotional valance variable predicts positive and significantly ($t = 3.251$; $\beta = .15$; $p < .05$).

Moderator analysis was conducted using Process Macro to determine whether PTSD predicted emotional distancing and accessibility to memories, and smoking predicted the strength and direction of the relationship in this equation. The entire model in which 3 variables, namely, emotional distancing, smoking, and PTSD interact, was statistically significant ($F = 8.9166$, $p < .01$, $r^2 = .0562$). The results indicate that the interaction of emotional distancing and smoking significantly predicted the equation ($b = 17.9637$, $t = 6.5105$, $p = .000$). The conditional effects of the variables on the model are given in Table 4. While emotional distancing levels of nonsmokers were high, emotional distancing levels of smokers were low. In addition, it was determined that the trauma levels of nonsmokers were lower than those who smoked (Figure 1).

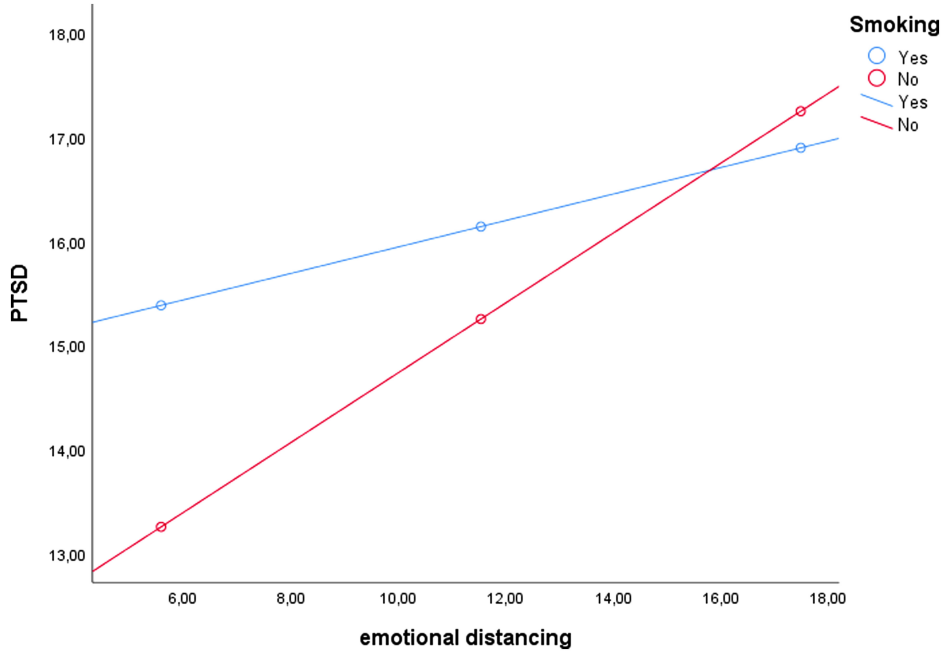

Figure 1. Partial moderator graph (PTSD- Smoking-Emotional Distancing).

Table 5. Conditional Effects of the Moderator Variable

Moderator	β	t	p
Smoking			
Very low level	−.2173	−2.4605	.0143
Low level	−.2928	−3.7802	.0002
Moderate level	−.4408	−3.9614	.0001

A moderator analysis was conducted to examine how smoking addiction is a moderator variable in the relationship between accessibility and PTSD. The overall model in which 3 variables, accessibility, smoking addiction, and PTSD interacted, was statistically significant ($F = 6.4548$, $p < .01$, $r^2 = .0415$). The findings indicate that the interaction of accessibility and smoking significantly predicted the equation ($b = 16.0082$, $t = 20.9989$, $p < .01$). The conditional effects of the variables on the model are given in Table 5.

When Table 5 is examined, it is seen that individuals defined as having a very low level of addiction, low level of addiction, and moderate addiction in the model predict statistically significantly. At the same time, it is seen that individuals with very low level of addiction have lower trauma levels and higher levels of accessibility, and individuals with low level of addiction have higher trauma levels and lower levels of accessibility than individuals with low level of addiction. It has been determined that individuals with moderate level of addiction have higher levels of trauma and lower levels of accessibility (Figure 2).

