

Abstract

Objective: The present study was conducted to determine the effect of subliminal presentation of smoking pictures on addiction potential, addiction acknowledgement, and addiction craving.

Method: A quasi-experimental research method along with pretest-posttest/control group design was employed in this study. The statistical population of this research included the male smokers who had presented to Rasht addiction treatment clinics (District one) in 2017. From among them, 40 men were selected through convenience sampling method and were randomly assigned to one experimental group (n=20) and one control group (n=20). The Iranian Addiction Potential Scale (Zargar, 2006), Addiction Acknowledgement Scale (Weed et al., 1992), and Drug Craving Scale (Somoza et al., 1995) constituted the data collection instruments. Following the administration of the pretest, smoking pictures were subliminally presented to the experimental group, while the control group was exposed to subliminal neutral color pictures. After completing the task, both groups were subjected to the post-test. **Results:** The results of this study showed that there was a significant difference between the mean ranks of addiction craving scores in the experimental group, which means that the rate of craving increased in the experimental group in comparison with the control group. However, there was no significant difference in variables of addiction potential and addiction acknowledgement ($P > 0.05$). **Conclusion:** Considering the significant effect of subliminal presentation of smoking pictures on addiction craving, the subliminal presentation can be used in clinical settings as a therapeutic and preventive method for reducing addiction craving.

Keywords: subliminal presentation, smoking pictures, addiction potential, addiction acknowledgement, addiction craving

The Effect of Subliminal Presentation of Smoking Pictures on Addiction Potential, Addiction Acknowledgement, and Addiction Craving

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Introduction

Research on the question of whether external information can be effective on perceptions, motivations, decisions, and emotions, in different areas of psychology such as an organization (O'Helman et al., 2012), Excitement (Zejunc, 1980), Clinical (Jones et al., 2013), cognitive (Keylestrom, 1987) and social (Fazio, 2001) is expanding (quoted by Van in Plog, Burrowschat, Versluis, & Verkoyl, 2017). Subliminal presentation is a classical but controversial topic in empirical psychology (Dehaene & Changeux, 2011). How much information and knowledge can be obtained through subliminal presentation, and how this non-significant cognitive process occurs, is still known as a familiar and challenging topic (Armstrong & Dienes, 2013). Research shows that many of the complex mental behaviors and mental activities of humans take place without consciousness. The nonsensical processing refers to situations where an unobtrusive stimulus on thoughts, emotions, actions, learning, or memory is effective (Kawakami & Yoshida, 2015). In fact, the results of studies indicate that high-level mental processes from activation to implementation and, finally, completion of the action can be carried out completely unconsciously (Hassin, 2013). As individuals continuously encounter a large amount of information, unconscious processes act as an adaptive process that enables the person to make signs and thereby identify and interpret changes in the environment and quickly begin to respond to behavioral consciousness before it can get more information (Wilson, 2002). Various studies indicate that sublingual induction is possible in brain activation. Neurons respond to thalamic inputs in the cortex. Of course, even peripheral stimuli that are unable to produce complete cortical responses and which are not sufficiently intelligent to detect can cause cortical activity (Ferrè, Sahani & Haggard, 2016). The growth of interpersonal trust can take place before and under consciousness (Huang & Murnighan, 2010). Perceptual grouping can also occur in the absence of consciousness (Montoro, Luna, & Ortells, 2014) and, of course, many other studies that show unconscious and unlucky are active in many processes. In fact, unconscious and unconscious can play an important role in many psychological, behavioral, cognitive, emotional, and even physiological and neurological aspects.

