

Reconceptualizing Addiction: Integrating the Sciences of Addiction & Reward Deficiency Syndrome, Part 1

Elizabeth Dale Gilley

Founder, Research Review Analyst, the Elle Foundation

*Corresponding author

Elizabeth Dale Gilley, Research Review Analyst, Founder of the Elle Foundation, 119 Executive Center Drive, Suite 404 West Palm Beach, Florida 33401

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Abstract

Analytic review of research study results from psychology, addiction science, and interactive sciences like neurology, genetics, and epigenetics, implore psychology, psychiatry and addiction recovery treatment fields to enlarge their perspective, by considering underlying causal influence. The appropriate time to re-conceptualize addiction for the practitioner world is now! Treatment protocol must expand beyond mitigation of the symptoms and address genetic, epigenetic and neurological causal influence. The science of Reward Deficiency Syndrome (RDS), offers a new phenotype for addiction, providing a common rubric for all obsessive, compulsive, and addictive behavioral patterns, and contributes understanding of the psychiatric genetics and/or causal influence of dopaminergic dysfunction in other co-occurring mental disorders. In consideration and review of the body of scientific knowledge, to successfully bridge the gap between science and practice, an integration of the sciences of addiction, and Reward Deficiency Syndrome must be achieved [1].

Introduction

Over one hundred years ago, after humanity had endured the suffering associated with the cocaine and morphine epidemic of the 1890's, and society attempted to self-correct in passing prohibition to make alcohol illegal, doctors and scientists began to explore the behavioral problems associated with addiction [2]. The field of addiction science was birthed, and the commercial response of addiction recovery treatment arose standing like an army ready to take its first steps into battle. The global scientific research and practitioner response has been phenomenal in creating and providing international addiction recovery treatment opportunity.

Research science continues to grow and expand exponentially across the planet. However, with increased understanding, it is known that the problem is bigger, more complicated, and more generational than ever imagined. Practitioners have become bogged down trying to treat the sheer numbers and overwhelming, growing need. Seemingly, addiction has morphed into an almost seemingly endless variety of other forms, including process behavioral addictions and a 50-80 year gap has been recognized between research understanding and delivery of effective practice protocol [1]. Treatment results have not been as positive as anticipated, and patients have been harmed by the lack of understanding of the underlying addiction syndrome and human tendency to blame and judge the patient for relapse symptomology.

While society is in the midst of an even more horrific opioid epidemic, a wealth of new research application has become stalled,

awaiting approval before it can be made available to the public. There is a bottleneck of red tape associated with becoming legitimized, as in NIH, NIDA, FDA acceptance, legalization, acceptance for insurance industry reimbursement coverage, and the addiction treatment industry's economically inspired, reluctance for change. This is the gap, or rather, trench, between research and practice.

It is complicated. New protocols cannot be delivered, legally, for human consumption until they withstand the tests of science, reach appropriate level one evidence status accreditation, through gold standard randomized double blind control trials. Even then, time is needed for the safety afforded through longitudinal studies, which hopefully reaffirms effectiveness and disproves potential detrimental harm which might not have been considered in the short range. Yet, shouting above all propriety are the psychic screams of those who have died, to please help the next generation, so that their children and grandchildren do not suffer the same fate.

Enlarged perspective suggests emphatically, that addiction needs to be re-conceptualized [3]. Previously behaviors, drugs or substances have been considered the cause of addiction, or Substance Use Disorder (SUD). Analytic review of research study results from psychology, addiction science, and interactive sciences like neurology, genetics, and epigenetics, implore psychology, psychiatry and addiction recovery treatment fields to enlarge their perspective, by considering underlying causal influence [4, 5].

Over fifty years of addiction science and neuro-genetic research have identified a new phenotype for impulsive, compulsive, obsessive and addictive behavioral expression which is changing the recovery landscape by linking all addictions under a common rubric [6-13]. The science of Reward Deficiency Syndrome (RDS) offers hope for SUD and for all obsessive, compulsive, and addictive behavioral patterns.

