

Abstract

Objective: This study aimed to compare behavioral activation and inhibition systems and coping styles between opium consumers, methadone maintenance treatment clients, and normal peers. **Method:** A causal-comparative study was used in this retrospective and basic research. The statistical population of this research included all male opium abusers who had referred to treatment centers in Sari city in 2016. The research sample consisted of 43 opium consumers (self-introduced), 45 methadone maintenance treatment clients, and 40 normal peers who were selected by convenience sampling method. Behavioral activation-inhibition system scale (BIS-BAS) and Coping Strategies Inventory (CISS) were administered to the three groups for data collection. **Results:** The results showed that there was a significant difference between the three groups in behavioral activation and inhibition systems and coping styles. In addition, opium consumers and methadone maintenance treatment clients showed higher levels of behavioral activation system and emotion-focused and avoidance-oriented coping than normal peers. **Conclusion:** These findings can help experts gain a better and more accurate understanding of the cause of substance abuse, and the use of proper methods for the prevention of addiction and expansion of helpful treatments of addiction.

Keywords: behavioral activation and inhibition systems, coping styles, substance abuse

Behavioral Activation and Inhibition Systems and Coping Styles in Opium Consumers, Methadone Maintenance Treatment Clients, and Normal Peers

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**Research on Addiction
Quarterly Journal of Drug
Abuse**

Presidency of the I. R. of Iran
Drug Control Headquarters
Department for Research and Education

Vol. 10, No. 40, Winter 2017

<http://www.etiadpajohi.ir/>

Introduction

Substance use dependence imposes a great deal of harm on the affected people, health care system (Peiper et al., 2016), and communities (Klein, 2016) inasmuch as increasing the likelihood of developing physical conditions (Tremain et al., 2016) and mental disorders (Agrawal, Budney & Lynskey, 2012). Given the fact that drug abuse programs impose heavy costs on societies (Harrop & Richard, 2016; Hansen et al., 2011), the etiology and prevention of the factors affecting drug abuse are necessary (Denney & Connor, 2016). For this reason, a large volume of research has focused on the identification of preventive factors and potential risks associated with drug use in the hope that the identification of the vulnerable groups will lead to the development of effective strategies for the prevention of drug abuse (McConnell, Memetovic & Richardson, 2014). As a result, researchers have recently focused on the psychological variables associated with drug abuse (e.g., Hopwood et al., 2008; Fernandez-Montalvo & L'opez-Goñi, 2010; Ljuez et al., 2008; cited in Hopwood et al. 2015). In the same direction with above-mentioned necessity, the present study aims at identifying the factors affecting the onset and continuation of substance abuse (in particular, opium). The theoretical foundation of this study is based on Gray's Reinforcement Sensitivity Theory (RST) (1970) and Endler & Parker's Stress Coping Model (1990). In recent years, Gray's Bio Psychological Model (1970) has been used as a useful theoretical framework for understanding the factors affecting the onset and continuation of maladaptive behaviors, such as antisocial personality (Morgan et al., 2014), depression (Li, Xu & Chen, 2015), and drug abuse (Urosevic et al., 2015). RST (1970) focuses on the role of two motivational systems of behavioral inhibition and behavioral activation (Li et al., 2015). Behavioral inhibition system is described as sensitivity to the signs of punishment and failure, increased avoidance behaviors, and anxiety, whereas behavioral activation system is described as sensitivity to signs of reward and avoidance of punishment (Derefinko et al., 2016). In explaining the role of these two motivational systems in drug abuse, one can argue that alcohol and drugs have a rewarding role; thus, since individuals with a strong behavioral activation system have a high sensitivity to rewards, the increased activity of this system is correlated with substance abuse and alcohol abuse (Morgan et al., 2014). Therefore, the increased sensitivity of the behavioral activation system is a stimulus for willingness to rewards (Luciana et al., 2012) such as substance abuse. Behavioral activation system, known as the infrastructure of sensitivity to rewards, is facilitated by the release of dopamine (Wahlstrom et al., 2010). As a result, the oversensitivity of behavioral activation system predicts substance abuse and increased craving for substance use. In some studies, the behavioral-inhibitory-activation scale scores were correlated with electroencephalographic indicators of addiction abstinence (Sutton & Davidson, 1997), response to punishment and reward (Carver & White, 1997), and clinical anthropology

