

Dynamic Role of Negative Affect and Craving as Precipitants of Relapse among Drug Abusers

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Abstract: Substance abuse is commonly thought of as a "chronically relapsing condition" (Witkiewitz & Marlatt, 2004), with both youth and adults returning to substance abuse at high rates after treatment. Studies have shown that 66% of adult addicts and 75% of young addicts relapse within six months of stopping addiction treatment (Njoroge, 2018). Relapse can be attributed to several internal and external causes including mental illnesses, withdrawal, cognitive deficits, boredom, unemployment, defective coping strategies, interpersonal conflict, social pressure, lack of support, stigmatization, negative affect, craving, lack of leisure activities, and treatment facilities (Ramo and Brown, 2008; Njoroge, 2018). The purpose of the study was to compare negative affect, craving, and a number of relapses as precipitants in the relapse process in young adults and middle adults. **Methodology:** The research used a pre-post experimental controlled follow-up study design to verify the hypotheses. The study included young adult (n = 86) and middle adult (n = 54) male participants who were taking in-patient treatment for relapse. In addition to collecting sociodemographic data, other factors such as craving, and negative affect were measured using standardized instruments including a brief substance craving scale, and a positive and negative affect schedule scale. The data were statistically analyzed. **Results:** Disparity in sociodemographic factors were seen in both groups with young adults being more likely to be single, unemployed, and belonging to lower socioeconomic status. Among factors associated with relapse, the middle adult group scored significantly higher on negative affect, (P = .005). The most common reason cited for relapse in the young adult group was a desire for a positive mood and the middle adult reported negative mood and lack of family support as the primary precursors. However, the young adult group reported external pressure to use as the prominent factor of relapse. **Conclusion:** This study highlights the role of craving, negative affect, and a number of relapses as determinants in drug dependence and relapse. Relapse was found to be a complex multifactorial phenomenon. Despite differences in presentation, somewhat similar relapse mechanisms were seen in both groups

Keywords: Relapse, drug abuse, sociodemographic factors, negative affect, craving, positive and negative affect schedule, brief substance craving scale, duration of drug abuse, number of relapses

1. Introduction

Drug abuse is a "persistently relapsing condition" (Witkiewitz & Marlatt, 2004), with both youth and adults habitual to substance abuse at high rates after treatment. Studies have shown that 66% of adult addicts and 75% of young addicts relapse within six months of stopping addiction treatment (Njoroge, et. al., 2018). Relapse can be attributed to many internal and external causes including mental illnesses (anxiety/neuroticism), withdrawal, cognitive deficits (intellectual and learning disabilities), boredom, unemployment, defective coping strategies, interpersonal conflict, social pressure, lack of support, stigmatization, lack of leisure activities and treatment facilities (Ramo and Brown, 2008; Njoroge, 2018). Research in the substance abuse literature has focused on the age of onset of substance use as a proximate determinant of future drug use and dependence in adulthood (Behrendt et al., 2009; Trenez et al., 2012; Mayet et al., 2012). A major focus in research examining the process of addiction relapse has been the characterization of relapse "determinants," or contextual features of situations in which adults tend to use after they have been in treatment for drug problems. In the original work conducted by Marlatt and colleagues (1985) intrapersonal or environmentally-determined situations account for (58%) of the relapse process.

Emotions also play a major role in the development, maintenance, and cessation of substance use disorders

(Shiffman, S, et. al., 2009). The strong association between negative affect and drug use disorders is apparent in the high rates of co-occurrence of drug use disorders and affective disorders (Davis, Uezato, Newell, & Frazier, 2008; Kushner, Abrams, & Borchardt, 2000), and negative affect has been identified as one of the most significant predictors of drug lapses or relapse following treatment (Lowman, Allen, & Stout, 1996; Witkiewitz & Villarroel, 2009; Zywiak et al., 2006). Most studies show that abusers relapsing after a long period of abstinence fall prey to social pressure even after initiation of detoxification treatment (Ramo et al., 2005). A negative intrapersonal state also explains relapse and accounts for 33% of relapse cases (Ramo and Brown, 2008). A proportion of addicts have defective coping strategies, precipitating the use of illicit substances as a means to escape from negative affect such as sense of frustration, anger, depression, anxiety, boredom, and feeling of disappointment (Hyman and Sinha, 2009) and accounting for 55% in the presence or 26% in the absence of any cues of the drug (Hanson et al., 2011). Studies with alcohol-dependent patients have shown that ongoing depression increases the risk of relapse during and after treatment (Greenfield SF, Weiss RD, Muenz LR, et al., 1998; Witkiewitz K, Villarroel NA., 2009) and sudden increases in negative affect have been shown to immediately precede drug relapse (Shiffman S, Waters AJ., 2004). The emergence of SUD or relapse prevention can be modulated by either reducing the risk factors or enhancing the protective factors.

