

## Nutritional Considerations when Working with those Recovering from Substance Abuse

Elizabeth Wall-Bassett\*, Kylie Gearhart, Mary Crozier, Brenda Bertrand and Quing Wu

*School of Health Sciences, Nutrition and Dietetics Program, Western Carolina University, USA*

**\*Corresponding Author:** Elizabeth Wall-Bassett, School of Health Sciences, Nutrition and Dietetics Program, Western Carolina University, USA.

**Received:** November 14, 2017; **Published:** January 31, 2018

### Abstract

Healthy People 2020 recognizes substance abuse as one of the most complex public health issues due to social attitudes and political and legal responses to the use of alcohol and illicit drugs. There is a gap in the literature with regard to the interchanges between alcohol, drug, food, and behavioral addictions, especially among women. The search for eligible studies was performed using the electronic databases One Search, Academic Search Complete, LexisNexis Academic, MEDLINE, PubMed, and CINAHL. A total of 61 articles were identified and summarized in this literature review regarding nutritional considerations when working with those recovering from substance abuse. Overall, assessment of stages of change in substance use disorders based on readiness to change behavior, as well as changes in weight status, eating patterns, and other health related issues throughout recovery provides guidance to direct nutrition interventions.

**Keywords:** *Disordered Eating; Transtheoretical Model; Substance Abuse Recovery; Addictions; Weight Change; Women*

### Introduction

Substance abuse and dependence are some of the most pressing and detrimental health and social issues in the United States today. They yield serious, life threatening physical and mental health problems, destroy familial ties, friendships, and other social relationships, and compromise economic status and financial well-being. An estimated 27.1 million people in the United States suffer from substance dependence or abuse with 15.7 million with an alcohol use disorder [1]. Close to 95% of Americans with substance use issues meet the diagnostic criteria for treatment [2]. Substance use conditions often co-occur with mental health illnesses [1]. Over 8.9 million people have both a mental and substance use disorder, however only about 7% receive treatment for both conditions [2]. Extraordinary efforts have been made to understand the disorders and identify appropriate treatment strategies. Numerous hospitals now have treatment units for alcoholism and drug addiction, and treatment/rehabilitation centers, residential substance abuse services, and various other treatment programs may be found in diverse locales across the United States. Unfortunately, with recovery comes new challenges and dependencies, specifically with regard to relapse, dual addictions, and food choices that may adversely affect health [3]. Understanding food selections and health status of recovering substance abusers at various stages of recovery may help define optimal treatment.

An addiction is characterized as an intense, overriding motivational force or compulsion to get a hold of and consume a substance, along with a reduced ability to control this craving despite damaging consequences [4,5]. The repeated exposure to the drug of abuse leads to sensitization, which is an increase in the rewarding properties and locomotor activating effects of a substance that accompany repeated exposure [6]. Other characteristics of addiction include tolerance, which is observed when users require greater amounts and doses to reach the desired level of intoxication, and withdrawal when the user becomes ill after stopping use for a prolonged amount of

time and must dose again [7]. Shaffer, *et al.* [7] describes an “addiction syndrome”, suggesting that an addiction be categorized by the origin, nature, and processes underlying the addiction rather than the substance of choice. In this model, the addictive disorders may not be independent, and there is evidence of many biopsychosocial precursors, manifestations, and consequents surrounding excessive substance use and behavior which may indicate a root addiction syndrome [7]. A trademark of addiction is the desire to find an external reason and cure for problems, or something to blame for one’s actions or choices [3]. Whether the substance of choice is alcohol, marijuana, nicotine, cocaine, prescription medicine, a combination of drugs, or even chocolate, recovery from any substance addiction requires a behavior-change process stemming from a cognitive-behavioral framework which is widely used in recovery programs [8].

According to the cognitive-behavior theory, substance dependence is a learned behavior resulting from repeated experience with achieved desired outcomes, such as stress relief or euphoria. From this viewpoint, the most pertinent aims of recovery are to distinguish the needs that the substance is being used to meet and to acquire skills which provide alternate, healthier ways of meeting needs while achieving abstinence from the substance [9]. As the addicted person progressively acquires new skills that support recovery, they discontinue old habits and thinking patterns that promote recovery, although relapse is a possibility [8]. Cognitive-behavioral interventions, along with a client-centered approach, have demonstrated to be the most successful treatment methods for abusers attempting to achieve initial abstinence [5].

