

The Development Study of Smoking Stroop Test on a Turkish Sample

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ABSTRACT

Introduction: The purpose of this study is to engender a language and culture specific Smoking Stroop Test (SST) in Turkish.

Methods: The study is performed in three stages (N=334) with smokers and non-smokers of three age groups. On the third stage, all participants have filled STT and were administered Beck Depression Inventory. Besides, the smokers were applied Fagerström Test for Nicotine Dependence, and the elder participants were also assessed with Standardized Mini Mental State Examination Test.

Results: In the first stage, a list comprising a total of 92 words related and not related with smoking have been formed and in the second stage the participants were asked to evaluate the relatedness of these words with cigarette and smoking. As a result of this evaluation 9 related and 9 unrelated words were selected for SST. In the third stage SST was

administered to a sample of 70 participants. A 3×2×2 repeated measures for last factor ANOVA was used to determine whether the variance in response times depends on age, cigarette use and word type. The results revealed that there was no significant difference among the non-smoker participants' response times towards related or unrelated words in all age groups. On the other hand, the smokers in young and adult age groups displayed longer response times towards cigarette related words. Internal consistency and test-retest reliability analysis revealed that the test is reliable.

Discussion: SST is a valid, reliable and original tool that can be used in studies in Turkey.

Keywords: Smoking dependence, attentional bias, reliability and validity, Stroop test

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INTRODUCTION

It has been suggested that smoking affects the cholinergic system by affecting the nicotinic acetylcholine receptors, and accordingly, sensory and motor abilities and various cognitive processes, especially learning, attention and memory (1, 2). Recently, the role of cigarette addiction on various cognitive processes has been investigated. Attention is one of the most frequently studied cognitive functions in relation to smoking. It has been suggested that the most prominent effect of smoking on attention is related to the maintenance of focused attention on the stimulus or task (3). Rzetelny et al. stated that smoking increases selective attention towards clues related to smoking. In other words, it causes attention bias (4). Attention bias is defined as the substance user's automatic attraction of attention to the addicted substance and related stimulants (5) Accordingly, experiences associated with the rewarding item create changes related to learning, and the relevant stimulus (item) constantly becomes striking (6). Thus, the user's attention is directed automatically and involuntarily to stimulants related to the substance (7). It has been suggested that attention bias has a important effect on the maintenance of cigarette addiction and the relapse after smoking cessation, and also leads to diverting attention from other cognitive tasks that should be performed in daily life (8-10).

One of the paradigms developed to evaluate attention bias in addicts was created by modification of the classical Stroop Test (5). When the related literature is examined, these modified Stroop tests used to examine attention bias in addicts are generally named as "Modified Stroop Test" (11-13) or "Addiction Stroop Test" (5, 12), while in the case of cigarette addiction, the test is usually called "Stroop for Smokers" (14) and "Nicotine Stroop Test" (15). In this study, the Stroop Test for Smokers (STFS) name was used. In the Classical Stroop Test, the "color-word interference" (16) in relation to the Stroop interference effect is obtained when participants are requested to name the color of a word which also expresses a color (e.g., word blue written in red color). In other words, when the person is instructed to name the color used in the print of the word and ignore the meaning of the word, if the color expressed in the word and the color used in its print are not the same, a contradiction occurs, compared to the situation where the expressed color and the color it is printed which it is written are the same. This contradiction is related to increase in the time required to name the word (17).

In Stroop tests, which are modified to measure attention bias in smokers, words related to and unrelated to smoking are generally used (10, 13, 14).

As in the Classic Stroop Test, the person is asked to quickly and accurately press the button that is painted in the same color (red, blue, green or yellow) as the color used in the printed ink color of the words, or to say the name of the color, without paying attention to the meaning of the words. It is expected that it takes longer for a person to name the colors (or to press the same color button) of the smoking related words than to name the colors of smoke unrelated words.

It is accepted that the increase in reaction time occurs as a result of selective attention shifting to a feature of the stimulus that is requested to be neglected during the task (that is, the content of the word), and this is an indicator of attention bias (5, 8, 14).