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Several models have been proposed to explain the associations between negative affect, craving, and drinking outcomes (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004; Le Moal & Koob, 2007). The Cognitive Behavioral Model of Relapse (Witkiewitz & Marlatt, 2004) and the Youth Relapse Model (Brown & Ramo, 2006) suggest that affective disturbance would influence the circumstances the youth and adults find themselves in, and thus their likelihood of using in those conditions. Baker et al. (2004) proposed an affective model of drug motivation, in which avoidance of negative affect during withdrawal is the primary motive for relapse to drug use. Recently, McCarthy and colleagues (2010) expanded the Baker et al. affective model to consider the importance of contextual influences (e.g., drug cues), awareness, and cognitive control in the interplay among negative reinforcement, learning, and craving.

Recent empirical work (Witkiewitz & Villarroel, 2009), which found a dynamic association between negative affective states and drug relapses following treatment, provided empirical support for the theories of McCarthy et al. (2010) and Stasiewicz and Maisto SA (1993), concluding that substance use treatments should focus on changing an individual's response to negative emotional states and management of the urges and craving. How negative mood may lead to substance use is through its effect on craving for alcohol and other drugs. Several current models of substance use disorder etiology or relapse have offered explanations for the interplay among negative mood, craving, relapse, and substance use. For example, learning-based models postulate that substance abusers learn that the use of drugs can temporarily alleviate painful emotions. After such learning has occurred, negative emotions trigger the desire for alcohol or drugs, which in the immediate absence of alcohol or other drugs is experienced as a craving. The craving in turn then drives the substance abuser to seek out and use alcohol or drugs to reduce the negative affect (Stasiewicz PR, Maisto SA., 1993).

Craving has been defined as a behavioral, reinforcement, and cognitive processing terms in drug relapse. It is often measured subjectively and generally regarded as a desire to use a drug (Sayette MA, Shiffman S, Tiffany ST, Niaura RS, Martin CS, Shadel WG., 2000). Marlatt and Donovan (2005) define craving as the subjective desire to use drugs and urge as the behavioral intention or impulse to drink. The Incentive Sensitization theory (Robinson & Berridge, 1993) claims that incentive salience is attributed to stimuli that have been accompanied by repeated drug use in the past. In the last two decades, studies of relapse have focused on a single precipitating factor such as craving (e.g., Breese et al., 2005). Drummond, Litten, Lowman, and Hunt (2000) proposed that the subjective experience of craving may not directly predict substance use, but a relapse may be predicted from the correlates and underlying mechanisms of craving. For example, Sayette and colleagues (2005) experimentally proved that cue exposure was predictive of nicotine craving, but only for smokers who were deprived of nicotine. Likewise, the craving was self-reported as a cause of relapse by those who drink alcohol or use other synthetic drugs (Maisto, O'Farrell, Connors, McKay, & Pelcovits, 1988; Connors, Maisto, & Zywiak, 1998). Prospective studies have shown that craving was associated with drug

use (Robinson et al., 2011). Apart from the above-mentioned studies, craving predicts drug taking and/or relapse following abstinence in cigarette smokers (Berlin et al., 2013). Moreover, several studies have specifically shown that craving predicts drug taking and/or relapse following abstinence, including in cigarettes (Sweitzer, Denlinger, & Donny, 2012).