(Alloy et al., 2006) (cited in Urosevic et al., 2015). In fact, compulsory substance abuse is correlated with the malfunction of the brain mechanisms that disturb the correct decision-making ability. Substance abuse may be caused by poor decision-making ability that causes the affected people to overcome their long-term negative consequences due to the tendency to immediately satisfy their needs or to escape from the adverse conditions (Balconi, Finocchiaro & Canavesio, 2014), because increased sensitivity to rewards seems to stimulate people to seek more risks in order to experience psychological stimulation (Hinnant et al., 2016). In people in the process of substance use withdrawal, the behavioral activation system also influences the decision-making process and, thereby, is effective in the therapeutic outcomes. In the theoretical description of this effect, Boog et al. (2014) assume that high levels of sensitivity to reward lead to an increase in the rate of drug relapse and failure in the treatment of drug abuse. As described in the section of the theoretical basis, the role of these motivational systems in substance abuse is ambiguous due to contradictory results in the literature related to this area. For example, in Hasking's research (2006), behavioral activation systems did not predict substance abuse, especially alcohol abuse. However, the results of some other studies were inconsistent with that of this study. In the research conducted by Knyazev (2004), the behavioral activation system was found to be the best personality predictor of substance abuse. The effect of behavioral inhibition system on substance abuse was weak and affected by the type of substances. In the same way, the inhibition system had a protective role in women, while it increased the risk of substance abuse in men. In a longitudinal study, Urosevic et al. (2015) showed that the increased sensitivity of the behavioral activation system was associated with the onset of drug use and the increased alcohol consumption. These results supported the existence of a relationship between increased reward sensitivity and the onset of drug use. Derefinko et al. (2016) emphasized that the constructs of Reinforcement Sensitivity Theory are involved in prolonged substance abuse, as studied in physiology. On the other hand, coping styles have a decisive influence on the behavioral and emotional responsiveness of individuals when facing the stresses of everyday life and on the explanatory model of substance abuse (Robertson, Xu & Stripling, 2010). According to the addiction stress coping model, individuals tend to use psychoactive substances to extricate themselves from the experiences and thoughts about stressful events (Aldridge & Roesch, 2008; Kalichman et al., 2006; cited in Floyd et al. 2010). Lazarus & Folkman (1984) refer to coping as cognitive and behavioral potentials to tackle stress (cited in Kronenberg et al., 2015). Three types of coping styles have been discussed in the research literature, which include problem-focused strategies (e.g., problem-solving behaviors, seeking social support), emotion-focused strategies (e.g., anxiety and self-criticism), and avoidance strategies (e.g., wishful thinking and deny of problems). In Endler & Parker's Coping Style Model (1990), emotion-focused and avoidance styles are considered as