As a result of the literature review, it has been determined that the Stroop Test for Smokers, which aims measuring attention bias, that contributes to the maintenance of smoking, has not been used in our country yet. The aim of this research is to form a Stroop test consisting of Turkish words which can be used for smokers in Turkey. When the studies on the measurement of attention bias in cigarette addicts are examined, another observation is that the words associated with cigarettes expressed in different ways in their original language have only one Turkish equivalent, and this will create a limitation in the number of words in a Turkish test (e.g. the words 'cigarette', 'fag', 'puff' all correspond in Turkish).

Also, as a result of the translation, a stimulus consisting of a word in its original language can be expressed with two words in Turkish (eg, the word 'inhaled' is expressed as 'içine çekmek'), which does not comply with the requirement that the words used should have the same length and frequency (18). For this reason, we planned to create a new word list suitable for the culture and language in this study. Moreover, we observed that studies in the literature were conducted only with young or adult (18-45 years old) participants (10, 13, 14, 19). According to the Turkey Statistical Institute data (20) 17.9% of men and 2.6% of women over the age of 65 smoke in our country. Based on the prevalence of smoking in the elderly, this study was conducted in 3 different age groups, namely young (18-30 years old), adult (31-64 years old) and old (65 years and over), in order to determine whether there is an age-related differentiation. For the utility of STFS; Depending on whether the young, adult and old participants are a smoker or not, the reaction times to smoking-related and unrelated words should differ. Accordingly, smokers of all age groups are expected to react to the words associated with smoking longer than non-smokers.

METHODS

Participants

The development of the Stroop Test for Smokers was carried out in three stages. At each stage, the smoker and non-smoker participants from three age groups: young (18-30 years old), adult (31-64 years old) and old (65 years and over) were included in a gender balanced manner. Thirty people participated in the first stage of the research, where smoking related and unrelated word lists were created; 234 people participated in the second stage, where each word was evaluated in terms of its relationship with smoking, and 70 people participated in the final stage to determine the usability of the test. Accordingly, the research was conducted with the participation of 334 people in total.

In the first stage, 10 smokers from all three age groups took part in the study and the participants were balanced in terms of gender. In the second stage, a total of 234 people, including 100 young people (58 smokers, 42 non-smokers), 110 adults (54 smokers, 56 non-smokers), and 24 old (13 smokers, 11 non-smokers) took part in the study. Finally, in the third level, a total of 70 people were included, including 23 young participants (12 smokers, 11 non-smokers), 24 adult participants (12 smokers, 12 non-smokers) and 23 old participants (12 smokers, 11 non-smokers).

The criteria for inclusion in the study were as follows: For the smokers (n = 115), have been smoking for at least 1 year and have been smoking at least 10 cigarettes a day for the last six months; for non-smokers (n = 109) have never smoked during their lifetime or the lifetime usage should not exceed 100 in total. Among the participants in the old group, those who scored above the cut-off score of 24 on the Standardized Mini Mental Test (SMMT) (21, 22) were included in the study. In addition, depression scores of all participants were scanned with the Beck Depression Inventory (BDI) (23, 24), and participants who scored above 21 were not included in the study. The numbers of the participants in different stages of the study, their average age and standard deviation, and their average smoking period (years), average daily cigarette consumption and average scores obtained from other measurement tools are presented in Table 1.

Materials/Instruments

Demographic Information Form: It was created by the researchers to obtain information about the participants such as gender, age, education level and smoking.

Table 1. Demographic Information of the Participants in Different Stages of the Study

