

Introduction

Psychopathy and substance addiction are highly co-morbid. This co-morbidity has often been examined in a cause and effect relationship, where one condition pre-dates the other and results in the onset of the second condition. Rather than view the co-morbidity between addiction and psychopathy as a cause and effect relationship, I will argue that the two disorders are actually linked by a series of underlying traits. These traits do not serve as simply common characteristics among addicts and psychopaths, but rather as an explanation for the emergence of both addictive and psychopathic behaviors in certain individuals. In examining the presence of impulsivity and novelty seeking in both addicts and psychopaths, these characteristics emerge as hallmark traits in both populations. Recent evidence suggests that both these traits may result from the presence of a specific polymorphism on the dopamine D4 receptor gene. This 7-repeat sequence on the dopamine D4 receptor gene may ultimately account for a pre-disposed, genetic vulnerability for the emergence of psychopathy and addictions as the result of increased impulsivity and novelty seeking coupled with negative environmental factors.

History of Psychopathy

Throughout history, societal norms define normal behavior. Defining and understanding normalcy has not been nearly as difficult as understanding the abnormal. The extremes of society present a struggle for explaining human behavior. While both the exceptionally good and terribly evil fall outside the realm of most human experiences, societies have always been fascinated with attempting to understand the extremes of behavior perceived as evil.

Psychopathy as a modern construct for understanding the behaviors and expressions which characterize the most evil extremes of society has largely been defined by the work of Robert Hare, who not only developed the defining list of psychopathic traits, but also created the Psychopathy Checklist, Revised for psychopathic evaluation (Hare online). While Hare has developed an extensive, new way of describing the psychopathic personality, philosophers, psychologists, doctors, and countless great thinkers before him have laid the foundation for explaining and understanding evil.

Aristotle's student Theophrastus described one of the earliest portrayals of the psychopathic personality, the Unscrupulous Man. According to Theophrastus, an unscrupulous individual is the type to "borrow more money from a creditor he has never paid," as well as acting in other manipulative acts that are harmful to others (Millon, Simonsen, and Birket-Smith 3). His description of these individuals focuses primarily on their engagement in selfish, manipulative, and dishonest acts. These characteristics, particularly manipulation for selfish gains and narcissistic traits, are still viewed as hallmarks of the antisocial individual. For hundreds of years, society accepted the presence of the unscrupulous man with little attempt to explain or understand why these individuals engaged in unscrupulous behaviors. It was not until the late 1700's that philosophers and medical doctors began to explore these anti-social individuals in a clinical setting.

One of the original clinicians to examine psychopathic populations in a clinical setting was Pinel. Pinel's work took place almost exclusively within the bounds of confinement houses for the mad as he worked as a "liberator" in the post Great Confinement era (Foucault 47). He observed a variety of conditions and behaviors across the mad, notably their animal like

tendencies, particularly “the constancy and facility with which the mad of both sexes can tolerate prolonged extremes of cold” (Foucault 149). This animal essence became one of the hallmarks for diagnosing and defining the mad, despite a complete lack of understanding surrounding the phenomenon. Pinel was the first to notice that he had certain impulsive, seemingly insane patients who appeared to be capable of reasoning and understanding of their actions. He called these individuals *manie sans delire*, describing them as “manics who at no period gave evidence of any lesion of understanding.” (Millon, Simonsen, and Birket-Smith 4). From this interpretation arose the belief that it is possible for individuals to act in harmful and unjustified ways while being fully capable of logical thought and reasoning.

During the same times period in which Pinel was describing and attempting to make sense of *manie sans delire* in France, an American physician was exploring a similar phenomenon in the United States. Benjamin Rush was one of the earliest American physicians to equate mental illness with physical illness, and he strived to convince his colleagues that “the mind and body are moved by the same causes and subject to the same laws” (Brodsky 344). Rush was one of the first to characterize moral deficits as the result of some innate disease which impairs moral faculty, “the capacity in the human mind of distinguishing and choosing good and evil” (Brodsky 291). While Rush embraced a disease theory for explaining immoral behavior, he was particularly hard on individuals who lacked moral strength, especially those who engaged in behaviors which were detrimental to society. Rush placed much more emphasis on the societal harm resulting from immoral behavior than his predecessors, who focused on self-harm and protecting people from themselves rather than protecting society from harmful people.

Ultimately, Rush's idea of an "evil disease" was translated into the modern concept of a personality disorder.