Subliminal induction is a subset of cognitive unconsciousness in which the stimulus is not consciously perceived (Hassin, 2013). Subliminal induction occurs through an automated process that people are not aware of, reinforcing a number of beliefs. People are not able to protect themselves against this type of persuasion however (Verwijmeren, Karremans, Stroebe, & Wigboldus, 2013). In fact, subliminal messages can have a variety of effects on thoughts and behaviors (Hassin, 2013). Evidence suggests the effectiveness of Subliminal presentation of figures, words and brands in many aspects such as judging people (Bargh & Pietromonaco, 1982), advertising judgment (Channouf, 2000), self-

actualization (Baldwin, Carrel & Lopez, 1990).), attitudes (Zajonc, 1980) and behaviors (Brasel & Gips, 2011) (quoted by Légal, Chappé, Coiffard, & Villard-Forest, 2012). Subliminal messages can be used to facilitate the processing of conscious information (Van den Bussche et al., 2009), impact choices and decisions (Bermeitinger et al., 2009), change mood (Monahan et al., 2000), increase the motivation (Arts et al., 2008), the effect on intent and intention (Hassin et al., 2007), impact cognitive mechanisms (Lau & Passingham, 2007), and even change political attitudes and the intention to vote (Hassin et al. 2007) (According to Shabahang, Soltani Shal, Nikogoftar, & Hakim-Javadi, 2017). Also, studies on subliminal induction indicate the impact of this method on a variety of subjects such as facilitating the voluntary action preparation (Le Bars, Hsu & Waszak, 2016), early perceptual analysis of targets, and the evaluation and selection of goals (Lu, Zhang, Hu, & Luo, 2011), source evaluation (Legal et al., 2012), beliefs and attitudes (Krosnick, Jussim, & Lynn, 1992), and predisposition (Smith, Dijksterhuis, & Chaiken, 2008). In fact, according to research findings, it should be acknowledged that subliminal information and data can be meaningfully explained beyond conscious consciousness. In fact, individuals can detect the incomplete object's back-end configuration in subliminal-scenes (Mudric & Koch, 2013), solve the logical problems presented subliminally (Karpinski et al., 2016), and induce from the sequence of images and pairs of subliminal words (quoted from Shabahang et al., 2017). In general, various studies have shown that subliminal induction can be effective, although under certain conditions and by taking into account a few points (Bretmininger et al., 2009; Karremans, Stroebe, & Claus, 2006; Verwijmeren et al., 2011) In this regard, according to a number of points and considering them, subliminal induction is recognized as an efficient and feasible method.

Therefore subliminal perception and induction as well as subliminal messages are subjects that can relate to a wide range of phenomena and cause different consequences. One of the most important and prevalent phenomena that can be studied by subliminal perception and induction is addiction, a phenomenon that seems to be uncontrollable in spite of different approaches to prevention, treatment and control, and requires more innovative methods for prevention, treatment and control.

Addiction is considered to be a fundamental issue in various aspects of health, which is defined as a behavior with a defect in control and harmful consequences. Addiction refers to a disorder in which a person has an emotional behavior which has initially had delightful effects. In general, these delightful effects are due to changes in the Mesolimbic dopaminergic system. Of course, many neurological and hormonal systems such as Mu opioid, Serotonin, Norepinephrine, Anandamide, and hypothalamic-pituitary-axis (HPA) are also effective (Brewer & Potenza, 2008; Volkow & Wise, 2005; quoted by Sussman, Lisha & Griffiths, 2011). Addiction can include various aspects such as internet addiction, pathological gambling, compulsive sexual behavior, compulsive

buying, exercise dependence, addiction to food and even addiction to work (Zilberman, Yadid, Efrati, Neumark, & Rassovsky, 2018).). One of the broadest and most important dimensions of addiction is drug and tobacco addiction. Alcohol and drug abuse is one of the most important and most prominent problems of mental health in contemporary societies (Weed, Butcher, McKenna, & Ben-Porath, 1992). Drugs, alcohol, tobacco, opium, heroin and many other synthetic and semi-artifacts being misused are a major part of today's world. These materials not only affect the health of the individual but also directly affect the economy, the social, cultural and other dimensions of the lives of people (Kamkari & Shekarzada, 2012). Drug related disorders are also associated with a wide range of psychotic symptoms and disorders (Miller, Shields, Campfield, Wallace, & Weiss, 2007).