		Young (18-34)		Adult (35-64)		Old (65 over)	
		Smoker	Non-smoker	Smoker	Non-smoker	Smoker	Non-smoker
1. Stage (n=30)	n	10	-	10	-	10	-
	M+SD	21.30±2.20	-	45.70±8.98	-	71.20±5.78	-
2. Stage (n=234)	n	58	42	54	56	13	11
	M+SD	22.9±3.04	21.85 ±3.00	41.59±7.46	40.91±6.96	72.84±6.97	78.54±7.36
3. Stage (n=70)	n	12	11	12	12	12	11
	M+SD	22.58±2.84	21.27±2.37	49.16±5.93	44.75±7.21	67.75±3.3	73.2±7.45
	SD (year)	6.6±4.51	-	28.25±6.81	-	49.5±5.35	-
	DC	17.08±6.2	-	21.66±8.34	-	22.66±18.53	-
	BDI (M+SD)	12.16±6.87	5.90±3.08	10.75±7.94	7.16±5.28	9.88±7.19	6.58±4.12
	SMMSE (M+SD)	-	-	-	-	29.66±1.15	27.90±1.92
	FTND (M+SD)	4.25±2.73	-	5.58±2.06	-	5.0±1.75	-

SD: Smoking duration (year), DC: Daily cigarette, BDI: Beck Depression Inventory mean score, SMMSE: The Standardized Mini Mental State Examination mean score, FTND : Fagerström Test For Nicotine Dependence mean score

Stroop Test for Smokers (STFS): The development process of STFS, which is developed in this study to examine attention bias in smokers, is presented in detail in the Procedure and Results sections.

Fagerström Nicotine Addiction Test (FNBT): FNBT (25) was used to determine the nicotine addiction levels of the participants.

Standardization of the test to Turkish sample was carried out by Uysal et al. (26). The test consists of six items and the score that can be obtained from the test varies between 0 and 10.

Standardized Mini Mental State Examination (SMMSE): SMMSE (27) is used in the evaluation of the elderly, especially those with delirium and dementia. The validity and reliability study of the test was conducted for the diagnosis of mild dementia in Turkish population (28). This test was applied to all elderly participants. The highest score that can be obtained from the test is 30, and the participants who score below 24, which is the cut-off point, were not included in the study.

Beck Depression Inventory (BDI): It is a 21-item scale developed to measure the severity of depression symptoms through self-assessment (23). The form used in this study was adapted to Turkish by Hisli (24). The highest score that can be obtained from the scale is 63 and the cutoff point is taken as 21.

E-Prime Software Package Program: In order to prepare the experiment program, present the stimuli and record the reaction times and correct and incorrect responses of the participants, a licensed E-Prime (2.0) software package and serial response box were used developed by Psychology Software Tools, Inc., (Pittsburgh, USA). The stimulants in the second and third stages of the study were presented through this program.

Procedure

The research was conducted in Hacettepe University Behavioral Psychopharmacology Laboratory (DAPSAL).

First Stage Procedure: In the research, firstly, the words that will form the STFS were identified and selected. For this purpose, in the first stage, a word list related to smoking was prepared. Firstly, 16 words reported to be used in the relevant literature were translated into Turkish, then the Turkish Language Institution (TDK) Dictionary was searched and similar or synonyms of these words were identified and included in the list. In addition, 10 people from each age group were asked to write as many words as possible in 10 minutes related to smoking. Words produced by these participants were also added to the list. Then, again, by searching the TDK Dictionary, for each word included in the list related to smoking, non-smoking-related words with equivalent letter and syllable numbers were found and a list of words unrelated to smoking (eg, mallet, tile, stamp) was created using these words. While creating this list, for each word associated with smoking, at least two separate unrelated words with the number of letters and syllables corresponding to this word were determined. For example; The words 'stamp', 'bell' and 'clay' are included in the list of alternative unrelated words corresponding to the word "ash" in the related word list. After the word lists were created, a single list of 92 words in total was obtained, 25 of which were related and 67 were unrelated, by ensuring that the words in both lists were sorted randomly.

Second Stage Procedure: In the second stage, a list of 92 words was presented to each of the 234 participants, one by one in random order, in the center of a computer screen, in white on a black background, in Arial font and 60 points. Subsequently, participants were asked to evaluate each word in terms of its relevance to smoking. The participants were

asked to answer the question "do you think this word is related to the use of cigarettes and other tobacco products?" and were instructed to rate each item/word presented on the screen on a 5-point Likert type scale ranging from "not at all related" to "highly related" by pressing the number keys of the computer.