Although there is a line of research on drug relapse and the interplay among negative affect, craving, and factors that contributed positively at a particular stage there are few studies examining the number of relapses, craving, negative affect, and other intrapersonal or interpersonal factors which contribute to the full-blown drug relapse following treatment (Petry N. M., 2002; Kadam, et al., 2017; S. Ramsewak et al., 2020; Gonzales et al., 2012). Hence, we decided to undertake the study to compare the correlates of drug relapse in drug abusers who are using any kind of drug. The primary goal of this study was to compare the correlates of relapse in young adulthood and middle adulthood. The study also assessed no. of relapse, negative affect, and craving between both the groups.

2. Methodology

The research used a pre-post experimental controlled follow-up study design to verify the hypotheses. The study included young adult 19-35 years (n = 86) and middle adult 36-55 (n = 54) male participants. The researcher approached the **Punjab Red Cross Society Saket Drug De-addiction Centre & Hospital, Patiala**. Only those participants were included in the study who were screened in as per the patient intake file. The file was consisting of assessment, diagnosis, referral, admission, and discharge. They were explained the importance of the study and encouraged to sincere responses. Appropriate conditions were created so that the participants could fill out the questionnaires without any disturbance. The informed consent was taken firstly from the authorities and the participants. After seeking permission, rapport building was done with the participants who showed their willingness to participate in the study. They were assessed with semi-structured performa containing the sociodemographic profile, details of substance use, number of relapses, scales, and questions about the aims of the study. All the self-report measures were administered individually in uniform sequence and strictly according to the guidelines mentioned in their respective manuals. The selected samples were between the ages of 18-55 years and were being treated at the hospital as in-patients. However, abusers who had other psychiatric illnesses were excluded from the study.

Instruments Used:

Sociodemographic profile: They were assessed with semi-structured performa containing the age, sex, marital status, education, number of relapses, year of drug abuse, etc. The socioeconomic status was followed specifically based on the Kupuswamy revised SES scale (2016).

Brief Drug Craving Scale (Somoza, E., Dyrenforth, S., Goldsmith, J., Mezinskis, J., & Cohen, M., 1995): This is a self-reporting tool consisting of 8 items, which was developed by Somoza, Dyrenforth, Goldsmith, Mezinskis,

and Cohen (1995). This instrument rates the time, frequency, and severity of craving on a 5-point Likert scale from not at all (0) to very much (4). This scale is highly correlated with addiction severity scales and its reliability using Cronbach's α was reported as 0.88 (Somoza et al., 1995).

PANAS (Watson, D., Clark, L. A., Tellegen, A., 1988): This scale is a self-report measure of affect. It consists of 20 items. Items 1, 3, 5, 9, 10, 12, 14, 16, 17, & 19 are scored for Positive affect and items 2, 4, 6, 7, 8, 11, 13, 15, 18, & 20 are scored as Negative affect. The total score is calculated as the sum of the 10 positive items, and then the 10 negative items. Scores range from 10 - 50 for both sets of items. For the total positive score, the higher the score the higher is the positive affect. For the total negative score, the lower the score the lower the negative affect. (Watson, Clark, & Tellegen., 1988) demonstrated internal consistency for the PANAS ranged between .86-.90 for positive affect and .84-.87 for negative affect. Test-retest reliability for the PANAS (1 week) was reported as .79 (positive affect) and .81 (negative affect) (Watson et al., 1988).

Objectives:

- 1) To assess negative affect and craving as determinants of relapse
- 2) Identify the vulnerable group following the determinants of relapse.

Hypothesis:

- 1) The young adult group would exhibit less craving as compared to the middle adult group.
- 2) The young adult group would exhibit less negative affect as compared to the middle adult group.
- 3) The young adult group would exhibit fewer relapse episodes as compared to the middle adult group.

Statistical Analysis:

Data analyses were carried out using IBM SPSS Statistics 22 (2013). Group differences were evaluated using Independent samples t-test as applicable. The level of significance for two-tailed P values was set at 0.05. The confidence interval was set at 95%. The obtained data were subjected to a number of statistical analyses pertinent to the research objectives of the study. Apart from descriptive statistics, the data were analyzed using t-test and One Way ANOVA to compare both groups.

3. Results

As per the table, no. 1 majority of patients in both the groups had completed twelfth grade and fewer had completed post-graduation as well. Almost 50% of patients from both groups were unemployed. Both the groups represented 60-70% of the patients from rural backgrounds. As per the table most of the patients belonged to the lower or middle class.