The moderator role of traumatic experiences in the relationship between smoking addiction and vividness of memories was investigated. The overall model in which the 3 variables, smoking, vividness, and trauma interacted was statistically significant ($F = 7.1422$, $p < .01$, $r^2 = 0.0457$). These results show that the interaction between smoking and traumatic experiences is an important predictor of the equation ($b = 24.0982$, $t = 21.1548$, $p = .000$).

Table 6 shows that individuals who have experienced trauma remember traumatic memories more vividly and smoke more than individuals who have not experienced trauma. Individuals who have not experienced trauma remember negative events less vividly and have lower smoking levels than individuals who have experienced trauma (Figure 3).

DISCUSSION

The relationship between individuals who experienced traumatic life experiences and their autobiographical memory characteristics and the role of smoking were investigated. The results show that smoking predicts autobiographical memory characteristics, and trauma plays a role in this relationship. In addition, the analyses show that the autobiographical memory characteristics of smoking play a role in predicting PTSD. Individuals' quality of life and emotional states in daily life are related to how they remember their past.[30] A review of the literature reveals that traumatic life experiences are remembered easier, more vividly, and in more detail.[31]

The findings of the study are compatible with the expected relationship hypothesis and literature between PTSD and autobiographical memory characteristics. As a result of the analysis, a relationship was found between the PTSD levels of individuals and the autobiographical memory characteristics of emotional valence, belief in accuracy, preoccupation with emotions, and sensory details. Individuals remember negative life events in more detail and exaggerate more, and by doing this, they center traumatic life events. When individuals centralize memories after a traumatic experience, the accessibility to the event in autobiographical memory increases, thus activating ruminations and activated ruminations triggering PTSD.[4] Markowitsch and Staniloiu[32] stated that the emotional value attributed to the event in autobiographical memory processes is important in recalling memories. Brown and Kulik[33] stated that individuals tend to maintain high levels of vitality, belief in accuracy, emotional value, and intensity for their negative experience memories. Winningham et al[34] proposed that individuals remember negative memories more accurately. Accuracy beliefs are highly related to emotion regulation and coping strategies.[35] The related literature is also consistent with another interesting finding of the study that emotional value predicts smoking. It was observed that smoking increased as individuals attributed more negative value to their negative memories. This implies that smokers overestimate their memories of traumatic life experiences. It is thought that people will use maladaptive coping

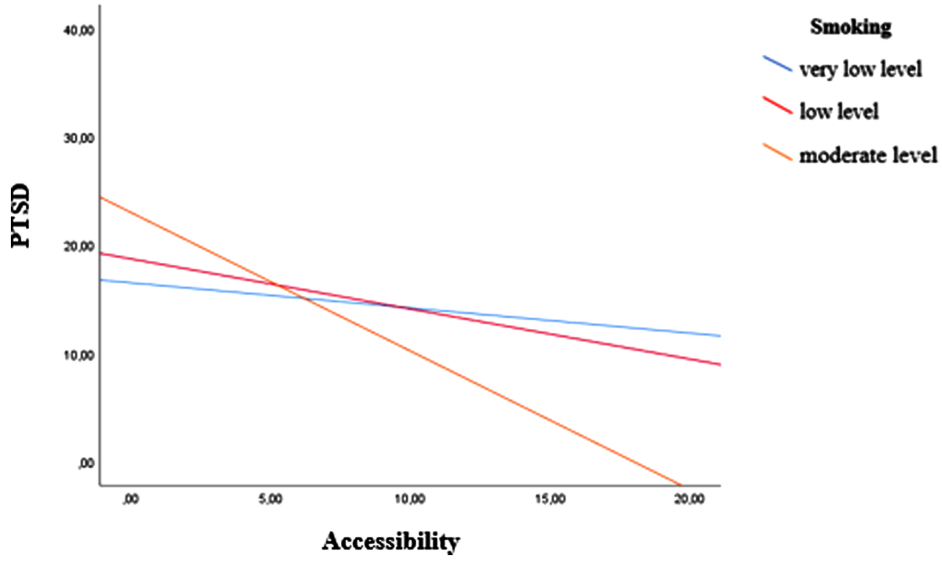

Figure 2. Partial moderator graph (PTSD-Smoking-Accessibility).