Within the small percentage of Americans who recognize their substance dependence problem, 273,000 have made an unsuccessful effort to obtain treatment [10]. For those who obtain treatment, 80% to 90% will relapse within the first year of treatment [11]. According to the “syndrome model”, the reason for such high relapse may lie in the common treatment method of focused object-specific treatment despite the current research suggestion that addiction arises from more dominant foundations rather than just the objects of addiction themselves [7]. Symptom substitution likely occurs when the therapist treats the symptoms of the addiction, but fails to treat underlying psychological issues [12].

Healthy People 2020 recognizes substance abuse as one of the most complex public health issues due to social attitudes and political and legal responses to the use of alcohol and illicit drugs [13]. The Healthy People 2020 goal in this regard is to reduce substance abuse to protect the health, safety, and quality of life [13]. Specific objectives for screening and treatment include increasing the proportion of people who receive alcohol and/or illicit drug treatment, specialty treatment for abuse or dependence, and emergency medical and follow-up care [13]. Healthy People 2020 also aims to promote health and reduce chronic disease risk through the intake of nutritious diets and maintenance of healthy body weights. Objectives related to healthier food access include increasing state-level policies that persuade food retail outlets to supply foods that are recommended by the Dietary Guidelines and the proportion of Americans who have access to these locations. Other objectives in the health care and worksite settings include increasing the proportion of physician office visits and worksite counseling for nutritious, balanced eating and healthy weight management [13]. Combining the individual objectives by increasing access to substance abuse treatment, healthier food outlets, and balanced eating and weight management counseling, the substance abuse population in America may experience expedited, more successful and sustainable healthier recoveries.

### Characteristics of Substance Abusers

There are a number of demographic factors that are associated with substance abuse risk as demonstrated in figure 1 [2]. Substance abuse may be equally as common among males and females [14]. Notably, of those 18 and older with drug or alcohol dependence, 20% of males and 17% of females receive treatment [2]. According to DHHS, the rate of alcohol and substance abuse was highest among adults aged 18 to 25 years, and among American Indians or Alaska Natives (16%), followed by those of mixed race or Hispanic nationality (10% for each, respectively) [2].

Higher rates of substance abuse occur in the US occur in the Western region (10%), and more commonly in metropolitan rather than rural settings. In 2010, DHHS reported those who graduate from a baccalaureate program have low rates of substance abuse or

dependence, and unemployed have higher prevalence (16%) as compared to adults with part-time (11%) or full-time employment (9%) [2]. However, about half of substance abusers aged 18 or older were employed full-time in 2010. Those with a criminal record who had been released from jail or on parole had higher rates of drug and alcohol dependence (38%) than those who were not recently in jail or on parole (8%) [2]. Those who had been on probation also had a significantly higher rate of substance abuse (37%), than those who were not on probation (8%) [2].

Keyes and Hasin have reported alcohol dependence is higher among those experiencing socioeconomic disadvantage [15]. Of those with family income levels less than \$20,000, the substance use problem is 12.5%, while families earning \$50,000 and higher have an 8.4% substance use problem [16]. Cigarette smoking, cannabis and polysubstance use are also more common among those from low socioeconomic status [17]. It is important to recognize that although substance dependence and abuse is more prevalent in certain populations, addictions can be found commonly throughout the US [2].