maladaptive and problem-solving style is considered as the adaptive style to cope with the stresses of everyday life (Marquez-Arrico, Benaiges & Adan, 2015). Previous studies have investigated the relationship between coping styles and a range of substance abuse behaviors (e.g., Hasking & Oei, 2004; Sanchez et al., 2010) and findings from different studies show that emotion-focused and problem-focused coping styles are predictors of alcohol consumption and substance use (Cooper et al., 1988; Hasking & Oei, 2004; Johnson & Pandina, 2000; cited in Eitle & Eitle, 2013). The role of coping styles in people in the process of substance use abstinence has also been examined. In this regard, Murphy & Khantzian's longitudinal study (2012) showed that the coping style in people in the process of substance use abstinence will be improved after treatment. With regard to search for finding empirical support from the coping styles model in the field of addiction, an examination of the experimental literature reveals conflicting results. Feil & Hasking (2008) reported that the avoidance coping style is correlated with alcohol consumption. Robertson, Xu & Stripling (2010) showed that active coping style was not associated with the consumption of alcohol and other drugs among adolescent girls, but the avoidance style was related to higher alcohol consumption. Contrary to previous studies, Iwamoto et al. (2011) reported that coping styles could not predict substance use but had a significant relationship with depression. Martindale et al. (2013) indicated that coping styles and lifestyle strategies improved the people under the treatment of substance use disorder. McConnell, Memetovic & Richardson (2014) found that adaptive coping styles were associated with a lower rate of tobacco and alcohol consumption, while a different result was revealed for maladaptive styles. Adaptive style had a protective role against the tendency to use tobacco. Marquez-Arrico, Benaiges & Adan (2015) conducted a study on substance abuse patients with and without schizophrenia and the results showed that substance abuse patients with and with schizophrenia differ from each other only in the level of adaptive styles. In addition, substance abusers with schizophrenia used adaptive coping styles to a lesser extent than the normal group. Gundy et al. (2015) showed that the problem-focused coping style is less likely to predict drug disorder such as marijuana among American-African and white youths. In white youths, the avoidance style was associated with an increased risk of alcohol consumption, marijuana use, and other drug use disorders, while the avoidance style was associated with a lower probability of marijuana use in American-African youths. Individuals' skills in the face of life styles are effective in people's tendency to substance abuse. In the meantime, the behavioral inhibition-activation system and coping styles play a central role in this regard. The contradictory results and the non-evaluation of the aforementioned variables in a comprehensive model are the main motives behind the conduct of this study.

Method

Population, sample, and sampling method

A causal-comparative research method was used in this retrospective and basic research. In this design, the three groups of opium users, methadone maintenance treatment clients, and normal peers were compared in terms of two dependent variables, namely coping styles and behavioral activation and inhibition system. The statistical population of this research included all male opium abusers who had referred to treatment centers in Sari city in 2016. The research sample consisted of 43 opium consumers (those who referred to addiction treatment centers for the first time and had not received any treatment in addiction treatment clinics previously), 45 methadone maintenance treatment clients, and 40 normal peers who were selected by convenience sampling method after announcing their consent. The criteria for the inclusion of participants in this study were being male, aged from 20 to 40 years, and non-dependence on non-opioid substances (such as crystal or other drugs) in opium users; being under methadone treatment and no drug use (for the minimum period of one month) in the methadone treatment group; and not having physical and psychological problems and having at least primary school education in the normal group. In addition, severe psychiatric disorders in all three groups and history of drug use in the normal group were considered as the exclusion criteria. The normal group consisted of 40 participants from among the patients' companions who were selected via convenience sampling method. It is noteworthy that the three groups were matched in terms of gender (all were male), age ($F = 1.86, P = 0.05$), and education ($P > 0.05, X^2 = 1.166$). The administration procedure was in such a way that one of the researchers provided explanations to the clients and companions about the research. As a result, the participants entered the study with informed consent and awareness of the research objectives.

Instruments

1. Behavioral Activation-Inhibition System Scale (BIS-BAS): This questionnaire was developed by Carver & White (1994) and includes 20 items and two subscales, namely behavioral inhibition and behavioral activation. The behavioral inhibition subscale consists of 7 items that measure the sensitivity of behavioral inhibition or response to the threat and the feeling of anxiety when confronted with threatening symptoms. The behavioral activation subscale contains 13 items that measure the sensitivity of the behavioral activation system and comprises three other minor subscales, including drive (D), fun seeking (F), and reward responsiveness (R). Carver & White (1994) have reported the internal consistency of the behavioral inhibition system equal to 0.74 and that of the behavioral activation system equal to 0.71. Mohammadi (2008) conducted a research in order to study the psychometric properties of Behavioral Activation-Inhibition System Scale in Iranian society, and reported the internal consistency

of behavioral inhibition system and behavioral activation system to be equal to 0.69 and 0.78, respectively (cited in Amiri, Ghasemi Navab & Abdollahi, 2014).

