



# Integrating the Science of Addiction and the Science of Wellbeing

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Received date: June 09, 2017; Accepted date: August 04, 2017; Published date: August 15, 2017

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## Abstract

A gap between public understanding, cutting edge brain science and the practice of addiction treatment has created hardship for those suffering. New perspective replaces the term addiction with the new concept of a continuum of substance use. Substance Use Disorder (SUD) is now regarded as a manifestation of Reward Deficiency Syndrome, which contributes to a spectrum of disorders related to genetic polymorphisms, especially in regard to impulsive, addictive and compulsive behaviors. The new brain science of addiction requires neurological medical intervention and novel treatment with nutraceuticals, the building blocks of neurotransmission. Innovative alternative holistic and wellness therapies are proving to be beneficial in helping the sufferer thrive despite chronic neurological challenge.

**Keywords:** Addiction; Reward deficiency syndrome; Wellness therapy; Neurological challenge; Genetic polymorphisms

## Introduction

The comprehensive study done by The National Center on Addiction and Substance Abuse [1] (CASA) at Columbia University, 2012, titled *Addiction Medicine: Closing the Gap between Science and Practice*, is critically acclaimed [1] meta-analysis of treatment resources, healing application efficiency and/or lack, thereof. CASA Columbia implores the treatment industry to bridge the gap between the science of addiction and the practice of its treatment, and calls for the standardization of treatment protocol with evidenced-based applications, and national licensure requirements for professionals.

The authors highlight the need for the same medical standards that are utilized in the treatment of other neurological disorder, and question the validity of the industry's pattern of selling non-evidenced based twelve step treatments, which is free to the public, but believed to be ineffective. Unsurprisingly, Hazelden Betty Ford markets research with contrary findings, which support the effectiveness of Twelve-Step based treatment [2]. Where is the evidence base for twelve step theory? Why do we not have one? Addiction treatment needs to utilize higher standards, drawn from Evidence-Based Applications in the treatment of extreme neurological disorders.

CASA Columbia also questions the medical soundness of allowing the insurance industry to control (reimbursable) treatment response. Licensed medical professionals need to tailor treatment plans for the individual, and have freedom to draw from the banquet of evidence-based application. Standard cookie cutter treatment protocol is ineffective. This disease and all its variants are extremely subjective.

Many professionals in the field of Substance Abuse Treatment have called for a unification and enlargement of theory, with scientific evidence-based application [3-5]. New definitions (ASMM, 2011) have replaced those created in the last century, centered on twelve step understanding, which emphasizes powerlessness [6]. Today's cutting edge perspective utilizes concepts of powerfulness in taking

responsibility for recovery, initiating life style change, creating health and wellbeing [7,8].

Physical, mental, and/or psychological health is not static, or fixed, but rather changes over periods of time. A continuum of health and illness replaces the former "once an addict-always an addict" concept [9]. In effort to humanize the discussion and to induce compassionate change in perspective, new terminology has been introduced. Substance Use Disorder (SUD) is now the medically and politically correct term, and will hopefully help to ease harsh, judgmental, public negativity.

The cause of SUD is now understood, as genetic variance which predisposes Reward Deficiency Syndrome (RDS), a neurologically deficient state of dopamine, and serotonin transmission resulting in intense craving and maladaptive coping behavioral response patterns. Research has provided genetic screening application for polymorphic resiliency risk. Genetic Addiction Risk Score (GARS) re-screening could be made available to every individual, helping to stop the cycle in this generation [3,10-15].

## Discussion of the Problem

Discussion of the problem begins with the need to redefine the disease and find the means to explain it so that others can understand. In response to addiction recovery industry demands for unified new theory, to explain addiction, now known as Substance Use Disorder, Dr. Kevin McCauley's documentary *Pleasure Unwoven* provides one of the most up-to-date, comprehensive tutorials on the landscape of the mind and the brain science of addiction [16]. Dr. McCauley defines addiction as a "stress induced defect, acting on a genetic vulnerability in the reward learning area of the Mid-brain and the emotion choice area of the Frontal Cortex".

## Dr. Kevin McCauley theory

Dr. McCauley explains five brain levels of malfunction, which fit inside one another like Russian nesting cups. Malfunction on any level, effects not only that level, but all levels above. For example, level one is

genetics, polymorphic gene variances which affect predisposition and/or risk resiliency. NIDA researchers have announced 89 different genes which effect addiction [17].