Traditionally considered the originator of the construct of moral insanity, J.C. Prichard's work actually came after than of both Rush and Pinel. Prichard created the label of moral insanity and under it he included a wide range of mental and emotional disorders, including Pinel's original definition of mania without dementia. He included anyone with a deficit for the natural feelings of rightness, goodness, and responsibility as being morally insane. Prichard's description of moral insanity, published in A Treatise on Insanity and Other Disorders Affecting the Mind in the mid 1800s, bears remarkable similarities to Hare and Millon's descriptions of the psychopathic personality well over 100 years later. He details the condition as "consisting in a morbid perversion of the feelings, affections, and active powers, without any illusion or erroneous conviction impressed upon the understanding: it sometimes coexists with an apparently unimpaired state of the intellectual facilities" (Prichard 20). Similar to modern theorists, Prichard believes that moral insanity exists on a spectrum, and that many individuals are able to blend into society with only close friends and family members discovering their true nature. He also establishes manipulation, impulsivity, and extravagant self-indulgence as key characteristics in the morally insane (Prichard 21). This description of moral insanity is the basis of modern day anti-socialism. It is remarkable to think that a condition which is clearly defined by the values of society has remained constant for so long.

Addiction, much like the psychopathic condition, cannot be defined in absolutes, but rather is seen as function of societal norms and acceptance of drug use and abuse. In order to understand how addiction came to be viewed as a disease, it is necessary to explore substance abuse from the earliest drug cultures. While alcohol is a classic, seemingly timeless, substance of abuse, this exploration will begin with the opiate culture of ancient China.

The earliest written references to opium as a recreational drug can be found in Sumerian tablets as old as 5000 BCE (Lee 6). The drug spread to China through Arab traders during the T'ang Era, as early as 618 CE (Lee 7). However, it remained a purely medicinal product until the 16th century, around the same time that smoking tobacco became popular. The Chinese authorities recognized the addictive properties of both tobacco and opium, and in an attempt to fight dependence on foreign drugs, the government banned tobacco in the mid 1600's and opium less than 100 years later (Lee 9). However, the ban on opium did not last long. In the late 1850's, opium was re-legalized. By 1906, China was once again attempting to rid its people of opium and formally declared a new opium suppression plan (Dikotter, Laamann, and Xun 111).

From the beginning of its non-medicinal use, opium has had a powerful grip on Chinese culture and economics. The immense popularity of the drug across all social classes made it an extremely valuable import commodity, and it was not until the re-legalization of the drug that China began growing and regulating her own opium supplies. By most accounts, opium addiction and abuse was pervasive across all socioeconomic strata in China, much like alcohol in the modern Western civilizations. The wealthy devoted hours daily to opium consumption, establishing their own grandiose, private opium dens in their homes, sometimes going on opium binges lasting several days. In contrast, the working class sought refuge in after-work pipes of

low grade opium in the cheapest of roadside dens. It is impossible to deny that opium addiction was rampant in China during this era, sparking the world's first government organized war on drugs.

Alcohol has been highly integrated in Western society since the earliest civilizations. Cultures across the world have experienced a tenuous relationship with alcohol, at times embracing it as a necessary social lubricant, or way of worshipping and convening with higher religious powers. In contrast, alcohol also often plays the role of a terrible vice, wrecking havoc on an individual or society's ability to be productive.

In Ancient Greece, alcohol consumption took on three important roles: religious, philosophical, and social (Walton 44). In the ancient celebrations of Dionysos, worship was achieved through intoxication with wine and beer. The celebration festivals involved imbibing to the point of extreme inebriation in order to convene with nature and the gods. These alcohol fueled religious worships were readily attacked by the fledgling Christian churches during the Roman Empire. It seems that while the consumption of modest quantities of alcohol, such as during communion in the Christian faith, will always have a role in religious practices, the days of outright and ritualistic intoxication during worship ended with the Greek's celebration of Dionysos (Walton 45-52).

From the time of Socrates, the Greek strived to find a balance between "the lures of sensual pleasure and the higher life of the mind" (Walton 56). Often the distinction between the two merged, and alcohol consumption became an important part of large philosophical gatherings and debates. Symposiums in classical Athens were the hallmark of using alcohol, greatly diluted wine, to guide intellectual discourse. Educated men would gather for evenings of

discourse on human existence, fueled by the consumption of watered wine (Walton 62). It seems, however, that these symposiums had little contribution to the rampant alcohol abuse in classic Greece, as they stressed the importance of moderation by using watered wine and pre-determining the quantity to be consumed over the evening. It is important to note that while these events were intended to remain orderly, the consumption of alcohol often exceeded the planned amount and guests did not always follow the prescribed course of the symposium (Walton 63). Interestingly, over time these evenings became increasingly unruly and excessive, and were often significantly rowdier than public drinking houses.

Most cultures prefer one or two socially acceptable intoxicants, such as tobacco, opium, or alcohol. The emergence of the American drug culture from 1800-present day marks the onset of a wide variety of socially acceptable recreational drugs within one culture, as there are not only several different readily available drugs but also the emergence of imbibing with multiple substances at once. While many societies warned against the dangers of over-indulging or becoming intoxicated to frequently, the organized construct of addiction really emerged in relation to alcohol with the Temperance movement and the coining of the term alcoholism in the mid 1800s (White 41).

