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### **The Role of Neuroscience on Addiction and Society**

Drug and alcohol addiction is a serious problem in American society that people have tried futilely to resolve for several centuries. Many have come to accept that a solution to addiction will never be found. But just when all hope seemed lost, the emergence of neuroscience over the past couple of decades has reignited the hope for a solution to addiction. Neuroscience is transforming the fight against addiction from the traditional behavioral approach to a new biological approach. The hope is that neuroscience will give us a better understanding of why humans become addicted to destructive substances, and will enable us to create more effective treatments for addiction. This scientific approach is changing society's perception of addiction from a moral failing to a pathological disorder. There is debate over whether this changing perception is beneficial or detrimental to the fight against addiction. So while society should move forward with optimism about how neuroscience will improve addiction treatment, we must be aware and cautious of how research affects trends in destigmatization and overmedicalization, the emergence of new ethical dilemmas, and the premature emphasis on brain scans and other neuroscientific research.

In order to understand why the search for effective addiction treatment is so important, one must understand how detrimental addictions are to society. Bernard Grohman, the founder of an addiction support website titled "Treatment Centers", has outlined the following effects of addiction on society. First, addicts are unproductive members of society because they are unable to hold a steady job. The influence of drugs and alcohol makes them inefficient, unreliable, and potentially dangerous to coworkers. As a result, they require the assistance of social welfare

systems at a cost to the rest of society. They are unable to provide adequate parenting to their children, resulting in even more social problems and the resulting costs of dealing with them. Second, drug and alcohol addictions are directly correlated with increased crime rates because they impair people's judgements and make addicts willing to do almost anything in order to obtain more of the desired substance. Finally, there are the medical costs for treating overdoses and other related complications. Drug and alcohol addiction is also a factor in the spread of HIV and other blood-borne infections through the sharing of needles and other risky behavior that results from impaired judgements (Grohsman). According to the National Institute on Drug Abuse, the estimated costs of drug and alcohol addiction in 2009 added up to a staggering \$181 billion for illicit drugs and \$185 billion for alcohol (NIDA).

Addiction has devastating effects on the individual and his loved ones as well. They face feelings of failure, depression, anger, and despair as relationships, life goals, and quality of life are destroyed by a person's dependence on an addictive substance. According to a survey conducted in 2008 of Americans age 12 and older by the US Substance Abuse and Mental Health Services Administration, 3.9 million depended on or abused illicit drugs, 15.2 million depended on or abused alcohol, and 3.1 million depended on or abused both (SAMHSA). This level of human misery demands that we continue to search for better treatments for addiction than the ones we have now.

Up until now, the popular view of addiction was that of a moral failing and a behavioral disorder. Addicts were regarded as weak-willed, irresponsible and shameful. As journalist Michael Lemonick of TIME Magazine describes in his article, "The Science of Addiction," it was a social problem that was treated with social solutions. These solutions included talk therapy, counseling, and psychotherapy, as well as criminal punishment. But, according to

Lemonick, these modes of dealing with addiction are only effective about 20% of the time, and society lost faith in their power to solve addiction (Lemonick 42). So when fMRI technology emerged in the early 1990s, society was ready to accept this technology and its use for a new scientific approach to treating addiction.

The value of neuroscience compared to other approaches to treating addiction is that it makes it possible for us to understand how a person becomes addicted to a substance. In Lemonick's article, "The Science of Addiction," he reports on how scientists are using fMRI and PET scan technology to prove that fundamental changes occur in the structure of the brain of an addict. They are able to pinpoint which areas of the brain become activated in comparison to a non-addict, and they are able to understand which neurotransmitting chemicals are out of balance in an addict's brain. There is promising potential that this knowledge can be used to develop drugs that counteract the effects of addictive substances on the brain (Lemonick 42). By directly targeting the source of the addiction, these drugs could be more effective than behavioral therapy at overcoming addiction.

Society quickly embraced the field of neuroscience and its reframing of addiction as a brain defect. By 1997, Dr. Alan Leshner, the Chief Executive Officer of the American Association for the Advancement of Science, stated in the Journal "Science" that "addiction is a chronic, relapsing brain disorder." In this article, he enforced the claim that past strategies for treating addiction failed because they focused solely on the behavioral and criminal aspects of addiction and failed to focus on the core of the problem, the brain (Leshner). As a result of this publication from Dr. Leshner and publications from other leaders in science, neuroscience has emerged as the leading approach for understanding and treating addiction and behavioral studies

are falling to the way side. This transition from the social to the scientific perspective of addiction has been termed the “biologization” of addiction.