Research of the GABRA2 gene reveals that its' markers moderate subjective effects of alcohol [18]. Concurrent research of GABRA2 reveals that childhood trauma alters genetic expression and the interactive variance results in increased substance use and/or abuse [19]. Trauma is an epigenetic pressure which alters DNA expression. Certain genetic polymorphisms and experience of trauma in childhood, interact and are predictive precursors of SUD [20,21].

Level two malfunction in Dr. McCauley's theory deals with reward circuitry. More than four decades of research have led to the creation of new theory, Reward Deficiency Syndrome [22-25]. RDS is thought to be the root cause, or kitchen sink of neurological disorder, for a spectrum of dopamine related deficiency disorders ranging from Alzheimer, Asperger, Autism, Addiction, Depression, Impulsive-Compulsive Disorder and Parkinson's [22,26].

Level three malfunctions involve both the Midbrain, which deals with survival in the next 15 seconds and the Pre-frontal Cortex, which houses the executive override system. The Midbrain prioritizes a hierarchy of survival instinct, which in Substance Use Disorder and other impulsive-compulsive behavioral disorders gets recoded, by epigenetic pressures. In the reordering, or reshuffling of instinct hierarchical priority, Substance Use/Abuse gets pushed to the number one position, ahead of survival behaviors [16]. This is similar to a computer virus or Trojan, which alters both the hardware and software. Drugs literally rewire the brain [27].

Triple neurological malfunction occurs on level three. First, the Midbrain's hierarchy of instinct priority is restructured with addictive, compulsive and impulsive behavior lifted to the number one position. Secondly, there is a break-down of executive reasoning centers of the Cerebral Cortex. The Pre-Frontal Cortex's executive over-ride system which is supposed to catch, correct and alert other brain centers if there is a problem, falters. Thirdly, instead of correcting the error, it locks in the error, doing just the opposite of what it is supposed to do. A wash of electromagnetic frequency ignites action potential, and a pulsing bath of glutamate floods the neural network, creating intense craving which is coded into memory [16]. The hardship and complexity of level three neurological malfunctions is significant enough to warrant a change in sanctioning. Compassion is an appropriate response.

Action potential is the result of the electro-magnetic ionic wash, flowing over the body of the neural cell, which pulsates into neural firing, as energy from the field, crosses the zero point line of physics, manifesting into physical form in the creation of a chemical messenger molecule, known as a neurotransmitter [28]. Level four malfunction is stress induced, cue firing of action potential, which sends surge of electro-magnetic current through habituated neural memory paths, waking them up beneath the level of conscious awareness [16].

Stress induced cue firing reactivates and strengthens old memory lanes, which have been lived into being, created with experience, and sometimes reinforced and/or habituated with drug seeking behavior. Addiction can be active within the neural network of billions of billions of cells even when an individual is clean, sober and committed to recovery. It is active in the automatic pilot, sub-conscious portion of our brain, which handles 90% of the brain's activity.

The diseases lives, festering and re-ignited by life stressors often in the form of fear, negative emotion, and anxiety. For individuals whose genetic variance predisposes them to RDS, and SUD, the intense overwhelmingly consuming craving from level three malfunctions is sometimes enough to initiate level four malfunction. For those individuals who develop maladaptive coping responses on top of neurological challenge, sometimes life, itself, is a trigger. The bottom line of level four, addiction brain malfunction is that relapse is stress induced, beneath the level of conscious awareness, before the individual even realizes it.

Dr. McCauley also calls addiction a disease of the brain's choice reasoning centers. By the time, the brain malfunctions at level five, which is in the zone of conscious awareness, in the brain centers of choice, so much has already gone wrong in the brain, that individuals are motivated to make choices which would not be made by neurologically sound individuals. Decisions for immediate gratification are mandated by the extreme glutamate controlled cravings, which are so debilitating that an individual will sometimes act to quell them, no matter the cost, no matter the long-term detriment, no matter the immediate negative consequence.

Addiction is difficult to understand even for professionals. Dr. McCauley succeeds in explaining addiction, in his awarded documentary *Pleasure Unwoven* (2009). While it is the author's opinion that Dr. Kevin McCauley has done a thorough job explaining the complexity of addiction and made substantial contribution of resource to the world, with the body of his life's work, and the recovery institutions he has established, there is need for more concise, more easily understood theory, which highlights genetic variance and neurological challenge.