2. Coping Strategies Inventory (CISS): This questionnaire was developed by Endler & Parker (1990) and evaluates problem-focused, emotion-focused, and avoidance-focused coping styles. The dominant style of each individual is determined by his/her score in each of the three dimensions of coping styles. The scale items are scored based on a 5-point Likert scale from never (1) to always (5). The reliability of this test was calculated by Endler and Parker (1990) through Cronbach's alpha as follows: the problem-focused style for girls (90%) and boys (92%), emotion-focused style for girls (85%) and boys (82%), and avoidance-focused style for girls (0.82) and boys (0.85). Jafarnejad (2003) reported the reliability coefficients of 0.80, 0.83 and 0.72 for emotion-focused, problem-focused, and avoidance-focused styles, respectively. Piri & Shahrara (2005) obtained the Cronbach's alpha coefficients for problem-focused, emotion-focused, and avoidance-focused styles to be equal to 0.81, 0.85, and 0.80, respectively (cited in Shahgholian, Jannesar Shargh & Abdollahi, 2007).

Results

The age range of the members of the three groups was 21-to-38 years. The mean (standard deviation) of the opium users' age was equal to 29.21 (3.78), methadone treatment group's age equaled 29.58 (4.64), and normal peers' age was 30.58 (3.55) years. In terms of education, most of the participants in this research held diploma degrees. The descriptive statistics of the research variables are presented in Table 1.

Table 1: Descriptive statistics of the research variables for each group

<i>Variables</i>	<i>Opium users</i>		<i>Methadone Treatment</i>		<i>Normal peers</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Behavioral Inhibition System	15.12	1.8	15.68	2.76	18.83	2.55
Behavioral Activation System	32.65	3.40	31.32	3.10	28.80	3.70
Drive	10.14	1.78	9.66	1.62	8.66	1.55
Reward responsiveness	12.86	1.93	12.23	2.10	10.32	2
Fun seeking	9.65	1.67	9.61	1.71	8.71	1.77
Problem-focused coping style	45.26	5.93	46.41	7.08	51.37	7.73
Emotion-focused coping style	55.91	5.75	53	5.56	48.66	7
Avoiding coping style	54.79	5.60	52.75	6.52	45.54	6.98

Multivariate analysis of variance analysis should be used to compare the mean scores. One of the assumptions of this analysis is the normal distribution of the scores where Shapiro-Wilk test was used to evaluate this assumption. The results of this test are presented in Table 2.

Table 2: Shapiro-Wilk test results assessing the normal distribution of the data

<i>Variable</i>	<i>Df</i>	<i>Shapiro-Wilk ratio</i>	<i>Sig.</i>
Inhibition-activation system	128	0.989	0.379
Coping styles	128	0.989	0.436

As it is shown in Table 2, the normal distribution of scores has been observed in both variables. In addition, Levene's test was used to assess the assumption of error variances equality, and its results are presented in Table 3.

Table 3: Levene's test results examining the error variances equality

<i>Variable</i>	<i>F</i>	<i>Error degrees of freedom</i>	<i>Sig.</i>
Inhibition-activation system	0.176	125	0.945
Coping styles	0.057	125	0.945

Moreover, the results of Box's test indicate that the assumption of equality of covariance matrices has been met ($P > 0.05$). Therefore, multivariate analysis of variance in the inhibition-activation system was run and the results were indicative of the existence of a significant difference ($P < 0.001$; $F = 11.63$; Wilks's lambda = 0.456). Univariate analysis of variance was used to examine the patterns of difference as follows.

Table 4: Results of univariate analysis of variance for patterns of difference

<i>Variable</i>	<i>Df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Behavioral Inhibition System	2	167.11	28.540	0.0005
Behavioral Activation System	2	159.52	13.750	0.0005
Drive	2	23.86	8.660	0.0005
Reward responsiveness	2	73.22	18.020	0.0005
Fun seeking	2	11.91	4.020	0.02

As it is observed in the above table, there is a significant difference in all components. Tukey's post hoc test was used to examine the difference between the groups. The results showed that the normal group had obtained higher scores than both groups of methadone treatment clients and opium users in the component of the inhibition system. However, there was no significant difference between the methadone treatment clients and opium users. On the other hand, the normal group had obtained lower scores than the other two groups in the components of the behavioral activation system, drive, reward responsiveness, and fun seeking; however, no significant difference was observed between methadone treatment clients and opium users. In addition, multivariate analysis of variance was also performed on coping styles and the results indicated a significant difference ($P < 0.001$, $F = 16.60$, Wilks's lambda = 0.507). Univariate analysis of variance was used to examine the patterns of difference as follows.