Today, biologization is apparent in almost every scientific and media report on addiction that is presented to the public. For example, the National Association on Alcohol Abuse and Alcoholism has released several reports on studies that have found biological markers of ones propensity to become addicted to alcohol. One report, titled “Scientists Find Genes that Influence Brain Wave Patterns,” stated that “this study represents an important step toward the use of EEG (a brain wave reader) as a surrogate marker for alcoholism” (NIAAA 4/26/10). Another study posted by the NIAAA reported on scientists who identified a gene that influences alcohol consumption (NIAAA 12/5/07). Examples of biologization in the media include the cover of a Newsweek Magazine titled “The Hunt for an Addiction Vaccine” and the cover of a TIME Magazine titled “How We Get Addicted” with the subtitle, “New brain research is helping us understand why we get hooked and how we may get cured.” These articles are powerful endorsers of the attitude that addiction is a brain disorder.

The shift to a biological perception of addiction raises new dilemmas about the destigmatization of addiction, the medicalization of addiction, and the ethical questions about how to use neuroscientific knowledge. It is uncertain whether this changing perception is beneficial or detrimental to the fight against addiction.

The first consequence of the biologization of addiction is the fading of the long held stigma on addiction that formed from the belief that addiction is a moral failure. Researchers and addiction experts are promoting this loss of stigma as beneficial to addiction treatment. According an article by Dr. David Rosenbloom on the HBO Addiction Awareness website, a large problem with addiction treatment now is that many people try to hide their addiction out of

fear of being labeled as an addict, fired from a job, denied insurance, or incarcerated. As a result, their addiction goes untreated and only progresses further. In addition, the shame that society inflicts on an addict causes a lot of harmful stress to the individual. The emotions of shame and failure that an addict experiences cause depression and encourage further substance abuse. It is a vicious cycle that can be ameliorated if the addict is given support instead of ridicule (Rosenbloom). There is also the issue that the correlation of addiction with poor morality can cause a person to be in self denial about his addiction problem. If society dropped the stigma, one would be more willing to admit he has an addiction problem and seek help because it would not mean that he is admitting to being a bad person.

Conversely, some people are expressing concern that the push to destigmatize addiction will have a negative effect on the fight against addiction. One such critic of destigmatization is psychiatrist Dr. Sally Satel, a conservative thinker who has written several books on issues of healthcare and society. She claims that the fear of shame can motivate people to seek treatment for their addiction or to quit the addictive substance before they lose control (Satel 2). The most sensible stance is a middle ground between the two arguments. While it is undeniable that stigma can be effective in preventing addiction in the first place, some understanding and compassion can be very beneficial to those suffering with addiction.

Satel also criticizes how calling addiction a “disease” is overmedicalizing it. In her article, “Medical Misnomer Addiction isn’t a brain disease, Congress,” she criticizes the Recognizing Addiction as a Disease Act of 2007, which aimed to change the name of the National Institute on Drug Abuse to the National Institute on Disease of Addiction, and change the name of the National Institute on Alcohol Abuse and Alcoholism to the National Institute on Alcohol Disorders and Health (Satel 1). The medicalizing of addiction is a result of the trend in

today's society to medicalize all human abnormalities. It is created by the good willed effort to better understand human existence and to find scientific solutions to human problems. But the social mindset that it is creating may be unhealthy.

One way that medicalization creates an unhealthy mindset is that it eliminates the concept of personal responsibility for one's actions, which Satel states in her paper. She warns that people will play the role of the victim, claiming that their brains or their genes made them act the way they did (Satel 2). The rhetoric of victimizing addicts is already a common practice of addiction support groups. For example, one addiction support website is titled "The Survivor's Club." This attitude is disquieting because if nobody was held responsible for his actions, then society would not be able to function. We must be vigilant about the threat of neuroscience to undermine the concept of personal responsibility.