Demographic Characteristic	Illicit Drugs (% of total population)	Alcohol (% of total population)	Illicit Drugs or Alcohol (% of total population)
<b>Total</b>	3	7	9
<b>Gender</b>			
Male	4	10	12
Received Treatment	1	2	2
Female	2	5	6
Received Treatment	1	1	1
<b>Race</b>			
Caucasian	2	8	9
African American	4	6	9
American Indian or Alaska Native	6	15	17
Native Hawaiian or Other Pacific Islander	0	5	5
Hispanic or Latino	3	8	10
Two or More Races	3	8	10
Asian	1	3	4
<b>Education</b>			
Less than High School	4	7	10
High School Graduate	3	7	8
Some College	3	9	11
College Graduate	1	7	7
<b>Current Employment</b>			
Full-time	2	8	9
Part-time	4	9	11
Unemployed	6	12	16
Other	2	5	6
<b>Geographic Division</b>			
Northeast Region	3	8	9
Midwest Region	3	8	9
Southern Region	2	7	8
Western Region	3	9	10
<b>County Type</b>			
Large Metropolitan	3	8	9
Small Metropolitan	3	8	9
Non-metropolitan	2	7	8

**Table 1:** Substance Dependence or Abuse in the Past Year among Persons Aged 18 or Older, by Demographic Characteristics [2] (n = 67,804).

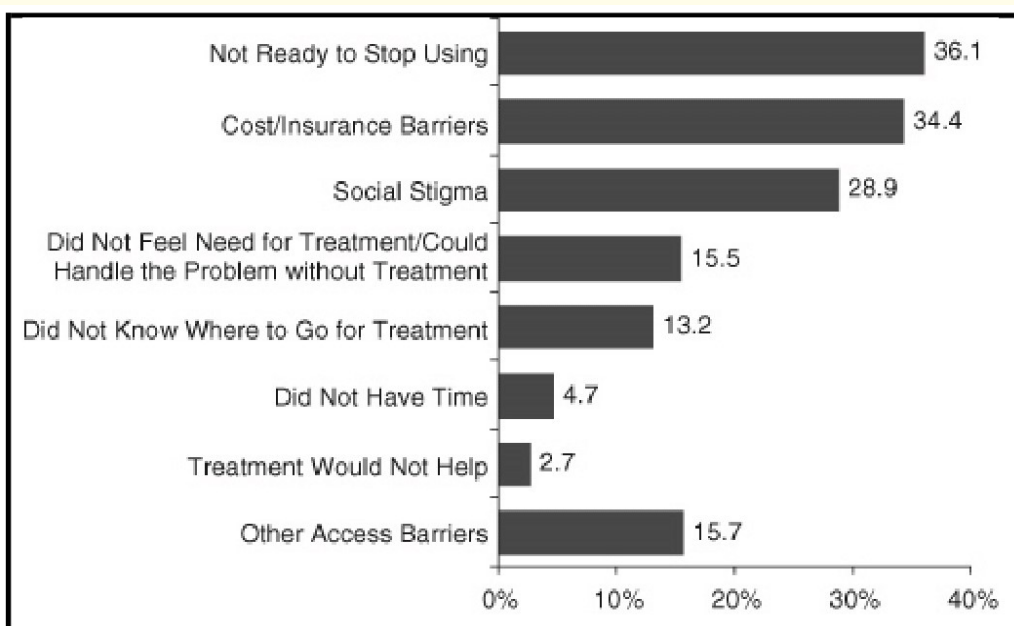
**Unique Needs of Women in Substance Abuse Recovery**

While most substance abuse recovery research is based on males, it is important to consider that women who abuse substances have unique recovery needs [18,19]. Stevens and Patton found that women in recovery from an alcohol or drug addiction exhibited better post-discharge outcomes if they live with their children during treatment [20]. Those residing with their children were more likely to refrain from alcohol and drugs, have employment, maintain child custody, avoid legal trouble, and be involved in aftercare or support groups [20]. Females in substance abuse treatment programs are often younger, have lower incomes and more children in the home, belong to more diverse minority racial/ethnic groups (Table 2), and are less likely to be employed than males [18]. Low-income women seeking substance abuse and mental health treatment often lack sufficient financial resources, and there is concern that they are not obtaining as much treatment as other income levels [21].

Race/Ethnicity	Percent
Caucasian	11%
African American	8%
American Indian or Alaska Native	22%
Native Hawaiian or Other Pacific Islander	10%
Hispanic or Latino	6%
Two or More Races	17%
Asian	4%

**Table 2:** Percentages of Women Aged 18 to 49 Who Needed Treatment in the Past Year, by Race/Ethnicity: 2004-2006 [2] (n = 6.3 million).