Addiction potential, addiction acknowledgement, and addiction craving are some of the most important concepts of addiction. Addiction potential (addiction readiness) evaluates the readiness of vulnerability to drug abuse, whether or not a person is currently abusing drugs (Qadimi, Karami & Yazdanbakhsh, 2014). In fact, addiction readiness suggests that some people are susceptible to addiction and if they are exposed to it, they get addicted, while if they do not have the potential, they will not get addicted. In other words, before the person uses drugs, the condition and readiness for drug abuse is developed which is considered as readiness for addiction (Zeinali, Vahdat and Hamednia, 2007). Research findings show that unhealthy developmental backgrounds, addiction potential, and addiction readiness play a major role in the formation of addiction (Zeinali, 2013). Addiction acknowledgement also implies the acceptance and confirmation of addiction and drug abuse. Moreover, considering addiction craving, Rosenberg (2009) defines craving as a personal and multidimensional phenomenon in which the one tries to gain desirable feeling and win over undesirable ones. In fact, addiction potential, addiction acknowledgement, and addiction craving, are important aspects affecting the addiction process. Based on this, it is possible to make changes in addiction potential and addiction acknowledgement by using subliminal induction which might ultimately lead to changes in the addiction process.

Little research has been done on the use of subliminal induction in addiction. But it's important to note that much of the studies in this regard report the effectiveness of subliminal induction in addiction. Palmatier & Bornstein (1980), using subliminal symbiotic stimulation as treatment adjunct, succeeded in maintaining more unwillingness to smoke. (As cited in Thornton, Igleheart & Silverman, 1987). Schurtmann, Palmatier & Martin (1982) found that when subliminal symbiotic stimulation in 6 sessions was given to the participants in a two-week period, the participants in the subliminal experimental group significantly participated more than those in the control group in the therapy program. In their research on heroin addicts in New York VA methadone clinic, Thornton, Igleheart & Silverman (1987) selected 47 addicts and placed them in

experimental and control groups. In addition to the usual methadone treatment program, both groups were subjected to verbal sublingual messages for 24 sessions (4 times a week for 6 weeks). For the experimental group the message "Mother and I are one" and for the control group the message "People are walking" were presented. The results of the study showed a significant reduction in the use of heroin and other prohibited drugs during the post-intervention period in the experimental group as compared with control group members. Also, Lundal et al. (2008) state the existence of subliminal distortions in addiction. In Lundal et al.'s (2008) study, subliminal images were presented to three non-smokers, smokers deprived for 12 hours and non-deprived smokers groups. The results showed that smokers group showed an error in the processing of smoking-related stimuli, while this did not occur in the non-deprived smokers group as well as the non-smokers group.

Regarding the role of perception, induction and presentation of subliminal induction and messages in relation to a wide range of different phenomena and outcomes, studying the effect of subliminal induction on addiction as a phenomenon resistant to many treatments is required. . The lack of sufficient and of course original research in this regard, especially in Iran, underscores the importance of examining the role of subliminal induction in addiction. In sum, it is important to understand whether subliminal induction affects addiction potential, addiction acknowledgement, and addiction craving or not. The purpose of the present study was to investigate the effect of subliminal presentation of smoking pictures on addiction potential, addiction acknowledgement, and addiction craving.

Method

Participants, sample, and sampling method

A quasi-experimental research method along with pretest-posttest/ control group design was used in this study. The statistical population of this research included male smokers who had presented to Rasht addiction treatment clinics (District one) in 2017. Based on Cochran's Sample Size Formula, 40 men were selected through convenience sampling method and were randomly assigned to one experimental group (n=20) and one control group (n=20). The entry criteria for participants were: being a man, a smoker, between 20 and 40 years old as well as the consent of the participants. Exit criteria were physical and psychiatric visible disorders. It should be noted that all necessary licenses were taken from the relevant organizations before the research was carried out. Also, ethical considerations, including explanations regarding the subject, tools, and research objectives were fully respected in this research. After sampling and assigning the participants into the experimental and control groups, the participants were transferred to an environment having a laboratory with calm, and stress-free conditions to minimize the effects of extraneous variables and therefore reduce the possibility of obtaining results contrary to reality.