While selecting the words that form STFS, the average Likert scores of each word were calculated first for all participants, then for smokers and non-smokers, and finally for smokers and non-smokers in each age group, and these scores were converted to z-scores. Words with at least 1.5 z-points above the mean for each group were considered to be related to smoking, and words that fulfill this condition (common for all groups) were listed for all groups. Because of the floor effect, this procedure cannot be followed for words unrelated to smoking, therefore the z-scores of these words are listed in ascending order. Then, for each word selected as related to cigarette, the first word with the lowest z-score on this scale and corresponding to this word in terms of letters and syllables was matched with the word associated with smoking. As a result of these evaluations, 9 words related to smoking and 9 words unrelated to smoking but equivalent to each related word in terms of syllables and letters were determined, and the STFS consisting of 18 words in total was formed.

Third Stage Procedure: At this stage, STFS was applied to a sample of smokers and non-smokers in three different age groups who did not participate in the previous two stages of the study (n = 70).

Creating Blocks. The word lists used in STFS were written on a black background, with Arial font in 60 pt, each of four different colors (red, blue, green or yellow). These words were randomly assigned to one of each of the four blocks (list) consisting of related words, with each word taking place only once in each block. The same process was carried out for unrelated words, and four blocks of these words were obtained. Thus, unrelated words were provided to be in four different colors, and the related words in four blocks, again in four different colors. All four blocks are named as a set. Synonym, 36 stimulants were presented in each set. Later, these related and unrelated word lists consisting of four blocks were presented on a computer screen as two sets with each word in the center of the screen. While the words in each block are presented one by one, the order of the words in the block has been randomized for each participant. The priority order of the sets is balanced. During the experiment, first, trial applications were made using the words not included in the test. Each word was presented in the center of the screen for 3000 milliseconds (ms), and the participants were asked to react as quickly as possible by pressing the button with the same color as the word they saw through the response console, which has four different colored buttons, regardless of the meaning of the word., The accuracy or falsity of the participants' responses and the reaction times in ms level were recorded for each reaction. When the participants gave reaction for the the word seen, the stimulus presentation ended and the interval time between the stimuli began. The interval between stimuli was set as 2000 ms and a white plus (+) sign was shown in the center of the screen during this time.

For the reaction times obtained from the STFS, the reaction time averages for each word related and unrelated to smoking over four blocks were calculated using only the correct reactions recorded for each subject. Then, by using these values, averages were obtained from nine related and nine unrelated words, and an average of reaction time for each participant was obtained for related and unrelated words. Analyzes were carried out using these mean values.

The applications were carried out individually for each participant and written consent was obtained from all participants before the applications.

Statistical Analysis

At the stage of selecting the words that make up the STFS, average scores and the z-score transformations of the average scores were used, and a repeated measures ANOVA was performed to determine whether the variables of age, smoking and word type had an effect on reaction times.

Cronbach's Alpha coefficient was used for internal consistency analysis, and Pearson Product Moment correlation coefficients were used to calculate item-total correlation and test-retest correlation.

RESULTS

Average Scores and Z-Scores of STFS Items

Nine words associated with smoking, which were 1.5 standard deviations above the mean, and nine unrelated words corresponding to each of them in terms of letter and syllable number and with the lowest z-scores were included in the STFS for all age groups of smoker and non-smoker participants.

The average scores of the related and unrelated words included in the STFS and the z-score conversion of these average scores are given in Table 2.

Table 2. Average Scores and z Scores of Related and Unrelated Words

Related words	All (n=234)			All (n=234)	
	M	Z score	Unrelated Words	M	Z score
Cigarette	4.79	2.12	Camera	1.16	-0.77
Tobacco	4.73	2.08	Soap	1.34	-0.62
Nicotine	4.66	2.02	Jar	1.12	-0.81
Butt	4.65	2.00	Tile	1.18	-0.75
Servitude	4.58	1.96	Tassel	1.23	-0.71
Lighter	4.43	1.84	Marble	1.13	-0.79
Smoke	4.4	1.81	Screen	1.32	-0.64
Ash	4.34	1.76	Stamp	1.20	-0.74
Pipe	4.19	1.65	Panel	1.20	-0.73

M: Mean

Internal Consistency

The Cronbach Alpha internal consistency coefficient of the words unrelated to smoking was found to be 0.78, and the total item correlation was found to vary between 0.26 and 0.69. The Cronbach Alpha internal consistency coefficient of the words related to smoking was found to be 0.83 and the total item correlation is between 0.38 and 0.68.