Table 6. Conditional Effects of the Moderator Variable

Moderator	β	t	p
Traumatic life experience			
Yes	.3462	2.3295	.0203
No	−.2312	−.9156	.3604

strategies more as they become more preoccupied with their memories of traumatic experiences and their belief in accuracy increases.[6] Traumatic life experiences are remembered more vividly and sensory details at the time of the event are recorded more strongly in autobiographical memory. As a result of the analysis, it was found that trauma predicts autobiographical memory characteristics and autobiographical memory characteristics also predict the trauma levels of individuals. Negative life events are not recorded weakly but, on the contrary, strongly.[3] At the same time, Rubin et al[3] emphasized in their research that the accessibility of memories increases when negative life events are recalled voluntarily or involuntarily.

Literature suggests that addictive substance use has a positive effect on short-term attention in individuals with addiction.[36,20] Due to the mechanism of action of nicotine, negative effects on attention and memory occur when addiction occurs.[21,22] It is thought that individuals use cigarettes to relieve such symptoms and that this continues as a cycle. When smoking is not consumed, individuals feel deficiencies in attention and memory performance and experience physiological symptoms.[37] In negative emotional states, individuals use cigarettes as an avoidance behavior from such symptoms. In chronic nicotine addiction, impairments in cognitive functions, attention, and memory may occur. Nonsmokers put more emotional distance to negative memories compared to smokers, which is consistent with the expectations of the study and the literature. It was found that nonsmokers distanced their memories of traumatic life events, whereas smokers were more preoccupied with their memories. It was also observed that nonsmokers had lower levels of trauma. It is thought that nonsmokers put emotional distance to memories as an emotion regulation strategy, and thus the centrality of the event is reduced.[30]

As a result, the trauma levels of smokers are higher, and the level of accessibility to negative memories is higher than those of nonsmokers. The extensive use of avoidance and suppression coping methods to reduce symptoms paradoxically increases the level of accessibility of memories.[6] This, in turn, causes PTSD to increase and persist.[2] It is known that as accessibility to the negative event increases, problems and stress levels increase, which results in the emergence of some mental problems. Anxiety and stress-related problems increase with smoking.[7] It is common to start smoking as a way of coping with stress to reduce the level of tension and relieve pain.[38] In addition, Aki et al[39] emphasize that after long-term substance use, deterioration in coping skills occurs, and as a result, the person cannot use effective coping skills. Smoking is known as a passive coping method used to cope with stress and negative life events.[40] Ergin et al[41] revealed that smokers use passive stress coping methods. Thus, the autobiographical memory characteristics of sensory details, preoccupation with emotions, belief in accuracy, and emotional valance are predicted by smoking. It has been found that as smoking increases, sensory details about negative events, preoccupation with the events emotionally, belief in the accuracy of the events, and the emotional valance of the event increase. Trauma has been found to have a moderator role in the relationship between smoking and vivid recollection of memories of negative events. Pillersdorf and Scorbia[15] stated in their study that cannabis use causes less fading in negative memories, that is, cannabis users remember negative life events more vividly. In the same study, it was observed that as alcohol use increased, they recalled memories more vividly. Pizzimenti and Lattal[17] revealed that substance use causes disorders in autobiographical memory. In addition, studies show that addictive substance users experience integrity in autobiographical memory and have difficulties in accessing memories.[12,13,42] Therewithal, Oliveira et al[18] revealed that depending on substance use, memory content, and memory recall differ in individuals.

Smoking is a moderator variable in the relationship between emotional distancing and PTSD. That is, while the trauma levels of smokers are higher, their emotional distancing to memories is lower than