Instruments

1. Iranian Addiction Potential Scale: This scale was designed by Wade et al. (1992), whose Iranian format was developed by Zargar (2006) in terms of the psychological and social status of Iranian society. The Iranian addiction readiness scale is composed of 36 items and 5 scales of the lie detector, which consists of two active-addictive sub-scales including antisocial behaviors, desire to use drugs, anxious attitudes, depression and excitement, and the passive addiction sub-scales including non-assertiveness and depression. Items are based on a Likert scale from I totally disagree (zero) to fully agree (3) with higher indicating more readiness for addiction and less grades as less willingness to addiction. Zargar, Najarian, and Naiami (2006) report the Structural validity correlation of this questionnaire as (0/45) using SCL-25 and the criterion validity of the scale is reported by conducting Cronbach's alpha 0.90. In another study Zarger et al. (2008) suggest a suitable validity and reliability for Iranian Addiction Potential Scale. The scale validity using Cronbach's alpha coefficient for the whole scale, active and passive scales was 0.90, 0.91 and 0.75, respectively.

2. Addiction Acknowledgement Scale: This scale was designed by Wade et al. (1992) to measure the inclination to alcohol and drug use, which consists of 13 items. Kurdmirza (2008) states that the validity of the Addiction Acknowledgement Scale is 0.75 using the Cronbach's alpha (quoted by Akbari Zardkina and Zandi, 2016). Rostami, Nosrat Abadi and Mohammadi (2007) reported Cronbach alpha of 0.73, and Minooei and Salehi (2002) report 0.62. in this study which was conducted on a sample of 1,000 high school students and 200 volunteer addicts, the addiction acknowledge scale could distinguish between people with Drug abuse potential and normal people.

3. Drug Craving Scale: This test is an 8-item self-report tool developed by Somoza et al. (1995) which evaluates the duration, frequency and severity of drug craving on a 5-point Likert scale from 0 to very high (4) Measures. This test has shown a high correlation with the severity of addiction, and its Cronbach's alpha coefficient is reported to be 88% (quoted by Basharpour, Mohammadi & Asadi Shishegaran, 2017).

4. The Geneva Smoking Pictures: Khazaal, Zullino, & Billieux's study (2012) is a collection of smoking-related images containing 60 images related to smoking Khalil, Zollino & Bilox (2012) presented a set of images to 91 participants in their research to evaluate images based on classic emotional pictures validation which is designed by international affective picture system (NIMH center for the study of emotion and attention, 2002). Images were scored based on three dimensions of value (from positive to negative), emotional arousal (from high arousal to low arousal) and dominance (from concave to prominent). Participants were also evaluated by Fagerström test for nicotine dependence. Standard ratings for value, arousal and dominance of images were appropriate. Also, the results indicated a relationship between the arousal and

prominence of the images with a greater dependence on nicotine. Finally, the Geneva Smoking Pictures base provides images for researchers in the field of nicotine and tobacco.

Procedure

After selecting the samples they were randomly assigned into experimental (20 participants) and a control (20 participants) groups. Then the addiction potential, addiction acknowledgement and addiction craving scales were presented to participants in both groups. After completing the pre-test, members of the experimental group were exposed to subliminal smoking images. Control group members were provided color subliminal images. The images were made using the Picture to Exe software and then were presented to the participants. In order to present subliminal effect each image was shown for 20, 40, or 60,000 milliseconds. In order to prevent people from predicting the time and place for providing the target stimulus, as well as their distraction from the point of fixation, the target stimulus had to be presented at intervals of 2 to 7 seconds (Ruys & Staple, 2008). In the same vein, images of each set at intervals of 2, 8, 5, 3, and 4 seconds and at a distance of 40 cm were presented to the participants. The images were presented in a direct point of view and at a radius of 15 cm from the center of the image on the computers screens in random order (Hosni, & Amiri, 2015). Previous research in this area shows that the model used in this study is of high validity in preventing the awareness of individuals from the subliminal stimulus (Staple, Coman, & Ruys 2002; Ruys & Staple, 2008). For more certainty, a briefing was held at the end of the experiment, which showed that none of the subjects were aware of the test objectives and that they were not able to recognize the images. In the end, after subliminal induction, both groups responded to addiction potential, addiction acknowledgement, addiction craving scales. Finally, the subjects were fully told about the research, and the subject, objectives and stages of the research were explained to them.