Another negative consequence of medicalizing addiction is that it makes addiction seem fatalistic, like addicts should have no hope of overcoming addiction on their own. This argument against the medicalization of addiction is supported by Gene M. Heyman, a research psychologist at McClean Hospital in Boston and a lecturer at Harvard University. During an interview with the Boston Globe, Heyman made the point that addiction is unlike a disease because it is possible for an addict to will himself out of an addiction. Many ex-addicts have proven that it is possible. In contrast, those suffering from diseases such as Alzheimer's or schizophrenia cannot will themselves out of it. So referring to addiction as a disease encourages the mindset that an addict has no control over his own recovery (Akst). This attitude is very damaging to efforts of recovery, especially if the medicine or other scientific treatments are ineffective or inaccessible.

Satel and Heyman present strong arguments for why referring to addiction as a “disease” is going too far in medicalizing it. But some medicalization is necessary in order to classify and treat addiction. Therefore, we should call addiction what it is, an addiction, defined as a state of being physically and mentally dependent on a particular substance due to changes in the brain caused by use of the substance. It is a medical condition, but it does not belong to the same category as other diseases.

The last consequence of the biologization of addiction is that it raises new ethical dilemmas over how to properly use neuroscientific knowledge. For instance, if it is possible to identify a person’s affinity for addiction, as current studies are suggesting it soon will be, should we use this knowledge to take preemptive measures? One study conducted by researchers at the NIAAA showed that preemptive measures could be very successful in reducing drug and alcohol abuse. In this study, parents of teenagers attended two-hour prevention sessions for seven consecutive weeks and children were taught how to set and attain positive goals, deal with peer pressure, and avoid risky activities. Researchers monitored the development of the children from the time they were age eleven until they were age 14 and compared their development to that of a control group that did not participate in the preventative program. The report does not offer specific data, but it states that “the prevention program proved especially beneficial for children with a genetic risk factor tied to risky behavior” (NIAAA 5/15/09). Preventative measures would be extremely effective at curbing addiction but it would be difficult to enforce them without infringing on personal rights. Even though the stigma on addiction is being reduced by a biological understanding addiction, the stigma still exists and, for many, addiction implies a weak will and poor character. It would be unjust to

label a person as an addict without giving him the chance to define his character through his actions.

The last significant danger of using neuroscience to treat addiction is that people are more likely to unquestioningly give authority to studies that use brain scans. The seduction of brain scans was exemplified in an experiment conducted by Deena Weisberg, a doctoral candidate at Yale University. In her experiment, when she gave neuroscience students and nonexpert adults examples of flawed scientific explanations, they easily found the flaws. Yet when the same flawed explanations began with the words, “brain scans indicate,” people were less likely to pick up on the flaws (Weisberg 1).

The reason that people place so much validity on brain scans is that is presented in the media and scientific articles as more objective and transparent than it actually is. For example, a report by the National Institute of Health released in 2007 stated that “Advances in brain imaging science make it possible to see inside the brain of an addicted person” (NIH). The brain imaging that they are talking about is here fMRI which cannot actually “see inside the brain” and the picture generated by the scan is not a simple photo of the brain. Kelly Joyce gives a more accurate description of how fMRI images are generated in her paper “Appealing Images: Magnetic Resonance Imaging and the Production of Authoritative Knowledge.” She explains how the original information produced by an fMRI is numerical data, not an image. There are many steps of mediation between the numbers produced by the fMRI scan and the production of the final image. These steps include the human designation of machine parameters, the translation of numerical data to images, and the interpretation of these images, which are fuzzy and difficult to understand. This human interpretation is subject to a lot of flaws and fMRI cannot be relied on as an objective source (Joyce 440).



Another reason why people place so much validity on brain studies is that they are endorsed by authoritative journals such as TIME and Newsweek, and authoritative organizations such as the World Health Organization and the National Institute of Health. People forget that these organizations have their own agendas beyond simply reporting the facts. Media articles highlight certain aspects of research in order to cater to social interests and generate profit. Scientists play up their research as well because the more interested the public is in their research, the more likely they are to obtain funding for more research.

The reality is that fMRI has great potential for understanding and treating addiction, but it has a long way to go before it can be used as an objective source for interpreting addiction. Given its limitations, we must be cautious about how much it deters us from our behavioral understanding of addiction and how it reshapes our perception of addiction and human behavior. We ought to draw from both neuroscience and behavioral studies in order to improve our understanding of the relation between addiction and human behavior, and to make advancements in the treatment of addiction.

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