### **Dr. Kenneth Blum theory**

Another theory has moved into the forefront, which actually parallels the first two levels of McCauley's theory, genes and reward circuitry. The spotlight of recognition by the scientific research community is now upon the new theory of Reward Deficiency Syndrome. Although many, have been researching genetic polymorphism in reward circuitry for decades, providing the research data and laying the necessary groundwork for the foundation of the theory [29,30], it is Dr. Kenneth Blum and his associates who are credited with naming it, synthesizing the complex research data into concise, understandable theory [31,32]. It is the unified team effort which has published, marketed and promoted RDS, successfully, converting the body of knowledge, into a tangible product, placed in the hands of consumers.

Dr. Blum explains that RDS is an "umbrella term used to describe common genetic antecedents of multiple impulsive, compulsive and addiction behaviors. Individuals possessing a paucity of serotonergic and/or dopaminergic receptors and an increased rate of synaptic Dopamine catabolism, due to high catabolic genotype of COMT gene, are predisposed to self-medicating any substance or behavior that will activate dopamine release, including alcohol, opiates, psychostimulants, nicotine, glucose, gambling and even excessive internet gaming, among others" [33].

The Kenneth Blum team of associates reads like a Who's Who of celebrity research scientists who have changed the present and the future of addiction recovery treatment. They have redirected focus to the genetics of reward circuitry deficiency, provided spot on, concise, new theory as well as evidence-based application. They have

successfully researched, developed, patented, and brought to market viable intervention which works.

Dopamine deficiency and irregular neurotransmission are considered “the common kitchen sink” of neurological challenge, contributing to Parkinson’s, Alzheimer, Asperger, Autism, depression, addiction, impulsive-compulsive disorder, obesity, and quite possibly fibro-neuralgia [34,35]. It was once said that “All roads led to dopamine,” but Blum and his associates also recognize problems in serotonin neurotransmission, with serotonergic-2A receptor (5HT<sub>2a</sub>), and the Catechol-o-methyl-transferase (COMT) [33].

Although Dr. Blum was not the first, to devise protocol for genetic screening [36], he is perhaps the most successful, with the widely acclaimed, patented Genetic Addiction Risk Score (GARS), which is an identifier of polymorphic variances which predispose an individual to SUD, and other impulsive-compulsive behaviors and their root cause RDS [37]. With genetic screening Blum and his team has provided scientific basis to determine addiction in its dormant state, before it activates, and provided a critical tool in stopping the cycle before it begins [10,11,38]. Armed with the GARS test, recovery warriors have the means to reach future sufferers and end the repetitive, worsening, generational cycle before it begins.

Blum et al. has also created new methodology of intervention. Traditional pharmaceutical therapy which has been known to work by poisoning components of the soma’s interactive balancing systems [39]. For example, in cases of too little serotonin, whether due to inadequate production, or inadequate docking ports at the neural wall, serotonin re-uptake inhibitors, SSRI’s have been prescribed to poison reuptake from the synapse, a crucial component of the serotonin neuro-transmission balancing system. Pharmacology can work as a short term bridge to neurological stability, but it can also have long term detriment [40,41].

Dr. Kenneth Blum and Dr. John Giordano have co-created holistic intervention which works by nourishing and feeding the brain, providing the building blocks of amino acids used in neurotransmission [33,42]. The team of research scientists created, researched, supported, patented, and brought to market NAAT therapy, the neutraceuticals which provide the proper building blocks for neural stem cell repair, helping to heal hyper stimulant damage and toxicity, at the cell wall. The recipe of nutrients is an interventional remedy being used by recovering individuals in real time, NOW. Other members of the team continue scientific inquiry, finding repetition in result, to contribute concurrent support [42].

Public misunderstanding and bias tend to shame, isolate, denigrate and incarcerate those who suffer from addiction, Substance Use Disorder, and other impulsive/compulsive disorders. This is not true of Reward Deficiency Syndrome.

## Discussion of Evidence-Based Interventions

Scientific research has made remarkable headway in redefining the problem, coined concise understandable theory with application, and provided a much needed redirection of focus to treatment of the cause. Research is also revealing correlation between alternative, integrated, holistic, wellness practices with increased self-efficacy, life satisfaction, resiliency and recovery resolve. Decades of research studies are proving that acupuncture, yoga, integrative mindfulness meditations, as well as many positive psychological therapies, increase happiness, well-being, and assist individuals to take responsibility for thriving.