RDS contributes understanding of psychiatric genetics, and/or causal influence of dopaminergic dysfunction in other co-occurring mental disorders and psychiatric comorbidity [9, 10]. Polymorphic gene variance and dopaminergic dysfunction lay at the heart of reward circuitry problems in many co-occurring mental health disorders and neurological diseases, such as depression, ADHD, PTSD, Bipolar, Gilles de Tourette Syndrome, the Autism Spectrum and Parkinson's disease [14, 15].

Research Review

Research shows that those with more than one substance use disorder, process or behavioral addiction, such as in gambling, gaming, eating and sexual disorders, and/or psychiatric co-morbidity as in impulsive, obsessive-compulsive disorder, ADHD, PTSD, Bipolar, and/or depression, etc. experience drastically diminished quality of life as compared to populations which do not have such extreme neuro-psychological impairment [16, 17]. This same population also experiences drastically lower recovery rates within the existing traditional SUD and psychiatric treatment protocol [18, 19].

For decades addiction research exclusion criteria disqualified those with comorbidity, so much so that results were affected and the industry was delayed in gaining an understanding of the true nature of neurogenetic causal influence [20]. Enlarged perspective demands that future research include those with co-morbidity as more researchers are becoming informed that addiction may be a symptom of Reward Deficiency Syndrome [8].

When patients with both Substance Use Disorders and Process Behavioral Addictions were interviewed, they related that addiction as they have experienced it, is both a state of deficiency, as well as, a state and condition of self-inflicted harm [21]. Participants revealed that they felt as if they lived in a continuous un-satiable state of deficiency. It did not matter how much they used, or how hard they tried, the stress of not being able to get up to zero, or normal remained. Researchers concluded after more extensive interview, that these participants were experiencing the Anhedonic state of dopamine depletion, even if they did not know what it was called. "The molecular role of dopamine in anhedonia [is] linked to reward deficiency syndrome (RDS) and anti-reward systems" [22].

Perhaps new expansive definitions of RDS related Anhedonia and Dysphoria, the resulting volatility and rage that comes with unending undercurrent of stress associated with Anhedonia, need to be developed for RDS psychoeducation of patients, along with Likert Scale measurements for self-report of Anhedonia and Dysphoria experience [6, 23]. These may be useful in future development of RDS adapted cognitive behavioral therapy to help inform clients through self-awareness, for self-management techniques for the purpose of achieving dopamine homeostasis to combat relapse and facilitate wellbeing [11].

These same participants also elaborated upon the addictive condition of participating in self-harm, whether that be in the form of physical

self-harm, as in taking of poisonous drugs, or cutting oneself [21]. They also experienced self-harm in the form of self-talk, self-concept and through negative thoughts about their self-worth. Researchers understand that those with multiple addictions feel devastation across the realms of genetics, neurology, psychologically, cognition, emotion, social relations, economic and financial stability, legal issues, and also in the realms of the spirit, love, hope, the numinous, the transpersonal and existential.

Participation in evidence-based integrative mind-body-spirit wellness applications, such as prayer, yoga, meditation, go-gong, tai chi, music, dance, exercise, art, drumming, singing, charitable action, etc. are all associated with increased wellbeing and recovery [7, 24- 26]. Energy follows focus. Energy follows intention. This research review is infused with the hope of inspiring the industry to recreate itself with the authenticity of the entire evidence base, and just not continue offering those therapies which are accepted for insurance reimbursement.

Neurological diseases such as Reward Deficiency Syndrome require neurological treatment. Not just psychological and pharmacological treatment [27]. Enlarged RDS perspective theorizes an underlying neuro-genetic causal influence for not only all addictions, but for psychiatric comorbidity with underlying dopaminergic dysfunction [28]. RDS dopaminergic dysfunction can extend beyond patients with psychiatric and psychological pathology to include patients along the Autism Spectrum, and those with Gilles de Tourette Syndrome and Parkinson's disease [9, 10, 29].