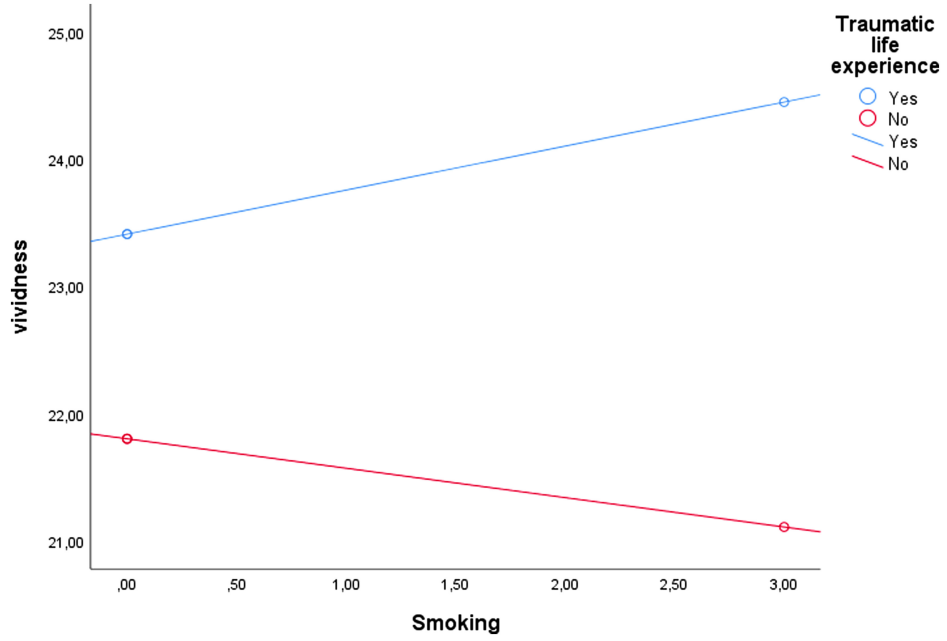

Figure 3. Partial moderator graph (Vividness-Traumativ life experience-Smoking).

nonsmokers. At the same time, smoking is a moderator variable in the relationship between accessibility and PTSD. While the level of accessibility to negative memories of nonsmokers is high, the level of trauma increases as individuals' smoking increases, but the level of accessibility to negative memories decreases. Trauma experience is a moderator variable in the relationship between research findings, smoking, and vivid recall of negative memories. While individuals who have had traumatic experiences remember negative life events more vividly, their smoking levels also increase. Therewithal, analyses reveal that autobiographical memory characteristics predict smoking. In other words, when individuals remember the sensory details of the traumatic event, when the emotional valance they attach to the event increases, when they have a belief in accuracy that the event happened, and when they are emotionally preoccupied with the memories, their smoking increases.

Limitations and Directions/Suggestions for Future Research

Among the limitations of the study is the use of a moderately reliable scale to measure smoking. It is recommended to use a more reliable scale for this measurement. Another limitation of the study is that it did not examine how long the participants had been smoking. It is thought that the examination of this variable will allow a better understanding of the predictive effect of nicotine on memory. In addition, it is thought that more sound findings will be obtained by collecting data from the clinical sample and using physiological measurement methods. Also, it is thought that analyzing and evaluating the recalled memory with content analysis can reveal which memories are remembered more vividly and in detail.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Aydın Adnan Menderes University (date: Decermber 31, 2020, number: 31906847/050.04.04-08/57).

Informed Consent: Written informed consent was obtained from patients/ patients' parents/ the parents of the patients/patient who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – G.P.; Design – G.P.; Supervision – G.P.; Resources – G.P., S.H.; Materials – S.H.; Data Collection and/or Processing – S.H.; Analysis and/or Interpretation – S.H.; Literature Search – G.P., S.H.; Writing Manuscript – S.H.; Critical Review – G.P.

Declaration of Interests: The authors declare that they have no competing interest.

Funding: The authors declared that this study has received no financial support.