## Alternative Treatment Modalities

### Acupuncture

Acupuncture is based upon the assumption that vital life force, Qi (electro-magnetic energy) courses through channels in the body, like rivers running to the sea, and blood coursing through the veins. The Chinese call it “Qi.” The Hindi refers to prana, or “Chi.” The Japanese call it “Rei.” Culture affects the movement and attunement of energy differently. Energy medicine is gaining ground in the westernizing and Americanization of eastern technique. A combination of western medicine and eastern alternative treatments are providing a comprehensive package, to attack illness and nurture well-being.

Acupuncture is a component of cutting edge holistic treatment models, as the current trend in addiction treatment protocol is shifting, enlarging, expanding beyond the disease model, to encompass components of integrative medicine and wellbeing [43]. For more than 5000 years, eastern philosophies have intuited the electro-magnetic energy grid of the first chakra, which western science has only recently been able to image with high tech equipment. Energy flow around the body’s electromagnetic grid jumps into the biological structural connective tissue.

Acupuncture has a grounding affect, stimulates the flow of life force, and increases sense of well-being, and stimulating the body’s production of beta-endorphins. As early as 1993, acupuncture was used in over 200 detoxification programs in the United States and Europe, with that number climbing significantly over the past 25 years. In detoxification from SUD, acupuncture has the immediate effect of cessation of many withdrawal symptoms [44].

In review of acupuncture as a treatment modality, NIDA found it stimulates kidney and liver, the filtration of toxins, reduces craving, releases anger, controls depression, aids relaxation, and promotes self-care [45-48]. As early as 1989, Bullock found that acupuncture reduces [49]. Finding that acupuncture is correlational with reduced rates of recidivism, some drug courts have begun to require it [50].

Acupuncture therapy no longer struggles for legitimacy [51]. Decades of research had laid foundation [48,52,53]. Building upon past research of acupuncture, as detoxification treatment [44,45,47], and technical review of its application [46], the National Institutes of Health, Office of Alternative Medicine has built a database of new perspectives of acupuncture in Substance Abuse Treatment [43,49].

Over the past few decades, research trend has designed evidence level I, random clinical trials, moving beyond qualitative research design and surveys of self-report to establish biological markers of cocaine-seeking reinstatement within the Nucleus Accumbens (NAc) in the “expression of c-FOS and the transcription factor cAMP response element-binding protein (CREB)” [54].

Dr. Kenneth Blum and associates hypothesized synergy between acupuncture therapy/auriculo-therapy and natural activation of mesolimbic dopaminergic pathways [33]. In meta-analysis of dozens of clinical research studies, which helped to inspire the creation of neuro-adaptogen amino acid therapy (NAAT), Blum and his team found that there was indeed interactive synergy of acupuncture and auriculo-therapy, to help repair brains damaged by psychostimulant substance abuse, especially when nourished with NAAT. EEG normality was restored for research participants, and the natural activation of mesolimbic dopaminergic pathways was enhanced.

A study on the effects of acupuncture on stress-induced relapse in conditioned cocaine-seeking rats showed that relapse was interrupted with immediate acupuncture treatment to acu-meridian at point HT7, but not at the control point of L15 [54]. This research confirmed that specific acupuncture point treatment is identified in rat populations, in randomized clinical study, advancing the knowledge base beyond the limitations of lower level evidence-based paradigm, derived by confirmation of general efficacy as reported by human participant self-report survey. Future research is necessary to support findings that acupuncture treatment at acu-meridian point HT7, will interrupt conditioned relapse initiated by cue activation, in human subjects.

## Yoga

Yoga integrates mind and body. Yoga is a predictor of psychological and physical wellness, as a method of transcendence of the ordinary [55]. Transpersonal psychological constructs, as well as spiritual measures are being used in yoga research [56]. Findings from past decades of yoga medicine research, support efficacy of yoga in facilitating physical, emotional, cognitive and spiritual well-being. Yoga research, with non-probability samples, finds co-relation between yoga practice, and increased levels of wellbeing, with higher levels of yoga experience predicting higher levels of well-being [57]. The body of research evidence supports findings that yoga is effective in decreasing levels of stress. It is beneficial in the treatment of disease [58], in the treatment of anxiety, and depression.

Research of its efficacy in SUD treatment supports the overall efficacy of yoga in facilitating physical, emotional, cognitive and spiritual well-being, as a means to increasing recovery resolve [55]. Present day trends have stretched beyond the boundary limitations of single alternative treatment study, to test the effectiveness of combined modalities, testing the synergetic influence of acupuncture and yoga together, to build recovery resolve, increase self-efficacy and well-being [59].