Results showed differences in marital, socioeconomic, and employment statuses in the two groups. The detailed sociodemographic profile of the sample is presented in Table 1.

Table 1: Shows the sociodemographic profile of the participants.

	Young Adult (N=86), n (%)	Middle adult (N=54), n (%)
Education		
Primary	-	1 (1.9)
Secondary	65 (75.6)	46 (85.2)
Graduate	16 (18.6)	6 (11.1)
Post Graduate	5 (5.8)	1 (1.9)
Occupation		
Student	8 (10.5)	-
Employed	29 (33.7)	26 (48.1)
Unemployed	48 (55.9)	28 (51.9)
Rural/Urban		
Rural	52 (60.5)	40 (74.1)
Urban	34 (39.5)	14 (25.9)
Marital Status		
Single	42 (78.8)	6 (11.1)
Married	43 (50)	46 (85.2)
Divorced	1 (1.2)	2 (3.7)
Socioeconomic Status		
Lower	46 (53.5)	32 (59.3)
Middle	40 (46.5)	21 (38.9)
Upper	-	1 (1.9)
Domicile		
Punjab	83 (96.5)	53 (98.1)
Other State	3 (3.5)	1 (1.9)

Table 2: Substance use history

	Mean=SD		t	P
	Young Adult (N=86)	Middle adult (N=54)		
Duration of years (years)	5.848=3.156	10.166=6.157	5.466**	.000
No. of Relapses	3.360=2.190	4.537=3.917	2.278	.61 (NS)

Significant P<0.01 Independent Samples t-test SD Standard Deviation

Young Adults (19-35 years), Middle adults (35-55 years)

As evident in Table No 2 the mean scores of the group of the young adult on the duration of years of substance use (M=5.848, SD=3.156) and no. of relapses (M=3.360, SD=2.190) were comparatively lower than the group of middle adults on the duration of years (M=10.166, SD=6.157) and on no. of relapses (M=4.537, SD=3.917). Statistically, a significant difference was found in the number of years (t=5.466, p<0.01) among both the groups. Although no. of relapses were not statistically significant the values are inclined towards statistical significance.

Table 3: Reasons cited for current relapse

	Young Adult (n=86) n (%)	Middle adult (n=54) n (%)
Negative Mood	32 (37.209)	29 (53.703)
Desire for Positive Mood	65 (75.581)	21 (38.88)
Craving & Urges	30 (34.883)	20 (32.037)
Sleep Problems	8 (9.302)	19 (35.18)
Life Stressors	20 (23.255)	27 (50)
Interpersonal Problems	26 (30.232)	30 (55.5)
External Pressure to Use	70 (81.395)	5 (9.259)
Loss of Control	31 (36.046)	12 (22.222)
Lack of Family/Social Support	45 (52.325)	31 (57.407)

Most subjects cited two or more causes for relapse. The most common reasons cited for relapse in both the groups

were desire for a positive mood, negative mood followed, external pressure to use, life stressors, and sleep problems. The group of young adults reported external pressure to use 81% as the most prominent cause of sleep problems and life stressors.

The middle adult group reported prominent causes of relapse as lack of family/social support 57% followed by interpersonal problems 55% and negative mood 53% and the least causes as lack of control and external pressure to use etc. Mood states contributed to a relapse precipitant in 53%-75% of the subjects in both groups.

Table 4: Comparison of craving and negative affect between both the groups

	Mean=SD		F	P
	Young Adult (N=86)	Middle adult (N=54)		
BDCS	13.186=5.063	11.814=5.024	2.447	.120 (NS)
Negative Affect	25.197=6.956	28.592=6.794	8.042**	.005

Significant $P < 0.01$ One Way ANOVA SD Standard Deviation BSCS Brief Substance Craving Scale

The obtained F values from One Way Analysis of Variance as shown in Table No. 4 for Brief Substance Craving Scale [F (1, 138)=0.05, $p > 0.05$] are not significant and on the negative affect scale [F (1, 138)=0.05, $p < 0.01$] the F value found a significant statistical difference. This means there is no significant difference between the groups found on the BDCS score. This means young adults and middle adults are almost equal in the craving domain. On the other hand, negative affect has been found statistically significant leading to the acceptance of the hypothesis that middle adults are more inclined towards negative mood tendencies.