Table 5: Results of univariate analysis of variance for patterns of difference

<i>Variable</i>	<i>Df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Problem-focused coping style	2	44.06	9.110	0.0005
Emotion-focused coping style	2	55.10	13.370	0.0005
Avoidance-focused coping style	2	98.21	24.180	0.0005

As it has been shown in Table 5, there is a significant difference in all components. Tukey's post hoc test was used to examine the differences between the groups. The results showed that the normal group has obtained higher scores in problem-focused component than the other two groups, i.e. methadone-treated group and opium users. However, there was no significant difference between the methadone treatment group and opium users in this regard. In addition, the normal group obtained lower scores in the components of emotion-focused coping style and avoidance coping style than methadone treatment group and opium users. However, there was no significant difference between the methadone treatment group and opium users in these two components.

Discussion and Conclusion

The present study was an attempt to compare behavioral inhibition and activation systems and coping strategies between opium users, methadone maintenance treatment patients, and normal peers. The findings of the study showed that there is a difference between the three groups in terms of the activity of behavioral inhibition-activation systems. In other words, there was a higher level of behavioral activation system and a lower inhibition system in opium users and methadone maintenance treatment clients than the normal group. In the normal group, the other of this result held true. This finding is in part consistent with those of the studies carried out by Urošević et al. (2015), Boog et al. (2014), Taylor, Reeves, James & Bobadilla (2006), Franken & Muris (2006), and Knyazev (2004). However, this result is not consistent with that of the study conducted by Hasking (2006). To explain this contradiction, Hasking (2006) argued that the absence of any correlation between the sensitivity of the behavioral activation system and drug abuse is attributable to the low level of consumption among alcohol abusers. The result of this study on the sensitivity of the behavioral activation system in opium users and people in the process of substance use withdrawal is another confirmation of Gray's Reinforcement Sensitivity Theory (RST) (1970). Considering that the behavioral activation system is highly sensitive to rewards and opium has also a rewarding property, the abuse of this substance in people with a strong behavioral activation system is justifiable. Balconi, Finocchiaro & Canavesio (2014) examined the effect of behavioral activation system along with Iowa gambling task on substance abusers' decision-making, and their findings indicated the faulty decision-making behavior of people with a behavioral activation system with regard to

the etiology of substance abuse in such a way that these individuals cannot refrain from instant pleasures and will ignore their long-term consequences. In addition, Boog et al. (2014) regard the behavioral index of reward sensitivity to be a predictor of failure in drug abuse treatment. Considering that the individuals under methadone maintenance treatment in the present study showed high a high sensitivity in behavioral activation system, clinical considerations in this area assume significant importance because this factor can be effective in the continuation of treatment. Moreover, two groups of opium users and methadone maintenance treatment clients obtained higher scores in the subscale of the behavioral activation system. In this regard, it can be argued that chronic substance abuse is explained by significant deficiencies in the decision-making process based on the response to rewards (Balconi, 2014). The fact that the two groups of opium users and methadone maintenance treatment clients have a high sensitivity to responding to immediate rewards compared to their normal peers is indicative of the substance dependent individuals' motivational defects in the decision-making process. The reward responsiveness is effective in inducing the individuals' extreme estimates for immediate rewards. In Franken & Muris's research (2006), the components of fun seeking and drive were correlated with alcohol and drug abuse. In line with these findings, the present study showed that opium users and methadone maintenance group gained higher scores in this subscale than the normal group. In addition, the findings of this study showed that there is a difference between the three groups in terms of coping strategies. The analysis of the data obtained from the research samples showed that opium abusers and methadone maintenance treatment group use more emotion-focused and avoidance strategies in dealing with stresses than the normal group, whereas the normal group used problem-focused strategies to deal with tensions stresses to a greater extent. This finding is partly consistent with the results of research done by Gundy et al. (2015), McConnell, Memetovic & Richardson (2014), Robertson, Xu & Stripling (2010), and Feil & Hasking (2008). According to Endler & Parker's Coping Style Model (1990), emotion-focused and avoidance styles are considered as maladaptive and problem-solving style is considered as the adaptive style to cope with the stresses of everyday life and some scholars (e.g., Floyd et al., 2010; McConnell, Memetovic & Richardson, 2014) emphasize that many people with maladaptive coping styles tend to substance abuse in dealing with stresses and negative events. Robertson, Xu & Stripling (2010) also acknowledge that the higher degree of exposure to negative events is associated with a higher level of substance use. To explain the relationship of emotion-focused coping style and avoidance coping style with substance abuse, one can claim that these individuals have a weak relationship with others while facing tensions and incidents; therefore, they do little effort in search for social support. The individuals under methadone maintenance treatment, like the opium user group, used emotion-focused and avoidance strategies to cope with stress. Murphy & Khantzian (2012) emphasize that coping strategies are