## Mindfulness based stress reduction

Mindfulness practice anchors one in the present moment, in the power of now (Tolle, 1999, 2005). Mindfulness-based stress has health benefits [60]. The evidence-based body of knowledge, supports mindfulness technique for improvement of wellbeing [57,61,62]. Integrative mindfulness meditation therapies are being used as interventions for psychiatric disorder [63], and adults with exposure to psychological trauma.

Mindfulness-Based Stress Reduction (MBSR) techniques, such as meditation, and yoga are supported in the facilitation of Post-Traumatic Stress Disorder (PTSD) treatment, in relieving physiological stress associated with states of hyper-arousal, while increasing immunity [64], and improving circulation of insulin-like growth factor (IGFO-1) concentrations [65].

MBSR and Mindfulness-Based Cognitive Therapy (MBCT) have been studied extensively. MBSR is beneficial for pain management, and psychological wellness. MBCT has been proven more effective at reducing worry, depression [66] and co-morbid disorders like substance abuse [67]. MBSR mediation practices have been found to be effective in the treatment of Generalized Anxiety Disorder (GAD), which may be a precedent to SUD [68].

Schoormans and Nyklicek were curious as to whether benefit was related to the type of mindfulness technique or the duration of practice

and found that the frequency of practice over a number of years was the stronger determinant. Mindfulness research is moving beyond the treatment of disease, with application for effective self-management strategy [69] and enhancement of the community and improvement in the workplace in corporate setting [70].

As reductionist trends remain the *modus operandi*, present mindfulness medicine research studies focuses upon more exact determination of specific components of how and why it works [65]. However, times are changing. The influence and complexity of quantum physics, as well as holistic approach investigating the synergy of combined alternative well-being practices appear to have the spotlight and interests of the scientific community.

## Positive psychological interventions

Psychology's old tried and true methods of cognitive-behavioral therapy certainly have earned their respected place in treatment protocol [71,72]. New constructs from Humanistic, Transpersonal, Existential and Integral psychological-philosophical perspective offer enhancement opportunity [73,74] Research review meta-analysis of positive psychological application finds consistent, concurrent support of increased self-efficacy and increased self-esteem, provide benefit in the treatment of SUD [75]. Positive psychology is both proactive and preventive: building resilience and increasing well-being in the fight against addiction [76-78].

Not only is positive psychology helpful in the treatment of disease, it is stellar for mental health promotion across the board, to enhance well-being of humanity at large [79]. Wake Forest University, a smaller university setting which leaves a powerfully large footprint in the research community, in pioneering present day addiction medicine [80-84], has also brought to the forefront of positive psychological perspective, Jayawickreme and Seligman with the support Positive Psychology's founder and past APA president Martin Seligman, and The Engine of Well-being [85]. The past 20 years have witnessed refocused energy and hope for positive psychology to mature into a stronghold, bridging the scientific study of disease with the science of well-being.

## Summary and Conclusion

Integrating the science of addiction and the science of wellness is not difficult. We have new definition, new theory, new application, renewed motivation. It will happen naturally, over time, with publication, and perseverance. Focus has shifted from the war on drugs, to the war for recovery. Change is a certainty. Functional near Infrared Spectroscopy is being used to find potential biological markers for assessment of addiction and its recovery [85]. Alpha frequency waves are being explored for reward-system effect to heal decisional impairments contributing to and damaged by drug addiction [86,87]. Stem cell and frequency research are carving the path, meandering from present to the future.

## References

1. CASA Columbia (2011) Addiction medicine: Closing the gap between science and practice. Columbia University Press.
2. ABAM Foundation (2012) The American Board of Addiction Medicine Foundation lauds CASA Columbia Report: Addiction Medicine: Closing the gap between science and practice. In press.
3. Stinchfield, Owen (1998) In press.