4. Discussion

The present study compared characteristics of relapse determinants among young adults and middle adults taking into account the no. of relapses. These individuals are taking inpatient treatment for various drug use disorders. The above-mentioned result states that lower or middle socioeconomic status may predispose to substance use, relapse, or be a consequence of social maladjustment. Unemployment coupled with financial problems are known to predispose to relapse (Veilleux JC, Colvin PJ, Anderson J, York C, Heinz AJ., 2010) The high cost of acquiring opioids further worsens the situation. Lack of a stable income coupled with a financial crunch for acquiring the substance is associated with substance-related criminality. Chandler, R. K., Fletcher, B. W., & Volkow, N. D. (2009). As the present study has found that almost the majority of the two groups were struggling with financial security. The rural background is also a noticeable issue for drug abuse and relapse because of the availability of drugs in many areas.

The duration of years of drug abuse was significantly higher in the middle adult group as compared to the young adult group. Statistically, a significant difference was seen in our study. This is not in keeping with other studies which have found a longer duration of illness in alcohol dependence. No significant differences in the number of relapses in both of the groups were seen in our study. This is in keeping with

findings of previous studies that found similar outcomes in both groups (Kadam et al., 2017).

This study also assessed the reasons cited for relapse such as positive expectancies, young adult group 75.581% and middle adult group 38.88%, about the effects of the drug experienced by users as fun and sensation seeking that are known to precipitate a relapse (Ersche, Karen D et al., 2010) Negative affect was reported by 37.209% and 53.702% of alcohol and opioid groups, respectively. This is in keeping with previous research which found unpleasant negative effects such as anger, frustration, sadness, and boredom is the most common cause of relapse at all developmental stages (Ramo and Brown., 2011). It was found that the young adults reported external pressure to use (81.394%) as a relapse precipitant because their mind is not fully developed. A considerable proportion of addicts have defective coping strategies leading to the use of illicit substances as a means to escape from negative affect such as a sense of frustration, anger, depression, anxiety, boredom, and feeling of disappointment (Hyman and Sinha., 2009).

So sometimes thrill or sensation seeking motivates them to use drugs repeatedly (S. Ramsewak et al., 2020). Apart from it, in this study both the samples of young adults and middle adults reported craving & urges 34.883% and 32.037%, sleep problems 9.302% and 35.18, interpersonal problems 30.232% and 55.5%, loss of control 36.046% and 22.222% and lack of family and social support respectively. These findings are almost similar to the previous studies (Kadam et al., 2017; Ramo and Brown., 2011; S. Ramsewak et al., 2020)

When both the groups were compared for craving on the BDCS scale, no statistically significant differences were found between the groups. Although the P value is not statistically significant but it is more inclined towards statistical significance. So the inference can be drawn that young adults can be high on cravings as compared to middle adults. The result is not in line with the previous research stating that craving can be the independent factor contributing to relapse in the drug relapse context. (Bottlender M, Soyka M., 2004; Evren, C, et. al., 2010). So the null hypothesis is rejected and the alternate hypothesis is justified. So the conclusion can be drawn from the result that there is no difference between young adults and middle adults when talking about cravings.

This study also examines that negative affect such as a prominent factor contributing to relapse. (Baker TB., et al., 2004). As per obtained results from the present study, the score for the negative affect scale achieved statistical significance. The null hypothesis is accepted which means adults were significantly higher on negative affect. This implies the age factor and multiple complexities of life which they are in. The results were supported by the previous research showing that relapse in middle adults is associated with negative affect, anger, frustration or interpersonal conflict, etc.