Enlarged perspective demands a re-conceptualization of addiction. There remains no unifying theory which can encompass all of addiction's complexity. There is need for new definitions, which include RDS theory, in explanation of causal influence for SUD, Process Behavioral Addictions, and COD [30]. This shift to enlarged perspective will facilitate the acceptance new application criteria and adaptation of psychology's old, tried and true therapies to include of RDS understanding [11]. Former and current psychological concepts of Substance Use Disorder (SUD) and many co-occurring mental health disorders (COD) within the Diagnostic and Statistical Manual for Mental Health Disorder have been questioned for their continued relevance, as psychology adjacent / interactive sciences, such as genetics, and neurology become more focused upon addiction's underlying neuro-genetic causal influences [31].

Genetic Addiction Risk Score (GARS) screening for addiction and reward deficiency syndrome, is available to the public, from Geneus Health [32, 33]. Genetic testing is an excellent tool for individualized treatment design and as prevention for the next generation [34, 35]. It is so precise that one's exact phenotype of RDS expression can be determined, for the personalized creation of intervention according to genetic need [14]. Pro-dopaminergic regulation research to combat dopaminergic dysfunction and achieve dopamine homeostasis is rising up through the chain or level of evidence, to hopefully one day soon be approved for human clinical trial [36, 37].

Brain imaging techniques, in the forms of electroencephalography (EEG), structural magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), functional near infrared spectroscopy (fNIR), positron emission tomography (PETP) and single positron emission computed tomography (SPECT) provide a wealth of data for the analyses of neural activity in the brain [38-

41]. Structural MRIs can show portions of the brain which are either enlarged or diminished due to drug use. Functional MRIs compare changes in magnetic fields associated with blood oxygenation and deoxygenation ratios. Increased blood oxygenation is interpreted as increased brain activity [42].

For example, fMRIs have been used in clinical studies to measure effect of new pharmaceutical intervention by analyzing modifications of cue induced responses in adults with ADHD [43]. ADHD is well known expression of RDS and is often a co-occurring mental disorder with Substance Use Disorder. Many patients attempt to mitigate ADHD symptomology through self-medication with cocaine or other stimulants [32, 33].

Functional magnetic resonance imaging (fMRI) and functional near infrared spectroscopy (fNIR) have been used to study the Behavioral Activation System (BAS) and Behavioral Inhibition System (BIS) of the prefrontal cortex. Research has compared left brain hemispheric impairments in decision making in drug addiction [44, 45]. Findings indicate that left brain hemispheric unbalance is also associated with increased impulsivity in gambling addiction [5]. Right brain hemispheric alpha frequency unbalance is associated with increased craving [46]. Baseline, or resting state lateralized activity can predict increased emotional responses. Electromagnetic frequency (EMF) studies are the future of addiction science [47].

Increased impulsivity, craving and emotional response all contribute to relapse. NIDA has funded an ongoing project to study Anhedonia as both a risk factor for and a consequence of substance use [48]. Anhedonia is a symptom of RDS, so it is understandable that it is an influencer of and risk factor for substance use. Prolonged substance use which spikes dopamine causes epigenetic alteration of the hedonic set point, which makes it more difficult to experience pleasure, gratification and/or ease. One of the main reasons that brain imaging is so important to addiction science is that researchers can see neural brain response in 3D, and don't have to rely solely upon patient self-report. Functional near infrared spectroscopy is being used in attempt to identify biological markers of relapse and recovery [49].