Test-Retest Reliability

STFS was re-administered approximately 40 days later to a total of 120 participants selected from each age group in equal numbers among these participants (smoking male n = 30, non-smoking male n = 30, smoking female n = 30, non-smoking female n = 30). The reliability coefficients of the test were calculated separately for smoking and non-smoking groups and related and unrelated words. As a result, when test-retest reliability coefficients were calculated for related and unrelated words in terms of reaction times and correct numbers, the lowest correlation ($r=0.67$, $p<0.001$) was found in the correct responses of smokers to related words, while the highest correlation was ($r=0.91$, $p<0.001$) found in the correct responses of smokers to unrelated words. Test-retest reliability of related and unrelated words are given in Table 3.

Results of Analysis for Reaction Time

In order to determine whether reaction times differ according to smoking status, age and word type, a 3 (Age: Young, Adult, Old) × 2 (Smoking: smoking, non-smoking) × 2 (Word type: related, unrelated) repeated measures analysis of variance (ANOVA) was conducted in a sample of 70 different people who did not participate in the previous stages of the study, ANOVA results regarding the reaction times of the participants in the STFS can be viewed in Table 4.

According to the results, age ($F_{1,64}=45.28$, $p<0.001$, $\eta^2=0.58$) and word type ($F_{1,64}=40.88$, $p<0.001$, $\eta^2=0.39$) were statistically significant. In addition, age and smoking variables ($F_{1,64}=4.22$, $p<0.05$, $\eta^2=0.12$) and word type and age ($F_{1,64}=11.05$, $p<0.001$, $\eta^2=0.26$), word type and smoking ($F_{1,64}=44.98$, $p<0.001$, $\eta^2=0.41$) and word type, age and smoking variables ($F_{1,64}=10.07$, $p<0.001$, $\eta^2=0.24$), the interaction effects were also found to be significant.

Multiple comparisons between means were made with the help of t-tests ($0.05/24$, $p=0.002$) performed by Bonferroni correction in order to determine the source of the interaction detected in the results of variance analysis. Whether the response times of the young, adult and old participants who smoke and those who do not smoke differ depending on the word type was examined using the t-test for dependent groups.

According to the results of the analysis, the average duration of the reactions of smoking-related and unrelated words ($t=9.24$, $p<0.002$) and smoking adults ($t=4.83$, $p<0.002$) were statistically significant. Accordingly, the average reaction times of the responses of both young people smoking and smoking adults for the related words (Young: 802.08 ± 102.89 , Adult: 1033.15 ± 191.00) are compared to the mean times of the reactions given for unrelated words (Young: 720.87 ± 98.46 , Adult: 933.35 ± 184.71) higher. On the other hand, there is no significant difference between the average reaction times of the smoking elderly and non-smoking youth, adults and old for related and unrelated words.

The average reaction times of the participants in different age groups who smoke and those who do not smoke to the related and unrelated word lists are shown in Figure 1 and Figure 2.

Table 3. Test-retest Reliability of STFS Based on Reaction Times and Accuracy for Smokers and Non-Smokers