There is a need to tailor made some sort of psychoeducation or psychosocial interventions so that drug abusers or vulnerable individuals may be prevented from indulging in a multiple relapse process. Although facilitation of de-

addiction is a focal point in supporting successful remission presently but other strategies such as psychoeducation and psychosocial interventions should be prioritized during the first year of abstinence. Relapse prevention methods should be tailored based on a risk-situation analysis by taking into account the contextual factors surrounding the individual. Relapse prevention strategies need to target such high-risk situations such as emotional states, urge to use, and external pressure to use and empower them to cope with such situations with better self-efficacy. These strategies need to strengthen family support systems as well and tackle the expressed emotions of the family members. Psychoeducation for the better dialog of patients with their family members needs to be encouraged to resolve interpersonal complexities and problems.

Limitations of the study include a sample consisting of all men selected from a drug de addiction center that was not representative of all demographics. Although the present study includes a follow-up design but the longitudinal study may do more justice to a dynamic process such as relapse. Finally, biological and environmental factors contributing to relapse were not studied concerning relapse.

5. Conclusion

The disparity in sociodemographic factors was seen in both groups with young adults being more likely to be single, unemployed, or belonging to lower socioeconomic status, and the middle adults were high on negative affect and interpersonal problems. Such disparities indicate that social determinants play a critical role in the substance use and relapse process and should be addressed alongside physical and psychological determinants. Differences were seen in substance use history with the middle adult group having high on years of substance abuse.

Negative affect correlated positively with middle adults and craving has no age bar. The study findings echo the literature that describes relapse as a complex multifactorial phenomenon. Although there were differences in presentation, similar pathways and mechanisms of relapse were seen in young adults and middle adults, albeit with some differences.

References

- [1] Witkiewitz, K., & Marlatt, G. A. (2004). Relapse prevention for alcohol and drug problems: that was Zen, this is Tao. *American psychologist*, 59 (4), 224.
- [2] Njoroge, L. W., Al-Kindi, S. G., Koromia, G. A., ElAmm, C. A., & Oliveira, G. H. (2018). Changes in the association of rising infective endocarditis with mortality in people who inject drugs. *JAMA cardiology*, 3 (8), 779-780.
- [3] Ramo, D. E., & Brown, S. A. (2008). Classes of substance abuse relapse situations: a comparison of adolescents and adults. *Psychology of Addictive Behaviors*, 22 (3), 372.
- [4] Behrendt, S., Wittchen, H. U., Höfler, M., Lieb, R., & Beesdo, K. (2009). Transitions from first substance use to substance use disorders in adolescence: is early onset associated with a rapid escalation?. *Drug and alcohol dependence*, 99 (1-3), 68-78.
- [5] Trezn, R. C., Scherer, M., Harrell, P., Zur, J., Sinha, A., & Latimer, W. (2012). Early onset of drug and polysubstance use as predictors of injection drug use among adult drug users. *Addictive behaviors*, 37 (4), 367-372.
- [6] Mayet, A., Legleye, S., Falissard, B., & Chau, N. (2012). Cannabis use stages as predictors of subsequent initiation with other illicit drugs among French adolescents: use of a multi-state model. *Addictive behaviors*, 37 (2), 160-166.
- [7] Shiffman, S., Gwaltney, C. J., Balabanis, M. H., Liu, K. S., Paty, J. A., Kassel, J. D., . . . & Gnys, M. (2009). Immediate antecedents of cigarette smoking: an analysis from ecological momentary assessment.
- [8] Davis, L., Uezato, A., Newell, J. M., & Frazier, E. (2008). Major depression and comorbid substance use disorders. *Current opinion in psychiatry*, 21 (1), 14-18.
- [9] Kushner, M. G., Abrams, K., & Borchardt, C. (2000). The relationship between anxiety disorders and alcohol use disorders: a review of major perspectives and findings. *Clinical psychology review*, 20 (2), 149-171.
- [10] Lowman, C., Allen, J., Stout, R. L., & Group, T. R. R. (1996). Replication and extension of Marlatt's taxonomy of relapse precipitants: Overview of procedures and results. *Addiction*, 91 (12s1), 51-72.
- [11] Witkiewitz, K., & Villarroyel, N. A. (2009). Dynamic association between negative affect and alcohol lapses following alcohol treatment. *Journal of consulting and clinical psychology*, 77 (4), 633.
- [12] Zywiak, W. H., Stout, R. L., Trefry, W. B., Glasser, I., Connors, G. J., Maisto, S. A., & Westerberg, V. S. (2006). Alcohol relapse repetition, gender, and predictive validity. *Journal of substance abuse treatment*, 30 (4), 349-353.
- [13] Ramo, D. E., Anderson, K. G., Tate, S. R., & Brown, S. A. (2005). Characteristics of relapse to substance use in comorbid adolescents. *Addictive behaviors*, 30 (9), 1811-1823.
- [14] Hyman, Scott M., and Rajita Sinha. "Stress-related factors in cannabis use and misuse: implications for prevention and treatment." *Journal of substance abuse treatment* 36.4 (2009): 400-413.
- [15] Hanson, K. L., Cummins, K., Tapert, S. F., & Brown, S. A. (2011). Changes in neuropsychological functioning over 10 years following adolescent substance abuse treatment. *Psychology of Addictive Behaviors*, 25 (1), 127.
- [16] Greenfield, S. F., Weiss, R. D., Muenz, L. R., Vagge, L. M., Kelly, J. F., Bello, L. R., & Michael, J. (1998). The effect of depression on return to drinking: a prospective study. *Archives of general psychiatry*, 55 (3), 259-265.
- [17] Witkiewitz, K., & Villarroyel, N. A. (2009). Dynamic association between negative affect and alcohol lapses following alcohol treatment. *Journal of consulting and clinical psychology*, 77 (4), 633.
- [18] Shiffman, S., & Waters, A. J. (2004). Negative affect and smoking lapses: a prospective analysis. *Journal of consulting and clinical psychology*, 72 (2), 192.
- [19] Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation

- reformulated: an affective processing model of negative reinforcement. *Psychological review*, 111 (1), 33.
- [20] Le Moal, M., & Koob, G. F. (2007). Drug addiction: pathways to the disease and pathophysiological perspectives. *European Neuropsychopharmacology*, 17 (6-7), 377-393.
- [21] Witkiewitz, K., & Marlatt, G. A. (2004). Relapse prevention for alcohol and drug problems: that was Zen, this is Tao. *American psychologist*, 59 (4), 224.
- [22] Brown, S. A., & Ramo, D. E. (2006). Clinical course of youth following treatment for alcohol and drug problems. *Treating adolescent substance abuse: State of the science*, 79-103.
- [23] Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: an affective processing model of negative reinforcement. *Psychological review*, 111 (1), 33.
- [24] McCarthy, D. E., Curtin, J. J., Piper, M. E., & Baker, T. B. (2010). Negative reinforcement: Possible clinical implications of an integrative model.
- [25] Witkiewitz, K., & Villarroel, N. A. (2009). Dynamic association between negative affect and alcohol lapses following alcohol treatment. *Journal of consulting and clinical psychology*, 77 (4), 633.
- [26] Stasiewicz, P. R., & Maisto, S. A. (1993). Two-factor avoidance theory: The role of negative affect in the maintenance of substance use and substance use disorder. *Behavior Therapy*, 24 (3), 337-356.
- [27] Sayette, M. A., Shiffman, S., Tiffany, S. T., Niaura, R. S., Martin, C. S., & Schadel, W. G. (2000). The measurement of drug craving. *Addiction*, 95 (8s2), 189-210.
- [28] Robinson, T. E., & Berridge, K. C. (1993). The neural basis of drug craving: an incentive-sensitization theory of addiction. *Brain research reviews*, 18 (3), 247-291.
- [29] Breese, G. R., Chu, K., Dayas, C. V., Funk, D., Knapp, D. J., Koob, G. F., . . . & Weiss, F. (2005). Stress enhancement of craving during sobriety: a risk for relapse. *Alcoholism: Clinical and Experimental Research*, 29 (2), 185-195.
- [30] Drummond, D. C., Litten, R. Z., Lowman, C., & Hunt, W. A. (2000). Craving research: future directions. *Addiction*, 95 (8s2), 247-255.
- [31] Sayette, M. A., Martin, C. S., Wertz, J. M., Perrott, M. A., & Peters, A. R. (2005). The effects of alcohol on cigarette craving in heavy smokers and tobacco chippers. *Psychology of Addictive Behaviors*, 19 (3), 263.
- [32] Maisto, S. A., O'Farrell, T. J., McKay, J. R., Connors, G. J., & Pelcovits, M. (1988). Alcoholic and spouse concordance on attributions about relapse to drinking. *Journal of substance abuse treatment*, 5 (3), 179-181.
- [33] Connors, G. J., Maisto, S. A., & Zywiak, W. H. (1998). Male and female alcoholics' attributions regarding the onset and termination of relapses and the maintenance of abstinence. *Journal of Substance Abuse*, 10 (1), 27-42.
- [34] Robinson, J. D., Lam, C. Y., Carter, B. L., Minnix, J. A., Cui, Y., Versace, F., . . . & Cinciripini, P. M. (2011). A multimodal approach to assessing the impact of nicotine dependence, nicotine abstinence, and craving on negative affect in smokers. *Experimental and Clinical Psychopharmacology*, 19 (1), 40.