4. Gilley ED (2016a) Stopping the Cycle of Addiction. West Palm Beach, FL: The Elle Foundation.
5. Hari (2015) In press.
6. NIDA (2013) In press.
7. Moberg CA, Humphreys K (2016) Exclusion criteria in treatment research on alcohol, tobacco and illicit drug use disorders: A review and critical analysis. *Drug and Alcohol Review*.
8. McKay (2016) In press.
9. Oksanen (2013) In press.
10. Wein (2013) In press.
11. Gilley ED, Auclair CEL (1996) *Dragon Slayers and Bridge Builders*. Dallas, TX: The Elle Foundation.
12. Gilley ED (2012) *Dragon Slayer and Bridge Builders Workbook*. Winston-Salem, NC: Elle Images.
13. Widom CS (1989) The cycle of violence. *Science* 244: 160-166.
14. Widom CS (1993) Child abuse and alcohol use and abuse. In: Martin SE (ed.) *Alcohol and Interpersonal Violence: Fostering Multidisciplinary Perspectives*. NIAAA Research Monograph No. 24. NIH Publication No. 93-3496. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism pp: 291-314.
15. Widom CS, Ireland T, Glynn PJ (1995) Alcohol abuse in abuse and neglected children followed-up: Are they at increased risk? *Journal of Studies on Alcohol* 56: 207-217.
16. Widom CS (1997) Child abuse, neglect, and witnessing violence. In D. Stoff, J. Breiling, and J. Maser (Eds.), *Handbook of Antisocial Behavior*. New York, NY: Wiley pp: 159-179.
17. McCauley K (2009) *Pleasure Unwoven*. Castle Craig.
18. Uhl G, Liu Q (2006) NIDA researchers identify 89 genes implicated in addiction: At least 21 are likely to affect brain's memory processes. *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics)* 141-B.
19. Uhart M, Guo X, Kranzier H, Li N, McCaul M, et al. (2012) GABRA2 markers moderate the subjective effects on alcohol. *Addict Biol* 18: 357-369.
20. Enoch M, Hodgekinson C, Yuan Q, Shen P, Goldman D, et al. (2010) The influence of GABRA2, childhood trauma, and their interaction on alcohol, heroin, and cocaine dependence. *Biological Psychiatry* 67: 20-27.
21. Anda RF (2006) The enduring effects of abuse and related adverse experiences in childhood. *Eur Arch Psychiatry Clin Neuro* 256: 3.
22. Ireland T, Widom C (1994) Childhood victimization and risk for alcohol and drug arrests. *Int J Addict* 29: 235-274.
23. Blum K, Braverman E, Holder J, Lubar JF, Miller D, et al. (2000) Reward Deficiency Syndrome: A biogenetic model for the diagnosis and treatment of impulsive, addictive, and compulsive behaviors. *J Psychoactive Drugs* 32: 1-112.
24. Blum K, Gold M, Liu Y, Shriner R (2011b) Reward circuitry dopaminergic activation regulates food and drug craving behavior. *Curr Pharm Des* 17: 1158-1167.
25. Blum K, Borstein J, Chen A, Chen T, Giordano J, et al. (2012a) The addictive brain: All roads lead to dopamine. *J Psychoactive Drugs* 44: 134-143.
26. Blum K, Bowirrat A, Carnes S, Carnes P, Giordano J, et al. (2012b) Sex, drugs, rock 'n' roll: Hypothesizing common mesolimbic activation as a function of reward gene polymorphisms. *J Psychoactive Drugs* 44: 38-55.
27. Chen T, Blum K, Bowirrat A, Downs W, Madigan M, et al. (2011) Neurogenetics and clinical evidence for the putative activation of the brain reward circuitry by a neuroadaptagen: Proposing an Addiction Candidate Gene Panel Map. *J Psychoactive Drugs* 43: 108-127.
28. Chilton S, Rukstalis M, Gregory A (2016) *The rewired brain*. Grand Rapids, MI: Baker Books.
29. Gilley ED (2013a) *Creating addiction*. Winston-Salem, NC: The Elle Foundation.
30. Alguacil LF, Gonzalez-Martin C (2015) Target identification and validation in brain reward dysfunction. *Drug Discov Today* 20: 347-352.
31. Leyton (2014) In press.