Social stigma, labeling, and guilt are all substantial obstacles to receiving treatment for recovering females. Females are more susceptible and vulnerable than males to the psychosocial effects of substance abuse, and their addictions more commonly coincide with psychosocial problems and traumatic life events [18]. Although recovery time is extended, Grella found that females recover from addictions more effectively in women-only programs [19]. Collectively, these findings suggest that women in substance abuse recovery programs have greater psychological stress of social stigmatism, have more children, are at a younger age, and have lower income. As shown in figure 1, the main reason women with substance abuse or dependence do not receive treatment is because they are not ready to quit using (36%), experience cost and insurance barriers to enter treatment programs (34%) and report social stigma (29%) [18].



**Figure 1:** Percentages of Women Aged 18 to 49 Who Needed Substance Use Treatment in the Past Year But Did Not Receive Treatment and Their Reasons For Not Receiving Treatment: 2004-2006 [2] (n = 345,000).

### Gaps in Literature

The majority of studies that have investigated nutrition-related health aspects of recovering individuals are focused on males. There is limited information of the nutritional concerns of women in recovery, especially among postpartum women. Further, there is a gap in the literature with regard to the interchanges between alcohol, drug, food, and behavioral addictions [7]. Assessing the characteristics of substance abusers, specific stages of change in substance abuse recovery, the transitioning process between substances and behavioral addictions, eating patterns, and subsequent weight changes will help to determine the nutrition related issues faced by those in recovery.

### Methods of Literature Review

In order to address the gap in the nutritional and health concerns of women recovering from substance abuse, a systematic review of the literature was conducted to identify specific issues that women face during the stages of recovery. Studies in this review were collected via a comprehensive literature review using the following electronic databases: One Search, Academic Search Complete, LexisNexis Academic, MEDLINE, PubMed, and CINAHL. The search was conducted in 2012 and 2013 using combinations of the following search keywords: nutrition, food choice, eating behavior, weight change, health, substance abuse, addiction, dependence, treatment, stage of recovery, cognitive-behavioral, postpartum women, females, and symptom substitution. A total of 61 articles were identified and summarized in this literature review.

### Discussion

#### Stages of Recovery

The Transtheoretical Model (TTM), commonly referred to as the stages-of-change model, is used as a guide for clinical interventions for a variety of health problems. TTM has been used to define stages of change in substance use disorders based on readiness to change behavior [22]. TTM describes purposeful change as a process rather than a specific moment, and is sensitive to the dynamic changes one endures over time in terms of motivational stage. The five major stages include Precontemplation, Contemplation, Preparation, Action, and Maintenance and are each defined as follows:

**Precontemplation** is described as no intention to change the behavior within the upcoming six months, and the person may not believe that they have a problem. The most suitable intervention technique at this stage is psychoeducational [23].

**Contemplation** is the stage when the individual is considering change with ambivalence and no further commitment to action. Interventions should focus on educating the individual on benefits of change, with intent to motivate the individual to act on their decision to change [23].

**Preparation** is represented by commitment to action. The intervention should focus on strengthening the sense of commitment to change and to assist the individual to create a personalized action plan [23].

**Action** is the first stride toward modification of earlier habits. The individual becomes engaged and develops an improved attitude. This stage typically lasts three to six months. Interventions include intermittent reviews of the plan and reaffirmation of the commitment to change [23].

**Maintenance** is a dynamic stage and continuous process of sustaining and integrating new habits that lasts at least 6 months. The new behavior can be considered established and secure when it becomes more natural and the individual no longer has to apply conscious effort or energy to maintain it. The focus of treatment is to prevent relapses and solidify positive gains made in the action stage [23].

**Relapse** is the final component of the TTM, and defined as an expected regression in the stages of behavior transformation. Relapse is an expected part of the process, and represents the cycling through stages until the individual can adequately consolidate the transfor-

mation in behavior. Interventions should focus on returning to the plan, strengthening self-efficacy, and renewing self-confidence [23]. Recognizing an individual's stage of change can help guide clinical interventions and possibly be a tool for implementing appropriate nutrition interventions [24].