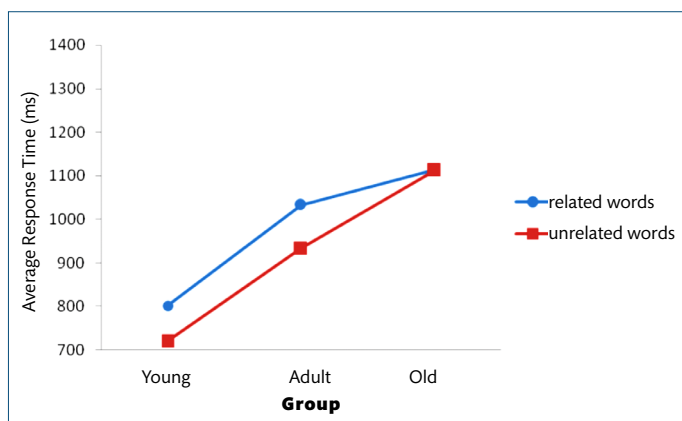
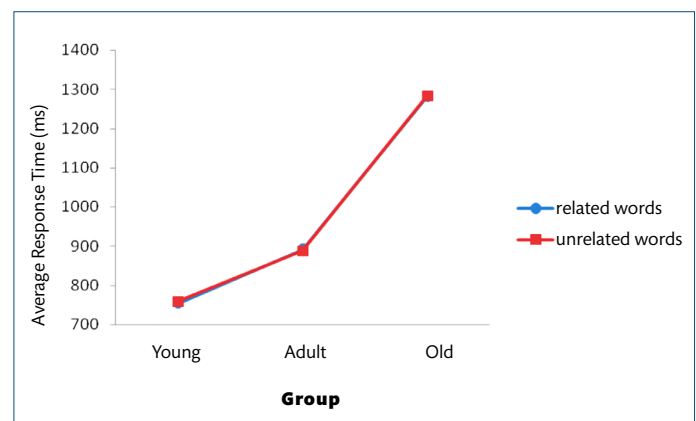
	Reaction Times		Accuracy	
	Smokers	Non-smokers	Smokers	Non-smokers
Related words	0.88***	0.89***	0.67***	0.70***
Non-related words	0.91***	0.90***	0.84***	0.74***

*** $p<0.001$. Correlation coefficients of reaction times and accuracy.

Table 4. Repeated Measured ANOVA Results for the Reaction Times of the Participants in STFS

Predictor	Sum of Squares	SS	Mean Square	F	p
Between Subject					
Age (A)	4474541.157	2	2237270.578	45.287	0.000*
Smoking (B)	20083.669	1	20083.669	.407	0.526
A x B	417290.868	2	208645.434	4.223	0.019*
Error	3161716.822	64	49		
Within Subject					
Word Type (C)	30818.127	1	30818.127	40.883	0.000*
A x C	16679.597	2	8339.799	11.050	0.000*
B x C	33951.297	1	33951.297	44.984	0.000*
A x B x C	15212.027	2	7606.014	10.078	0.000*
Error	48303.247	64	754.738		

* $p < 0.05$, Age (A): Young, Adult, Old; Smoking (B): Smoker, Non-smoker; Word Type (C): Related, Non-related; SD: Standart Deviation.

**Figure 1.** Average Response Times of Smokers to Related and Unrelated Word Lists**Figure 2.** Average Response Times of Non-Smokers to Related and Unrelated Word Lists

DISCUSSION

This study aimed to develop the Stroop Test For Smokers that measures attentional bias and can be used in Turkey. To summarize, in the first stage of the study, cigarette related and unrelated word lists that can be used in STFS were created. In the second stage, a different sample of participants in the three age group was asked to evaluate the words obtained in the previous stage on a five-point Likert-type scale. As a result, nine cigarette-related words were determined, followed by nine unrelated words equivalent to this word as the number of letters and syllables. Accordingly, STFS consists of 18 words in total.

In the last stage, STFS was presented to different participants from three age groups who did not participate in the previous stages, and it was examined whether the reaction time to related and unrelated words differed in the smoking and non-smoking groups. As a result, it was found that there was a significant difference in the reaction times of smokers and non-smokers to smoking-related and unrelated words. Accordingly, the reaction times of smokers to the words related with smoking was longer than the reaction time of non-smoking. When evaluated in terms of age groups, it was observed that the reaction times of smoking adolescents and adults to the words related to smoking was longer than the non-smokers. On the other hand, there is no significant difference in the reaction times of old smokers to words related to smoking compared to non-smokers. Considering the purpose of the study, participants who smoke are expected to react to smoking-related words longer than non-smokers, and the research findings support this expectation. When various studies in the literature are examined, it is

observed that participants who smoke react to the words related to smoking in a longer time (13, 19, 26). Accordingly, the finding is also compatible with the literature. The fact that there was no difference in the reaction time of non-smokers to words related to smoking and unrelated words shows that the two different types of words (related and unrelated to smoking) used did not cause attention bias in non-smokers included in the study as a control group. This finding supports that the STFS is a tool that can evaluate the attention bias towards smoking-related stimuli in smokers.