32. Blum K, Braverman E, Chen A, Williams L (2008) Dopamine D2 receptor TaqA1 allele predicts treatment compliance of LG839 in a subset analysis of pilot study in the Netherlands. *Gene Ther Mol Biol* 12: 129-140.
33. Blum K, Cull J, Sheridan P (1995) Genetic screening: To be or not to be? *Genetoc Engineering News* 15: 4-20.
34. Blum K, Braverman E, Carbajal J, Downs B, Downs J, et al. (2011a) Hypothesizing synergy between acupuncture/auriculotherapy and natural activation of mesolimbic dopaminergic pathways: Putative natural treatment modalities for the reduction of drug hunger and relapse. *Integrative Omics and Applied Biotechnology Letters* 1: 1-14.
35. Calderon-Garciduenas (2015) In press.
36. Cohen B, Carlezon W (2007) Can't get enough of that dopamine. *Am J Psychiatry* 164: 543-546.
37. Uhl (2002) In press.
38. Blum K, Demetrovics Z, Gold MS, Oscar-Berman M (2014) Genetic Risk Score (GARS): Molecular neurogenetic evidence for predisposition to Reward Deficiency Syndrome (RDS). *Mol Neurobiol* 50: 8726.
39. Gilley ED (2016b) Positive psychology is both proactive and preventative: Building resilience and increasing well-being in the fight against addiction. West Palm Beach, FL: The Elle Foundation.
40. Hopkins A (2008) Network pharmacology: The next paradigm in drug discovery. *Nat Chem Biol* 4: 682-690.
41. Howell (2007) In press.
42. Castren F (2005) Is mood chemistry? *Nat Rev Neurosci* 6: 21-26.
43. Miller (2012) In press.
44. Brumbaugh AG (1995) Acupuncture: New perspectives in chemical dependency treatment. *J Subst Abuse Treat* 10: 36.
45. Smith M, McKenna B (1994) The integration of acupuncture into existing chemical dependency treatment programs. 21st International Institute on Prevention and Treatment of Drug Dependence, Prague, Czech Republic.
46. Brewington V, Smith M, Lipton D (1994) Acupuncture as a detoxification treatment: An analysis of controlled research. *J Subst Abuse Treat* 11: 299.
47. McLellan AT, Grossman D, Blaine JD, Harvekos HW (1993) Acupuncture treatment for drug abuse: A technical review. *J Subst Abuse Treat* 10: 569-576.
48. Washburn AM, Fullilove R, Fullilove MT (1993) Acupuncture heroin detoxification: A single blind clinical trial. *J Subst Abuse Treat* 10: 345-351.
49. Smith M (1993) Lincoln hospital acupuncture drug abuse program: testimony presented to the NIH office of alternative Medicine and the national wellness coalition.
50. Bullock M, Culliton P, Olander R (1989) Controlled trial of acupuncture for severe recidivist alcoholism. *The Lancet* 8: 1435-1439.
51. Bullock M, Kiresuk T, Pheley A, Culliton P, Lenz S (1999) Auricular acupuncture in the treatment of cocaine abuse. a study of efficacy and dosing. *J Subst Abuse Treat* 16: 31-38.
52. Singer J (1996) *An analysis of acupuncture therapy for the treatment of clinical dependency and it's struggle for legitimacy*. Spring, Stony Brook, New York: The State University of New York.
53. Smith M, Squires R, Aponte J (1982) Acupuncture treatment of drug addiction and alcohol abuse. *American Journal of Acupuncture* 10: 161-163.
54. Smith M, Khan I (1988) An acupuncture program for the treatment of drug addicted persons. *Bulletin on Narcotics* XL: 35-41.
55. Yoon S, Choi S, Jang E, Kim H, Lee B, et al. (2012) Effects on acupuncture on stress-induced relapse to cocaine-seeking in rats. *Psychopharmacology* 222.
56. Moliver N, Mika E, Chartrand M, Haussman R, Khalsa S (2013) Yoga experience as a predictor of psychological wellness in women over 45 years. *International Journal Yoga* 6: 11-19.
57. MacDonald D, Friedman H (2009) Measures of spiritual and transpersonal constructs for use in yoga research. *International Yoga Journal* 2: 2-12.