### The Syndrome Model

Once a substance abuser is in recovery, other addictive behaviors are ordinarily adopted to continue patterns of compulsive behavior and alter their bodies' sensations [3]. It is common for recovering substance abusers to acquire another addiction before completely recovering from their original ones [7]. The "hopping" between objects of addiction, as suggested in the "syndrome model" has been noted for illicit drugs and nicotine, alcohol abuse and bulimia, and for substance abuse and gambling [7,12]. Common substances used to replace the drug or alcohol include caffeine, sugar, chocolate, nutritional supplements and medicinal herbs [3]. The common link that ties obsessive food behaviors and new addictions is the addictive behavior remains intact, however the substance has changed to a more socially acceptable alternative [3].

### Disordered Eating in Recovery

In addition to use of new substances and development of food addictions during the recovery process, substance abusers may experience disordered eating and weight change [3]. Isralowitz and colleagues reported that females who used drugs did not understand the importance of proper eating patterns on their health, and were inclined to skip meals or use cigarettes as a weight control strategy [25]. Weight gain during recovery tends to panic women, resulting in disordered eating [3]. Women in recovery may starve themselves to lose touch with reality, create a crisis, and preserve low self-esteem by negating one's need for nourishment, or binge eat to lose sense of time or reality [3]. These rewards are similar to those of substance abuse [3].

Ifland., *et al.* [26] reported that processed foods with high amounts of sugar, fat, salt, and caffeine act as replacement addictive substances and that the associated behaviors imitated the Diagnostic and Statistical Manual (DSM) of Mental Disorders criteria [27] for substance use disorders. Because foods with certain qualities (sugary, starchy, fatty, salty) may be consumed in excess in a manner which conforms to DSM criteria, over-eating may be classified as an addiction stemming from a mental disorder [28]. Sugar is often consumed in excess by recovering alcoholics since alcohol causes blood sugar spikes [3]. Once one achieves abstinence from alcohol, the blood sugar flux intensifies, causing mood swings, depression, poor concentration, and sugar cravings from hypoglycemia [3]. Caffeine is typically increased during early recovery to relieve alcohol withdrawal symptoms by central nervous system stimulation [3]. Chocolate is thought to be a sensual and socially acceptable way to alter mood during recovery [3].

### Weight Changes in Recovery

Avena., *et al.* [29] reported that the cessation of drug use is associated with hyperphagia, and most substance abusers gain about 15 pounds over a 28-day treatment program period [3]. Lindsay, Warren, Velasquez, and Lu reported that the typical diet of a drug user is high in sugar and fat (including sources such as soda, candy, and potato chips), and over 70% of women recruited from substance abuse treatment facilities expressed weight-related concerns while in treatment [27]. Returning to regular daily eating patterns after long episodes of fasting coupled with sedentary lifestyle may result in rapid weight gain during recovery.

Cowan and Devine categorized eating patterns and weight issues among males during recovery. Those in the middle (7 - 13 months) and late (14 - 36 months) recovery expressed dissatisfaction with excess weight gain in recovery and their frustration with efforts to lose weight [8]. Most participants stated that during their addiction they rarely ate, sometimes only twice per week, and experienced an extreme weight loss [8]. Reasons for this decreased food intake include: anorexic drug side effect; less time spent on food preparation and more time spent seeking, using, and recovering from drugs or alcohol; to stay high; and fewer relationships with family who may have previously supplied food [31].

During recovery, most participants had body mass index (BMI) greater than recommended and stated that they had reached the highest weight of their lives thus far [8]. This could be attributed to medications causing weight gain, physiological factors, a decrease in smoking cigarettes, more food availability, and decreased physical activity due to meetings and treatment activities [31]. Another factor to consider regarding weight gain during recovery to high treatment cost or debt from buying drugs and alcohol, substance abusers may resort to calorie-dense inexpensive food items [32].