Results

The age range of the participants in the study was from 22 to 40 years old with an average (and standard deviations) of 15.28 (1.20) years. Also, 60% of them were single and 40% were married, of which 15% had primary education degree, 45% had below high school diploma degree, 30% had diplomas and 10% had university degrees. 70 percent of these people had jobs, and 30 percent did not have a good income. Regarding the number of drug abstinence attempts, 24 percent less than 5 times, 47 percent between 5 and 10 times, and 29 percent have withdrawn from drug use more than 10 times. Also, 43.5% were under treatment for less than one month and 46.5% were under treatment for more than one month. The descriptive statistics of the variables studied is presented in Table 1 based on group and test type.

Table 1: Descriptive Statistics of the Variables Studied based on Group and Test Type

Variables	Experimental group				Control group			
	Pre-test		Post-test		Pre-test		Post-test	
	mean	Standard deviation	mean	Standard deviation	mean	Standard deviation	mean	Standard deviation
Craving	17.55	1.60	20.85	1.69	14.05	10.13	14.35	5.83
Acknowledgement	18.75	2.61	18.25	3.16	32.30	18.53	30.65	16.32
Potential	95.65	8.35	82.50	8.44	138.65	59.92	135.75	47.71

In order to determine the effectiveness of the intervention used in this study and due to the mismatch of the data with the normal distribution and meaningfulness of the Kolmogorov-Smirnov test, for all three variables of craving, acknowledgement and potential in both the experimental and control groups ($P < 0.05$), the non-parametric Mann-Whitney U was used. These data, even after statistical transformations known as logarithms based on 10, did not have normal distribution. Before determining the difference between the post-test scores of the groups, the difference between the scores of the post-test groups was calculated from the pre-test scores. Then, the differentiated scores were compared. The results of Mann-Whitney U test for comparing the ranked mean for craving, acknowledgement and potential variables experiments and control groups are presented in Table 2.

Table 2: Mann-Whitney U Test Results for Determining the Difference between the Scores in the Studied Variables

variables	groups	Ranked mean	Mann-Whitney U statistics	Z	Sig.
Craving	Experimental	24.20	126.00	-2.028	0.403
	Control	16.80			
Acknowledgement	Experimental	20.75	195.00	-0.140	0.889
	Control	20.25			
Potential	Experimental	21.35	183.00	-0.466	0.641
	Control	19.65			

As is shown in Table 2, there is a significant difference between the average craving scores in the experimental group after the intervention (presentation of the subliminal presentation of smoking images) ($P < 0.05$, $Z = -2.28$; that is, Compared with the control group, the rate of craving increased in the experimental group (24.24 vs. 16.80). The results of this non-parametric analysis for two variables of acknowledgement and potential were not significant ($P > 0.05$). Graph 1 shows the score change trend for craving, acknowledgement, and potential variables in both the experimental and control groups in the pre-test and post-test phases based on ranked mean.

Discussion and Conclusions

The purpose of this study was to investigate the role of subliminal smoking images in addiction potential, addiction acknowledgement, and addiction craving in drug abusing men. That is, is there any possibility of a change in

addiction potential, addiction acknowledgement, and drug abuse craving through the presentation of the subliminal smoking images? According to the results, the presentation of subliminal smoking images led to increased drug abusing craving participants, but did not affect the addiction potential and addiction acknowledgement. This means that the participants in the experimental group who were presented with subliminal smoking images showed a significant increase in the post-test craving scores compared to the control group participants who were presented with neutralized subliminal color images. This is indicative of an increase in drug abuse craving due to the presentation of subliminal smoking images. The results of this study are in line with the results of studies done by Palmatier & Bornstein (1980), Schurtman, R., Palmatier, J. & Martin, E. (1982), Thornton, Igleheart, & Silverman (1987) and Lundal et al. (2008) which confirm the effectiveness of subliminal interventions in addiction.