REFERENCES

1. Rubin DC. A basic-systems approach to autobiographical memory. *Curr Dir Psychol Sci*. 2005;14(2):79-83. [CrossRef]
2. Rubin DC, Boals A, Berntsen D. Memory in posttraumatic stress disorder: properties of voluntary and involuntary, traumatic and nontraumatic autobiographical memories in people with and without posttraumatic stress disorder symptoms. *J Exp Psychol Gen*. 2008;137(4):591-614. [CrossRef]
3. Rubin DC, Berntsen D, Bohni MK. A memory-based model of posttraumatic stress disorder: evaluating basic assumptions underlying the PTSD diagnosis. *Psychol Rev*. 2008;115(4):985-1011. [CrossRef]
4. Rubin DC, Basic A. Systems account of trauma memories in PTSD: is more needed? *Clin Perspect Autobiographical Mem*. 2015:41-64. [CrossRef]
5. Berntsen D, Rubin DC. When A trauma becomes A key to identity: enhanced integration of trauma memories predicts posttraumatic stress disorder symptoms. *Appl Cogn Psychol*. 2007;21(4):417-431. [CrossRef]
6. Berntsen D. *Involuntary Autobiographical Memories: an Introduction to the Unbidden Past*. New York, NY: Cambridge University Press; 2009.
7. Koca B, Oğuzöncül A. İnönü üniversitesi sağlık Yüksekokulu Öğrencilerinin sigara, alkol, madde kullanımı, madde Kullanımına etki eden etmenler ve aileden aldıkları sosyal Desteğin etkisi. *Kocaeli. Med J*. 2015;4(2):4-13.
8. Aldemir S, Tan S. Travma ve bağımlılık sendromlar. *Yeni Tıp Derg*. 2011;28(4):198-202.
9. Koob GF, Schulkin J. Addiction and stress: an allostatic view. *Neurosci Biobehav Rev*. 2019;106(245):245-262. [CrossRef]
10. Lijffijt M, Hu K, Swann AC. Stress modulates illness-course of substance use disorders: A translational review. *Front Psychiatry*. 2014;5:83. [CrossRef]
11. D'Argembeau A, Van der Linden M, Verbanck P, Noël X. Autobiographical memory in non amnesic alcohol-dependent patients. *Psychol Med*. 2006;36(12):1707-1715. [CrossRef]
12. Eiber R, Puel M, Schmitt L. Heroin abuse, autobiographical memory and depression. *Encephale*. 1999;25(6):549-557.
13. Gandolphe MC, Nandrino JL. Overgeneralization of autobiographical memory strategies in cannabis users and multiple psychoactive substance consumers. *Encephale*. 2011;37(2):144-152. [CrossRef]
14. Gandolphe MC, Nandrino JL, Hancart S, Vosgien V. Autobiographical memory and differentiation of schematic models in substance-dependent patients. *J Behav Ther Exp Psychiatry*. 2013;44(1):114-121. [CrossRef]
15. Pillersdorf D, Scoboria A. Cannabis-associated impairments in the fading affect bias and autobiographical memory specificity. *Conscious Cogn*. 2019;74:102792. [CrossRef]
16. Nandrino JL, Gandolphe MC, Alexandre C, Kmiecik E, Yguel J, Urso L. Cognitive and affective theory of mind abilities in alcohol-dependent patients: the role of autobiographical memory. *Drug Alcohol Depend*. 2014;143:65-73. [CrossRef]
17. Pizzimenti CL, Lattal KM. Epigenetics, and memory: causes, consequences, and treatments for post-traumatic stress disorder and addiction. *Genes Brain Behav*. 2015;14(1):73-84. [CrossRef]
18. Oliveira CCC, Scheuer CI, Scivoletto S. Autobiographical and semantic memory of adolescent drug users. *Arch Clin Psychiatry (S Paulo)*. 2007;34(6):260-265. [CrossRef]
19. Blake JS, Smith A. Effects of smoking and smoking deprivation on the articulatory loop of working memory. *Hum Psychopharmacol Clin Exp*. 1997;12(3):259-264. [CrossRef]
20. Kenney JW, Gould TJ. Modulation of hippocampus-dependent learning and synaptic plasticity by nicotine. *Mol Neurobiol*. 2008;38(1):101-121. [CrossRef]
21. Gould TJ. Addiction and cognition. *Addict Sci Clin Pract*. 2010;4:5.2.
22. Pakyürek G, Şenyüz L. Sigara kullanımı ve bilişsel yük Farklılaşmasının İleriye dönük bellek Performansına Etkisinin İncelenmesi. *Addict: Turkish J Addict*. 2019;6(2):221-238.
23. Sabia S, Elbaz A, Dugravot A, et al. Impact of smoking on cognitive decline in early old age: the Whitehall II cohort study. *Arch Gen Psychiatry*. 2012;69(6):627-635. [CrossRef]
24. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom tolerance questionnaire. *Br J Addict*. 1991;86(9):1119-1127. [CrossRef]
25. Uysal MA, Kadakal F, Karşıdağ C, Bayram NG, Uysal O, Yılmaz V. Fagerstrom Test for Nicotine Dependence: reliability in a Turkish sample and factor analysis. *Tuberk Toraks*. 2004;52(2):115-121.
26. Weathers FW, Litz BT, Keane TM. The PTSD checklist for DSM-5 (PCL-5). *Scale Available from the National Center PTSD Website*; 2013. Available at: http://www.ptsd.va.gov.
27. Kilpatrick DG, Resnick HS, Friedman MJ. *National Stressful Events Survey PTSD Short Scale*; 2013. Available at: http://www.psychiatry.org/practice/dsm/ dsm5/online-assessment-measures#Disorder.
28. Evren C, Dalbudak E, Aydemir O, et al. Psychometric properties of the Turkish PTSD-short scale in a sample of undergraduate students. *Bull Clin Psychopharmacol*. 2016;26(3):294-302. [CrossRef]
29. Boyacioglu I, Akfirat S. Development and psychometric properties of A new measure for memory phenomenology: the autobiographical memory characteristics questionnaire. *Memory*. 2015;23(7):1070-1092. [CrossRef]