- [35] Berlin, I., Singleton, E. G., & Heishman, S. J. (2013). Predicting smoking relapse with a multidimensional versus a single-item tobacco craving measure. *Drug and alcohol dependence*, 132 (3), 513-520.
- [36] Sweitzer, M. M., Denlinger, R. L., & Donny, E. C. (2012). Dependence and withdrawal-induced craving predict abstinence in an incentive-based model of smoking relapse. *Nicotine & Tobacco Research*, 15 (1), 36-43.
- [37] Petry, N. M. (2002). A comparison of young, middle-aged, and older adult treatment-seeking pathological gamblers. *The gerontologist*, 42 (1), 92-99.
- [38] Kadam, M., Sinha, A., Nimkar, S., Matcheswalla, Y., & De Sousa, A. (2017). A comparative study of factors associated with relapse in alcohol dependence and opioid dependence. *Indian journal of psychological medicine*, 39 (5), 627-633.
- [39] Ramsewak, S., Putteeraj, M., & Somanah, J. (2020). Exploring substance use disorders and relapse in Mauritian male addicts. *Heliyon*, 6 (8), e04731.
- [40] Gonzales, R., Anglin, M. D., Beattie, R., Ong, C. A., & Glik, D. C. (2012). Understanding recovery barriers: Youth perceptions about substance use relapse. *American journal of health behavior*, 36 (5), 602-614.
- [41] Somoza, E., Dyrenforth, S., Goldsmith, J., Mezinskas, J., & Cohen, M. (1995, May). In search of a universal drug craving scale. In *Annual Meeting of the American Psychiatric Association, Miami Florida* (pp. 121-132).
- [42] Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of personality and social psychology*, 54 (6), 1063.
- [43] Veilleux, J. C., Colvin, P. J., Anderson, J., York, C., & Heinz, A. J. (2010). A review of opioid dependence treatment: pharmacological and psychosocial interventions to treat opioid addiction. *Clinical psychology review*, 30 (2), 155-166.
- [44] Chandler, R. K., Fletcher, B. W., & Volkow, N. D. (2009). Treating drug abuse and addiction in the criminal justice system: improving public health and safety. *Jama*, 301 (2), 183-190.
- [45] Kadam, M., Sinha, A., Nimkar, S., Matcheswalla, Y., & De Sousa, A. (2017). A comparative study of factors associated with relapse in alcohol dependence and opioid dependence. *Indian journal of psychological medicine*, 39 (5), 627-633.
- [46] Ersche, K. D., Turton, A. J., Pradhan, S., Bullmore, E. T., & Robbins, T. W. (2010). Drug addiction endophenotypes: impulsive versus sensation-seeking personality traits. *Biological psychiatry*, 68 (8), 770-773.
- [47] Bottlender, M., & Soyka, M. (2004). Impact of craving on alcohol relapse during, and 12 months following, outpatient treatment. *Alcohol and Alcoholism*, 39 (4), 357-361.
- [48] Evren, C., Durkaya, M., Dalbudak, E., Çelik, S., Çetin, R., & Çakmak, D. (2010). Factors related with relapse in male alcohol dependents: 12 months follow-up study. *Dusunen Adam The Journal of Psychiatry and Neurological Sciences*, 23 (2), 92.

- [49] Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: an affective processing model of negative reinforcement. *Psychological review*, *111* (1), 33.