improved during treatment; however, no difference was found between the two groups of opium users and methadone treatment group in the present study. In explaining this inconsistency, it seems that this improvement can be seen in coping styles in longitudinal studies. Since one of the criteria for inclusion in the present study was to be under methadone treatment for at least one month, it can be said that longitudinal studies are needed to assess this improvement. The results of this research can be taken into consideration at both theoretical and practical levels. At the theoretical level, the findings of the present study confirmed the assumptions of Gray's Reinforcement Sensitivity Theory (1990) and Endler & Parker's Coping Style Model (1990) about substance abuse. At the practical level, the results of this study can be an appropriate empirical basis for the development of training, interventional, and therapeutic programs. One of the limitations of this research was the use of convenience sampling method and the small sample size; thus, it is that other sampling methods be used in future studies.

Reference

- Agrawal, A., Budney, A. J., & Lynskey, M. T. (2012). The co-occurring use and misuse of cannabis and tobacco: a review. *Addiction, 107*(7), 1221-1233. DOI: 10.1111/j.1360-0443.2012.03837.x.
- Alloy, L. B., Bender, R. E., Wagner, C. A., Whitehouse, W. G., Abramson, L. Y., Hogan, M. E., ..., Harmon-Jones, E. (2009). Bipolar spectrum–substance use co-occurrence: Behavioral approach system (BAS) sensitivity and impulsiveness as shared personality vulnerabilities. *Journal of personality and social psychology, 97*(3), 549-565. DOI:10.1037/a0016061.
- Amiri, S., Ghasemi Navab, A. & Abdollahi, M. (2014). Comparative Study of Working Memory Performance, Behavioral Activation System (BAS) and Behavioral Inhibition System (BIS) Based on the Dimensions of Stress in Adolescents, *Journal of Cognitive Psychology, 2* (4), 10-22.
- Balconi, M., Finocchiaro, R., & Canavesio, Y. (2014). Reward-system effect (BAS rating), left hemispheric “unbalance”(alpha band oscillations) and decisional impairments in drug addiction. *Addictive behaviors, 39*(6), 1026-1032.
- Bianchini, V., Roncone, R., Giusti, L., Casacchia, M., Cifone, M. G., & Pollice, R. (2015). PTSD Growth and Substance Abuse Among a College Student Community: Coping Strategies after 2009 L'aquila Earthquake. *Clinical practice and epidemiology in mental health: CP & EMH, 11*, 140-143. DOI:10.2174/1745017901511010140.
- Boog, M., Goudriaan, A. E., Wetering, B. J. Mvd, Polak, M., Deuss, H., & Franken, I. H. A. (2014). Rash Impulsiveness and Reward Sensitivity as predictors of treatment outcome in male substance dependent patients. *Addictive behaviors, 39*(11), 1670-1675.
- Denney, A. S., & Connor, D. P. (2016). Serious juvenile offenders who have experienced emerging adulthood: Substance use and recidivism. *Children and Youth Services Review, 67*, 11-19.
- Derefinko, K. J., Eisenlohr-Moul, T. A., Peters, J. R., Roberts, W., Walsh, E. C., Milich, R., & Lynam, D. R. (2016). Physiological response to reward and extinction predicts