58. Huang FJ, Chien DK, Chung UL (2013) Effects of Hatha yoga on stress in middle aged women. *Journal Nursing Resources* 21: 59-66.
59. Lipton B (2005) *The biology of belief: Unleashing the power of consciousness, matter, and miracles*, Hay House.
60. Nagilla N, Hankey A, Nagendra H (2013) Effects of yoga practice on acumeridian energies: Variance reduction implies benefits for regulations. *International Journal Yoga* 6: 61-65.
61. Grossman P, Niemann L, Schmidt S, Walach H (2004) Mindfulness-based stress reduction and health benefits: A meta-analysis. *J Psychosom Res* 57: 76-89.
62. Nyklicek I, Mommersteeg PM, Van Beugen S, Ramkers C, Van Boxtel GJ (2013) Mindfulness-based stress reduction and physiological activity during acute stress: A randomized controlled trial. *Health Psychology*.
63. Libby D, Reddy F, Pilver C, Desai R (2012) The use of yoga in specialized VA PTSD treatment programs. *International Journal of Yoga Therapy* 22: 79-87.
64. Marchland WR (2013) Mindfulness meditation practices as adjunctive treatments for psychiatric disorders. *Psychiatric Clinics North America* 36: 141-152.
65. Wahbeh H, Zwickey H (2009) Mind-body medicine and immune system outcomes: A systematic review. *Open Complimentary Medicine Journal* 1: 25-34.
66. Gallegos AM, Hoerger M, Talbot NL, Krasner MS, Knight JM, et al. (2013) Toward identifying the effects of the specific components of mindfulness-based stress reduction on biologic and emotional outcomes among older adults. *Journal of Alternative Complementary Medicine* 19: 787-792.
67. McCarney R, Schultz J, Grey R (2012) Effectiveness of mindfulness-based interventions in reducing symptoms of depression: A meta-analysis. *European Journal of Psychotherapy & Counseling* 14: 279-299.
68. Arch J, Ayers C, Baker A, Almklov E, Dean D, et al. (2013) Randomized clinical trial of adapted mindfulness-based stress reduction versus group cognitive-behavioral therapy for heterogeneous anxiety disorders. *Journal of Behavioral Resource Therapy* 51: 185-196.
69. Hoge EA, Bui E, Marques CA, Morris LK, Robinaugh DJ, et al. (2013) Randomized controlled trial of mindfulness meditation for generalized anxiety disorder: Effects on anxiety and stress reactivity. *Journal Clinical Psychiatry* March 13.
70. Khusid M, Vythilingam M (2016) The emerging role of Mindfulness Meditation as effective self-management strategy, Part 1: Clinical implications for depression, Post-Traumatic Stress Disorder, and anxiety. *Military Medicine* 181: 961.
71. Bazarko D, Azocar F, Cate R, Kreitzer M (2013) The impact of an innovative mindfulness-based stress reduction program on the health and well-being of nurses employed in a corporate setting. *Journal of Workplace Behavioral Health* 28: 107-133.
72. Sofuogel, Sugarman, Carroll (2010) In press.
73. Beck A, Liese B, Newman C, Wright R (1993) *Cognitive therapy of substance abuse*. New York, NY: Guilford Press.
74. Gilley ED (2015) *The History of Transpersonal Psychology*. West Palm Beach, FL: The Elle Foundation.
75. Serlin I (2011) *The History and Future of Humanistic Psychology*. *Journal of Humanistic Psychology* 51: 428-431.
76. Krentzman A (2013) Review of the application of positive psychology to substance use, addiction and recovery research. *Psychological Addictive Behavior* 27: 151-165.
77. Gilley ED (2016) *Champions of the Cause: How we recover from addiction and it's treatment*. West Palm Beach, FL: The Elle Foundation.
78. Schueller S (2014) *The science of self-help: Translating positive psychology research into increased individual happiness*. *European Psychologist* 19: 145-155.
79. Seligman M (2005) In press.
80. Kobau R, Peteson C, Seligman M, Thommpson W, Zack M (2011) Mental Health promotion in public health: Perspectives and strategies from positive psychology. *American Journal of Public Health* 101: e1-e9.
81. Gould RW, Czoty PW, Porrino LJ, Nader MA (2017) Social status in monkeys: effects of social confrontation on brain function and cocaine self-administration. *Neuropsychopharmacology* 42: 1093-1102.
82. Porrino LJ, Beveridge TJ, Smith HR, Nader MA (2016) Functional consequences of cocaine expectation: findings in a non-human primate model of cocaine self-administration. *Addict Biol* 21: 519-529.
83. Brucher E, Nader SH, Nader MA (2016) Evaluation of the reinforcing effect of quetiapine, alone and in combination with cocaine, in rhesus monkeys. *J Pharmacol Exp Ther* 356: 244-250.
84. Kromrey SA, Czoty PW, Nader SH, Register TC, Nader MA (2016) Preclinical laboratory assessments of predictors of social rank in female cynomolgus monkeys. *Am J Primatol* 78: 402-417.
85. Jayawickreme E, Seligman M (2012) *The engine of well-being*. American Psychological Association.
86. Dempsey JP, Harris KS, Shumway ST, Kimball TG, Herrera JC, et al. (2015) Functional near infrared spectroscopy as a potential biological assessment of addiction recovery: preliminary findings. *The American Journal of Drug and Alcohol Abuse* 41: 119-126.
87. Balconi M, Canavesio Y, Finocchiaro R (2014) Reward-system effect (BAS rating), left hemispheric "unbalance" (alpha band oscillations) and decisional impairments in drug addiction. *Addictive Behaviors* 39: 1026-1032.