### Nutritional Supplementation in Recovery

Nutritional supplements, such as multivitamins, glutamine, and niacin are commonly used by those in recovery to relieve withdrawal symptoms, provide satisfaction toward improving health, or attempt to reconcile poor dietary practices [3]. Taking supplements can be detrimental to the recovering abuser as ingesting nutritional supplements mirrors previous addiction patterns by altering state of mind or physical health while removing the obligation to eat nutritiously [3]. For example, glutamine and niacin decrease alcohol cravings and relieve hangover symptoms [3]. Glutamine has been reported to cause delusions and insomnia. Excess intake of nicotinic acid causes a burning sensation or “high” that the user might crave [3]. Nicotinic acid is hepatotoxic [33]. Herbs, which one might believe is “safe” to use because it is “natural” are not Food and Drug Administration (FDA) regulated and can have harmful side effects [34,35]. For example, valerian has been used to tame the withdrawal symptom known as “dry drunk syndrome” [3]. Multivitamins and herbs are considered relatively harmless when taken in doses within recommended limits, but be ingested in excess by those recovering from substance abuse [3].

### Nicotine in Recovery

Cigarette smoking increases during recovery, because nicotine eases feelings of withdrawal accompanying alcohol or drug cessation [3]. Like other drugs, nicotine stimulates the dopamine reward system that individuals in recovery lack [12]. Likewise, smoking cigarettes provides 15 to 60 minutes of appetite suppression, mimicking the pattern of skipping meals that normally accompanies a drug or alcohol addiction [3]. Nicotine is an unhealthy substitute to illicit drug and alcohol use and should be discouraged in rehabilitation facilities, especially since smoking cessation is associated with greater abstinence from drug use after treatment [36]. However, smoking cessation is associated with hyperphagia, thus weight gain is a common side effect of quitting [29].

## Conclusion

### Neuro-Science of Addictions

A probable reason for replacement of drugs and alcohol with food during recovery deals with the areas of the brain that control addictions. Blüml, *et al.* found that both food and drug intake are regulated by the same neurobiological pathways, and compete for the same target brain reward sites [4]. These reward sites include the mesolimbic and mesocortical dopaminergic reward-motivation circuits, and deficits in these neural reward responses are thought to be typical mechanisms for obesity and drug addiction [4]. A dopamine D2 receptor deficit has been identified in obese and drug-addicted adults [4]. Dopamine D2 receptor antagonists have been shown to enhance meal size and duration of feeding by decreasing sensitivity to reward stimuli, therefore making the individual feel the need to eat more to compensate for the deficit. Low dopamine D2 receptor sites have also been linked to increasing the pleasant effects of stimulant drugs, possibly showing an increase for drug abuse susceptibility [37]. These may be reasons why overweight and obese adults were significantly less likely to consume illicit drugs, as essentially, their brain reward sites were already occupied by neural substrates following food intake. If substances no longer occupy these brain reward sites, as occurs during the recovery process, then recovering addicts might compensate by using food to satisfy deficits in neural reward responses [4]. Simply put, “the brain mechanisms underlying the drive to procure and consume food are the same as those that are ‘hijacked’ when one becomes dependent on a drug” [29].

### Nutrition Interventions in Recovery

Nutrition education may benefit health throughout all stages of recovery [30,38,39]. Since most substance abusers exhibit nutrient deficits, improved nutrition status throughout recovery can enhance treatment outcomes [38]. Most treatment programs do not include nutritional counseling [39]. Grant, *et al.* reported that nutrition education during substance abuse treatment increases the possibility of addiction recovery, especially in a group setting [38]. Women in recovery showed improvement in Addiction Severity Index (ASI) scores (predictive of treatment outcomes) in the Psychiatric, Medical, and Family/Social domains after nutrition education services [38]. Hodgkins, *et al.* found that adolescents who received nutrition education and aerobic exercise interventions throughout an 8-week substance abuse recovery program gained an average of three pounds less than a control group [40]. There is an opportunity for healthcare providers to promote healthy eating among residential and outpatient programs in private, public, and governmental health care settings for those in recovery for alcohol and substance abuse.