- alcohol, marijuana, and cigarette use two years later. *Drug and Alcohol Dependence*, 163, S29-S36.
- Eitle, T. Mc N., & Eitle, D. (2014). Race, coping strategies, and substance use behaviors: A preliminary analysis examining White and American Indian adolescents. *Substance use & misuse*, 49(3), 315-325. DOI:10.3109/10826084.2013.832329.
- Endler, N. S., & Parker, J. D. (1990). Multidimensional assessment of coping: a critical evaluation. *Journal of personality and social psychology*, 58(5), 844-854.
- Feil, J., & Hasking, P. (2008). The relationship between personality, coping strategies and alcohol use. *Addiction Research & Theory*, 16(5), 526-537.
- Ferguson, K. M., Bender, K., & Thompson, S. J. (2015). Gender, coping strategies, homelessness stressors, and income generation among homeless young adults in three cities. *Social Science & Medicine*, 135, 47-55.
- Floyd, L. J., Hedden, S., Lawson, A., Salama, C., Moleko, A. G., & Latimer, W. (2010). The association between poly-substance use, coping, and sex trade among black South African substance users. *Substance use & misuse*, 45(12), 1971-1987.
- Franken, I. H. A., & Muris, P. (2006). BIS/BAS personality characteristics and college students' substance use. *Personality and Individual Differences*, 40(7), 1497-1503.
- Hansen, R. N., Oster, G., Edelsberg, J., Woody, G. E., & Sullivan, S. D. (2011). Economic costs of nonmedical use of prescription opioids. *The Clinical journal of pain*, 27(3), 194-202.
- Harrop, E., & Catalano, R. F. (2016). Evidence-Based Prevention for Adolescent Substance Use. *Child and Adolescent Psychiatric Clinics of North America*, 25(3), 387-410. DOI: 10.1016/j.chc.2016.03.001.
- Hasking, P. A. (2006). Reinforcement sensitivity, coping, disordered eating and drinking behaviour in adolescents. *Personality and individual differences*, 40(4), 677-688.
- Hinnant, J. B., Forman-Alberti, A. B., Freedman, A., Byrnes, L., & Degnan, K. A. (2016). Approach behavior and sympathetic nervous system reactivity predict substance use in young adults. *International Journal of Psychophysiology*, 105, 35-38. DOI: 10.1016/j.ijpsycho.2016.04.013.
- Hopwood, C. J., Schade, N., Matusiewicz, A., Daughters, S. B., & Lejuez, C. W. (2015). Emotion regulation promotes persistence in a residential substance abuse treatment. *Substance use & misuse*, 50(2), 251-256.
- Iwamoto, D., Liu, W. M., & McCoy, T. E. (2011). An exploratory model of substance use among Asian American women: The role of depression, coping, peer use and Asian values. *Journal of ethnicity in substance abuse*, 10(4), 295-315.
- Klein, J. W. (2016). Pharmacotherapy for Substance Use Disorders. *Medical Clinics of North America*, 100(4), 891-910.
- Knyazev, G. G. (2004). Behavioural activation as predictor of substance use: mediating and moderating role of attitudes and social relationships. *Drug and alcohol dependence*, 75(3), 309-321.
- Kronenberg, L. M., Goossens, P. J. J., van Busschbach, J., van Achterberg, T., & van den Brink, W. (2015). Coping styles in substance use disorder (SUD) patients with and without co-occurring attention deficit/hyperactivity disorder (ADHD) or autism spectrum disorder (ASD). *BMC psychiatry*, 15(1), 1-10. DOI: 10.1186/s12888-015-0530-x
- Li, Y., Xu, Y., & Chen, Z. (2015). Effects of the behavioral inhibition system (BIS), behavioral activation system (BAS), and emotion regulation on depression: A one-year follow-up study in Chinese adolescents. *Psychiatry research*, 230(2), 287-293.
- Luciana, M., Wahlstrom, D., Porter, J. N., & Collins, P. F. (2012). Dopaminergic modulation of incentive motivation in adolescence: age-related changes in signaling,