A seminal study of importance is the meta-analysis of addiction risk factors, revealed in hemispheric lateralization and electromagnetic imbalance [50-56]. As stated above, prior research has shown that increased PFC left hemispheric lateralization is co-relational to increased impulsivity, while increased right hemispheric lateralization is co-relational to increased craving and withdrawal. In the war for recovery, brain imaging can identify proclivity for increased impulsivity as well as increased tendency for craving, both of which contribute to relapse of substance use disorder, and process behavioral addictions.

This meta-analysis of current fMRI studies of brain lateralization, in the field of RDS addiction science assesses impulsivity, through response inhibition, the inability to restrain negative action, using two task tests: the stop signal and go/no go. The study designers used research studies whose data could be divided into 8 octants to assess activation peaks in the left and right hemispheres of participants, who were shown visual cues of drug use. Twelve stop signal studies, with a total of 274 participants and fifteen go/no go studies with 409 subjects were assessed and 374 activation peaks analyzed across 8 octants. These fMRI studies provided cue induced brain activation

evidence in real time, three dimension. Science does not get much better than this!

It was hypothesized that in comparison to control groups those with substance use disorders would show increased left hemispheric lateralization for increased impulsivity as evidenced by response inhibition and increased right hemispheric lateralization for increased craving and withdrawal. Results supports these hypotheses, attesting to relevance, and validity of recent brain imaging science with crosses the boundaries of psychology, neurology and physics.

Limitations for this meta-analysis come down to the limitations of the original studies within this meta-analysis. Too often convenience samples are used, with those who have multiple addictions and psychiatric co-morbidity being excluded. The author of this meta-analysis suggests that future research should explore brain connectivity and neuro-anatomical differences. The author of the research review in which this meta-analysis is included would like to suggest that future research participants be selected by Reward Deficiency Syndrome and genetic addiction risk screening (GARS), to that the very patients who need it the most are not excluded.

Summary and Conclusions

In consideration and review of the body of scientific knowledge, too successfully bridge the gap between science and practice, an integration of the sciences of addiction, and Reward Deficiency Syndrome must be achieved [21]. Enlarged focus of treatment application must also include all wellness applications as the shift in perspective changes from a war on drugs to a war for recovery.

Substance Use Disorder treatment response needs to provide more than twelve step group therapy, the utilization of psychological adaptation for coping response, and pharmacotherapy. Neurological problems need neurological solutions. At the very minimum, existing psychological addiction treatment models need to be enlarged and reconfigured to include Reward Deficiency Syndrome. Established psychologies can be modified and adapted to provide psychoeducation for RDS.

A new model for RDS, Addiction and associated co-occurring mental health disorders treatment, which has already been presented for consideration to the industry can be adapted, expanded and perfected [34]. RDS solution focused brief therapy (RDS-SFBT) interventions can be both utilized in continuing education credits for practitioners, as well as in psychoeducation of patients, family members, and the next generation [29]. The next logical step would be to adapt Cognitive Behavioral Therapy for RDS, so that those suffering are informed regarding dopaminergic dysfunction and dopamine homeostasis.

In order to achieve this, new definitions of Anhedonia and Dysphoria and Likert scale measurement criteria for RDS treatment of dopamine dysfunction and homeostasis will have to be designed and verified. Future research study will need to test the validity and reliability of RDS solution criteria, in real life, addiction study without excluding the very populations that it most effects.

The future looks promising. Expanding research of hemispheric lateralization within the prefrontal cortex is providing a 3D map of impulsivity and craving in real time. Biomarkers of molecular and cellular initiation of relapse and/or recovery are being established. Electromagnetic frequency research and application of new

neurological-psychological therapies are on the horizon [7]. With all the radiance of hope, addiction science, and the practice of addiction recovery treatment will realign with research, integrating Reward Deficiency Syndrome into its perspective, to re-conceptualize addiction. Arising like the Phoenix, the industry will be better equipped to deal with Substance Use Disorders, Behavioral Process Addictions, Co-occurring dopaminergic dysfunction Mental Health Disorders, and the underlying neurogenetic causal influence of Reward Deficiency Syndrome.

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