In summary, food addiction and obesity are interrelated issues for those in recovery. Assessment of changes in weight status, eating patterns, and other health related issues throughout recovery provides guidance to direct nutrition interventions [8]. Researching the association between addictive substance abuse, disordered eating, and obesity and determining whether these disorders have comparable underlying psychosocial elements is important to identify changeable risk components and implement interdisciplinary treatment methods [38].

### Suggestions for Future Research

Research is warranted among young adult females in substance abuse recovery programs to better understand the stage-specific weight changes, eating behaviors, and nutritional concerns among childbearing women. To date, no validated survey instrument that assesses nutritional concerns among this population exists and a screening instrument for women with disordered eating and a history of substance abuse is needed [41,42]. Research testing the effectiveness of different nutrition interventions and education techniques would also be beneficial to determine the most successful interventions for weight maintenance and relapse prevention in recovery. In addition, research assessing women in recovery's access to healthy food choices including fresh fruits and vegetables, lean meats, whole grains, and low-fat dairy would be beneficial in determining appropriate and realistic nutrition interventions for this population.

### Bibliography

1. US Department of Health and Human Services. National Survey on Drug Use and Health (2015).
2. US Department of Health and Human Services. National Survey on Drug Use and Health (2010).
3. Hatcher AS. "From one addiction to another: Life after alcohol and drug abuse". *Nurse Practitioner* 14.11 (1989): 13-20.
4. Blüml V, *et al.* "Relationship between substance use and body mass index in young males". *The American Journal on Addictions* 21.1 (2011): 72-77.
5. Coombs RH. "Handbook of addictive disorders: A practical guide to diagnosis and treatment". Hoboken, NJ: Wiley and Sons (2004).
6. Grigson Patricia S. "Like drugs for chocolate: Separate rewards modulated by common mechanisms?" *Physiology and Behavior* 76.3 (2002): 389-395.
7. Shaffer H, *et al.* "Toward a syndrome model of addiction: Multiple expressions, common etiology". *Harvard Review of Psychiatry* 12.6 (2004): 367-374.
8. Cowan J and Devine C. "Food, eating, and weight concerns of men in recovery from substance addiction". *Appetite* 50.1 (2008): 33-42.



9. Kadden Ronald M. "Cognitive-behavior therapy for substance dependence: Coping skills training". Farmington, CT: University of Connecticut School Of Medicine Farmington (2002).
10. US Department of Health and Human Services (DHHS), Office of Disease Prevention and Health Promotion. 2006. Healthy People 2010 midcourse review: Focus area 26, substance abuse. Washington, DC.
11. Marlatt GA and Gordon J. "Relapse prevention". New York: Guilford (1985).
12. Conner BT, *et al.* "Associations between drug abuse treatment and cigarette use: Evidence of substance replacement". *Experimental and Clinical Psychopharmacology* 7.1 (1999): 64-71.
13. US Department of Health and Human Services (DHHS), Office of Disease Prevention and Health Promotion. 2017. Healthy People 2020: Topics and Objectives. Washington, DC (2017).
14. Substance Abuse and Mental Health Services Administration. National Survey on Drug Use and Health. Department of Health and Human Services (2010).
15. Keyes KM and Hasin DS. "Socio-economic status and problem alcohol use: The positive relationship between income and the DSM-IV alcohol abuse diagnosis". *Society for the Study of Addiction* 103.7 (2008): 1120-1130.
16. Han B., *et al.* "State and sociodemographic variations in substance use treatment need and receipt in the United States". Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration (2011).
17. Redonnet B., *et al.* "Tobacco, alcohol, cannabis and other illegal drug use among young adults: The socioeconomic context". *Drug and Alcohol Dependence* 121.3 (2012): 231-239.
18. Brady TM and Ashley OS. "Women in substance abuse treatment: Results from the Alcohol and Drug Services Study (ADSS)". (DHHS Publication No. SMA 04-3968, Analytic Series A-26). Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies (2005).
19. Grella CE. "Women in residential drug treatment: Differences by program type and pregnancy". *Journal of Health Care for the Poor and Underserved* 10.2 (1999): 216-229.
20. Stevens SJ and Patton T. "Residential treatment for drug addicted women and their children: Effective treatment strategies". *Journal of Ethnicity in Substance Abuse* 13.1-2 (1998): 235-249.
21. Rosen D., *et al.* "Low-income women's use of substance abuse and mental health services". *Journal of Health Care for the Poor and Underserved* 15.2 (2004): 206-219.
22. Migneault JP, *et al.* "Application of the Transtheoretical Model to substance abuse: Historical development and future directions". *Drug and Alcohol Review* 24.5 (2005): 437-448.
23. De Biaze Vilela FA, *et al.* "The transtheoretical model and substance dependence: Theoretical and practical aspects". *Revista Brasileira De Psiquiatria* 31.4 (2009): 362-368.
24. Green GW, *et al.* "Dietary applications of the stages of change model". *Journal of the American Dietetic Association* 99.6 (1999): 673-678.
25. Isralowitz RE and Trostler N. "Substance Use: Toward an Understanding of its Relation to Nutrition-Related Attitudes and Behavior among Israeli High School Youth". *Journal of Adolescent Health* 19.3 (1996): 184-189.
26. Ifland JR, *et al.* "Refined food addiction: A classic substance use disorder". *Medical Hypotheses* 72.5 (2009): 518-526.

27. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5<sup>th</sup> edition, text revision). Washington DC: American Psychiatric Publishing Inc (2013).
28. Gearhardt AN, *et al.* "Food addiction: An examination of the diagnostic criteria for dependence". *Journal of Addiction Medicine* 3.1 (2009): 1-7.
29. Avena NM, *et al.* "Implications of food addiction and drug use in obesity". *Psychiatric Annals* 41.10 (2011): 478-482.
30. Lindsay AR, *et al.* "A gender-specific approach to improving substance abuse treatment for women: The Healthy Steps to Freedom program". *Journal of Substance Abuse Treatment* 43.1 (2012): 61-69.
31. Glovsky E, *et al.* "Healthy habits in recovery: Dietary study methods in substance abuse treatment centers". IRis, Northeastern University, Bouvé College of Health Sciences, Boston, MA (2007).
32. Dammann KW and Smith C. "Factors affecting low-income women's food choices and the perceived impact of dietary intake and socioeconomic status on their health and weight". *Journal of Nutrition Education and Behavior* 41.4 (2009): 242-253.
33. Winter SL and Boyer JL. "Hepatic toxicity from large doses of vitamin B3 (nicotinamide)". *New England Journal of Medicine* 289.22 (1973): 1180-1182.
34. Elsberry RB. "Herbal remedies". *Electrical Apparatus* 54.7 (2001): 40-41.
35. Bent S. "Herbal medicine in the United States: review of efficacy, safety, and regulation: Grand rounds at University of California, San Francisco Medical Center". *Journal of General Internal Medicine* 23.6 (2008): 854-859.
36. Lemon SC, *et al.* "The impact of smoking cessation on drug abuse treatment outcome". *Addictive Behaviors* 28.7 (2003): 1323-1331.
37. Wang GJ, *et al.* "Similarity between obesity and drug addiction as assessed by neurofunctional imaging". *Journal of Addictive Diseases* 23.3 (2004): 39-53.
38. Grant LP, *et al.* "Nutrition education is positively associated with substance abuse treatment program outcomes". *Journal of the American Dietetic Association* 104.4 (2004): 604-610.
39. Hodgkins CC, *et al.* "Adolescent drug addiction treatment and weight gain". *Journal of Addictive Diseases* 23.3 (2004): 55-65.
40. Hodgkins CC, *et al.* "Weight gain during substance abuse treatment". *Journal of Addictive Diseases* 26.1 (2007): 41-50.
41. Denoth F, *et al.* "The association between overweight and illegal drug consumption in adolescents: Is there an underlying influence of the sociocultural environment?" *PLoS ONE* 6.11 (2011): e27358.
42. Piran N and Gadalla T. "Eating disorders and substance abuse in Canadian women: A national study". *Addiction* 102.1 (2007): 105-113.

**Volume 13 Issue 2 February 2018**

©All rights reserved by Elizabeth Wall-Bassett, *et al.*