- individual differences, and implications for the development of self-regulation. *Developmental psychology*, *48*(3), 844-861. DOI: 10.1037/a0027432.
- Marquez-Arrico, J. E., Benaiges, I., & Adan, A. (2015). Strategies to cope with treatment in substance use disorder male patients with and without schizophrenia. *Psychiatry research*, *228*(3), 752-759.
- Martindale, S. L., Sejud, L. R., Giardina, A., McGowan, S., & Dolan, S. L. (2013). Changes in Coping Strategies over Time in a Residential Substance Use Disorder Treatment Population: A Preliminary Assessment. *Alcoholism Treatment Quarterly*, *31*(4), 484-494.
- McConnell, M. M., Memetovic, J., & Richardson, C. G. (2014). Coping style and substance use intention and behavior patterns in a cohort of BC adolescents. *Addictive behaviors*, *39*(10), 1394-1397.
- Morgan, J. E., Bowen, K. L., Moore, S. C., & Van Goozen, S. H. M. (2014). The relationship between reward and punishment sensitivity and antisocial behavior in male adolescents. *Personality and individual differences*, *63*, 122-127.
- Murphy, S. L., & Khantzian, E. J. (2012). Addiction as a “self-medication” disorder: application of ego psychology to the treatment of substance abuse. *Psychotherapy and substance abuse: A practitioner’s handbook*, 161-175.
- Peiper, N. C., Ridenour, T. A., Hochwalt, B., & Coyne-Beasley, T. (2016). Overview on Prevalence and Recent Trends in Adolescent Substance Use and Abuse. *Child and Adolescent Psychiatric Clinics of North America*, *25*(3), 349-365. DOI: 10.1016/j.chc.2016.03.005.
- Robertson, A. A., Xu, X., & Stripling, A. (2010). Adverse events and substance use among female adolescent offenders: Effects of coping and family support. *Substance use & misuse*, *45*(3), 451-472.
- Shahgholian, M., Jannesar Shargh, R. & Abdollahi, M. (2007). Relationship of emotional intelligence and stress coping styles with relational patterns between couples. *Quarterly Journal of Counseling Research & Developments*, *6*(22), 73-88.
- Taylor, J., Reeves, M., James, L., & Bobadilla, L. (2006). Disinhibitory trait profile and its relation to cluster B personality disorder features and substance use problems. *European Journal of Personality*, *20*(4), 271-284.
- Tremain, D., Freund, M., Wye, P., Wolfenden, L., Bowman, J., Dunlop, A., . . . Doherty, E. (2016). Provision of chronic disease preventive care in community substance use services: client and clinician report. *Journal of Substance Abuse Treatment*, *68*, 24-30. DOI: 10.1016/j.jsat.2016.05.006.
- Urošević, S., Collins, P., Muetzel, R., Schissel, A., Lim, K. O., & Luciana, M. (2015). Effects of reward sensitivity and regional brain volumes on substance use initiation in adolescence. *Social cognitive and affective neuroscience*, *10*(1), 106-113.
- Van Gundy, K. T., Howerton-Orcutt, A., & Mills, M. L. (2015). Race, Coping Style, and Substance Use Disorder Among Non-Hispanic African American and White Young Adults in South Florida. *Substance use & misuse*, *50*(11), 1459-1469.
- van Toor, D., Roozen, H. G., Evans, B. E., Rombout, L., Van de Wetering, B. J. M., & Vingerhoets, A. J. J. M. (2011). The effects of psychiatric distress, inhibition, and impulsivity on decision making in patients with substance use disorders: A matched control study. *Journal of clinical and experimental neuropsychology*, *33*(2), 161-168. DOI: 10.1080/13803395.2010.493300.
- Wahlstrom, D., Collins, P., White, T., & Luciana, M. (2010). Developmental changes in dopamine neurotransmission in adolescence: behavioral implications and issues in assessment. *Brain and cognition*, *72*(1), 146-159.