In a study done by using subliminal symbiotic stimulation as adjunct treatment for addictive behavior, Palmatier & Bornstein (1980) used rapid smoking method to help smokers abandon their habits. After the completion of the 12-session treatment, all smokers in both the control group and the subliminal experimental group were reluctant to smoke. But after one month, participants in the experimental group who received the simultaneous subliminal messages kept the cigarette tendency (67% vs. 13%) more than the control group (quoted by Thornton, Igleheart, & Silverman, 1987). In a study conducted on 72 alcoholic people in a resident treatment program, Schurtman, R., Palmatier, J. & Martin, E. (1982) found that when the subliminal symbiotic stimulation was given to the participants in 6 sessions in a two-week period, the members of the subliminal experimental group participated more in the therapeutic program than those in the control group. Also, in a three-month follow-up test, among those who were initially more symptomatic, those who received the message "Mom and I were the one", showed decreased anxiety and depression, increased self-esteem, and decreased alcohol consumption compared to the control group. In their research on heroin addicts in New York's Methadone Clinic, Thornton, P., Igleheart, H., & Silverman, L. (1987) selected 47 addicts and placed them in experimental and control groups.

In addition to the usual methadone treatment program, both experimental and control groups were presented with 24-hour verbal sublingual messages (4 times a week for 6 weeks). In the experimental group, the message "Mother and I are one" and to the control group, the message "People are walking" were presented. The results showed a significant reduction in the use of heroin and other prohibited drugs during the post-intervention period in the experimental group compared with the control group members. Also, the results of follow-up test showed that the experimental group experienced more control over habits, had better job performance and, of course, more positive dreams in relation to their spouse or child than the control group. Also, Lundal et al. (2008) note the existence of subliminal bias in addiction and addiction relapse. In Lundal et al.'s

(2008) study, subliminal -images were presented to three groups: the non-smoker group, the smokers deprived for 12 hours group, and non-smokers group. The results showed that smokers showed an error in the processing of smoking-related stimuli, while this did not happen in the non-smokers group deprived of smoking as well as non-smokers group. In fact, tobacco deprivation led to increased subliminal processing of the smoking-related stimuli, while it had no effect on the processing of subliminal processing of emotional stimuli.

The results of this study, as studies of Palmeriter and Burnstein (1980), Shartman, Palnter & Martin (1982), Thorenton, Ellhart & Silverman (1987), and Lundal et al. (2008), show the effect of subliminal induction on addiction. The presentation of subliminal smoking images to the experimental group in comparison with the control group (providing subliminal color images) led to increased addiction craving in them. Indeed, participants in the experimental group showed a significant increase in the post-test scores in comparison with the control group participants, indicating an increase in the potential of addiction craving due to the presentation of smoking images. According to the results of the present study as well as those of the previous studies, subliminal induction can be an effective factor in addiction. This means that using subclinical induction and programs can reduce addiction and related variables such as drug abuse craving in addicted people. Therefore, subliminal programs can be used as the main or complementary methods along with the main methods for preventing, treating and controlling addiction.

Finally, it is important to note that the present study suffered from a number of limitations. In this research study only male participants participated and since gender can be considered a determining factor, it is suggested that in future studies, female participants be examined to measure gender difference in subliminal induction of smoking images and their effect on addiction potential, addiction acknowledgement, and addiction craving. Extraneous variables such as biological, social, cultural, and economic conditions of the participants in the present study were not completely controlled for. In the same vein, it is suggested that future research be done by controlling and evaluating the above variables. It is also suggested that other studies in the area but in different environments, and with larger number of participants be done so that the results become generalizable. Based on the results of the present as well as previous studies, it is recommended that research on the possibility of preventing, treating and controlling addiction through subliminal programs, either as a primary method or as a complementary method be done in order to provide more information and background regarding the effective impact of subliminal induction on addiction.

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