30. Boyacıoğlu I, Aktaş Ç. *Depresyon ile Olumlu ve Olumsuz Otobiyografik Anıların Merkeziliği ve Fenomenolojik Özellikleri Arasındaki İlişkiler*. New Symposium; 2020.
31. Kaya-Kızılöz B, Altan-Atalay A. *Otobiyografik Bellek ve Psikopatoloji. Hayatı Hatırlamak: Otobiyografik Belleğin Psikolojisi*. Gülgöz B.E, Öner S, eds. Istanbul: Koç University Publications; 2018:221-241.
32. Markowitsch HJ,Staniloiu A. Amygdala in action: relaying biological and social significance to autobiographical memory. *Neuropsychologia*. 2011;49(4):718-733. [CrossRef]
33. Brown R, Kulik J. Flashbulb memories. *Cognition*. 1977;5(1):73-99. [CrossRef]
34. Winningham RG, Hyman IE, Dinnel DL. Flashbulb memories? The effects of when the initial memory report was obtained. *Memory*. 2000;8(4):209-216. [CrossRef]
35. Sarp N, Tosun A. Duygu ve Otobiyografik bellek. *Curr Approaches Psychiatry*. 2011;3(3):446-465.
36. Del Olmo N, Higuera-Matas A, Miguéns M, García-Lecumberri C, Ambrosio E. Cocaine self-administration improves performance in a highly demanding water maze task. *Psychopharmacol (Berl)*. 2007;195(1):19-25. [CrossRef]
37. Patterson F, Jepson C, Loughead J, et al. Working memory deficits predict short-term smoking resumption following brief abstinence. *Drug Alcohol Depend*. 2010;106(1):61-64. [CrossRef]
38. Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: A critical review of the literature. *Tob Control*. 1998;7(4):409-420. [CrossRef]
39. Aki Ş, Arıkan Z, Işıklı S, Bağımlıları ERA. En Az Bir yıldır Remisyonda olan alkol Bağımlıları ve kontrol Grubunun başa çıkma Mekanizmaları Yönünden Karşılaştırılması. *Arch Neurol Psychiatry*. 2008;45:36-45.
40. Yazıcı H, Şahin M. Üniversite Öğrencilerinin Sigara İçme Tutumları ile Sigara İçme Statüleri Arasındaki İlişki. *Kastamonu. Educ J*. 2005;13(2):455-466.
41. Ergin A, Uzun US, Bozkurt Aİ. Tıp Fakültesi Öğrencilerinde Stresle Başaçıkma Yöntemler ve bu Yöntemlerin Sosyodemografik Özelliklerle İlişkisi. *Fırat Med J*. 2014;19(1):31-37.
42. Whiteley C, Wanigaratne S, Marshall J, Curran HV. Autobiographical memory in detoxified dependent drinkers. *Alcohol Alcohol*. 2009;44(4):429-430. [CrossRef]