Another aim of the study was to investigate whether the reaction time of the participants to the words related and unrelated to smoking differ depending on whether the participants were young, adult, old and whether they smoke or not. At the same time, in all age groups, smokers are expected to respond to smoking-related words longer than non-smokers of the same age group.

Reaction times of non-smoking young, adults and old participant do not differ according to the word type, as expected. In the case of smokers, it was found that the reaction times of young and adult participants differ depending on the word type. Smokers in both samples responded to smoking-related words longer than non-smoking-related words. The fact that the reaction times of young and adult smokers to the words related to smoking were longer than the reaction times to unrelated words is compatible with the literature (11, 13, 19). In other words, attention bias occurs in young and adult smokers. This situation shows that STFS is a tool that can be used in the investigation of attention

bias towards stimulants associated with smoking in young and adult smokers.

It is observed that the reaction times of old smokers did not differ according to the word type. Comparison is difficult because there is no study in the literature with modified Stroop tests like STFS in this age group. The lack of difference in the elderly may be related to cognitive impairment due to aging, limited technology use skills of the elderly, or longer reaction times due to aging. It will be beneficial to repeat the study for this age group. In this context, the use of STFS in the elderly is limited.

When the items that form the STFS are examined, it is seen that the word list related with smoking consists of the words “cigarette, tobacco, nicotine, cigarette butt, ashtray, lighter, smoke, ash, pipe”. The words obtained in this study are similar in content to the words used in the literature (10, 13, 26). It is recommended that the words used in modified Stroop tests do not contain color information (12). Based on this, the words obtained in our study do not contain object and color information about the colors used in the Stroop test. On the other hand, the number of items in the test created within the scope of this study differs from other tests. When the researches in the field were examined, it was seen that there was no standard in terms of the number of items contained in STFS and similar tests (12). For example, Waters et al. used (10) 11 words related to smoking, Mogg et al. (13) and Field et al. (14) used 12 words related to smoking in their studies. On the other hand, Domier (9) used 26 words in his study. In this study, a total of 18 words; nine words related and nine words unrelated to smoking were selected. We believed that the variation in the number of words may be due to the creation of common word lists for three different age groups, including the elderly. In addition, since this is the first study developed Stroop Test for smokers using Turkish words, the number of words obtained may be changed in future studies. Findings regarding the validity and reliability of the test also support the usability of the test. Considering these results, the Turkish STFS is a test that can be used in young and adults. Unlike its counterparts abroad, the answers from the elderly participants were also evaluated at the stages of identifying the words that make up the test, and the test was also applied to the elderly. However, since the test was applied for the first time in this age group, whether the findings differ in terms of smoker and non-smoker old participants and its relationship with attention bias in this age group should also be supported by further studies. The small number of old participants in the study is among the limitations of the study. The main reason for the low number of old participants is the difficulty in reaching older participants who smoke. In further studies, it would be appropriate to include more elderly participants in order to better test the validity and reliability of the findings in this age group.

In conclusion, STFS is a reliable and valid measurement tool that can be used in the investigation of smoking-related attention bias in different age groups.

** Some of the research data were presented within the scope of the first author's master's thesis.*

Committee Approval: Ethics committee approval was received from the Hacettepe University Ethics Commission by decision numbered 433-2851.

Informed Consent: Written consent forms were obtained from the participants.

Peer-review: Externally peer-reviewed

Author Contributions: Concept – EK; Design – EK; Supervision – EK; Data Collection and/or Processing – EK; Analysis and/or Interpretation –EK, ZÇ; Literature Search – EK, ZÇ; Writing Manuscript – EK, ZÇ; Critical Review – ZÇ.

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