Addictive substances are impossible to avoid in modern America, from nicotine and caffeine to alcohol or heroin, nearly all Americans will at some point in their lives ingest a psychoactive substance (Tracy and Acker 1). All psychoactive drugs vacillate between social acceptance, at time being embraced as a miracle substance, and social contempt. It is often the discovery of a substance's addictive nature that drives it out of social favor, as addiction is stigmatized as a hallmark of social decay.

The very nature of addiction makes it extremely difficult to define. Like psychopathy, addiction is dependent on societal views. While both of these constructs are heavily subjective in their definitions and subject to change based on the values of society, they both arise as re-occurring themes throughout recorded history. It appears that both are rooted in some deeper aspect of human nature which transcends societal norms across cultures and generation.

Co-Morbidity: Addiction and Antisocial Personality Characteristics

Co-morbidity between personality disorders, such as psychopathy, and diseases which embody problems with living and coping normally, such as drug or alcohol addiction, is common. It is indisputable that antisocial populations display particularly high incidence of drug abuse and addiction. According to the National Institute on Drug Abuse, individuals who meet the diagnostic criteria for antisocial disorders (including Conduct Disorder and Antisocial Personality Disorder) are twice as likely to fit the DSM-IV criteria for drug abuse or dependence (NIDA online). The addiction rates for drugs in the general American population are estimated around 10% (this percentage varies widely depending on the source, 10% is an approximate average of the most commonly used statistics) (USnodrugs.com, online). The overall rate of addiction for Americans age 12 and older (including alcohol abuse, alcohol dependence, illicit drug abuse, and illicit drug dependence) was determined to be 9% by the 2007 National Survey on Drug Use and Health (SAMHSA 2007). Alcohol addiction rates are generally believed to be significantly higher than illicit drug addiction, largely due to the fact that alcohol is readily available and legal for adults over the age of 21. While some studies estimate alcoholism at as high as 25%, the 2007 National Survey on Drug Use and Health found that alcohol abuse and

dependence was occurring in about 7.5% of the US population over the age of 12. A more conservative rate based on a study conducted by the National Institute on Alcohol Abuse and Alcoholism in 2002 estimates that alcohol abuse as defined by the DSM-IV is 4.65% for the adult US population and alcohol dependence as defined by the DSM-IV is 3.81% (NIAAA 2005). Regier's 1990 study found that 83.6% of individuals who met the DSM-IV criteria for Antisocial Personality Disorder (APD) had a co-morbidity with substance abuse. A separate study found that nearly 40% of substance dependent individuals were able to be diagnosed with APD, and that individuals with multiple substance dependencies were more likely to have APD (Flynn et al, 1996). There is an undeniable link between substance abuse and antisocial or psychopathic tendencies, however what that link is remains unclear.

There are many different theories to explain the co-morbidity between addiction and psychopathic traits. Many people believe that one disorder is actually the cause of the other; for example, a psychopathic individual may resort to drug abuse as a coping mechanism. Alternatively, many violent criminals report that alcohol or drug use played a significant role in their violence, indicating that perhaps substance abuse is causing the display of antisocial tendencies. Rather than view the co-morbidity between addiction and psychopathy as a cause and effect relationship, I will argue that the two disorders are actually linked by a series of underlying traits. These traits do not serve as simply common characteristics among addicts and psychopaths, but rather as an explanation for the emergence of both addictive and psychopathic behaviors in certain individuals.

What is Psychopathy?

Psychopathy, a commonly misused phrase, is a construct used clinically to describe a set of “interpersonal, affective, and behavioral characteristics” (Hare 2008). These characteristics cover a wide range of narcissistic and anti-social behaviors, including deception, manipulation, impulsively, novelty seeking, lack of empathy, and lack of guilt and remorse (Hare 2008).

Psychopathic traits often lead to an involvement in crime, however it is important to note that criminal behavior itself is not sufficient to define psychopathy. There is a wide variety of psychopathic, socially problematic behaviors which are not criminal activities, including bullying, dishonest business practices, and other activities that result in psychological, physical, or financial harm to others. Historically, incarcerated populations provided the majority of study subjects for investigations into psychopathic behaviors and traits, however an increasing amount of work is being done with non-criminal populations as well (De Oliveira Souza 2008).

The two major components of psychopathy are aggressive narcissism and a socially deviant lifestyle (Hare 2008). In order for one to be considered a psychopath both factors must be present. The first factor, which deals with the interpersonal and affective deficits, establishes the personality basis of psychopathy, while the second factor explains the highly problematic lifestyle and social behaviors resulting from the psychopathic personality. The traits which compose each factor of psychopathy can be subdivided into separate facets.

Factor 1, Interpersonal/Affective dysfunctioning is explained by two facets. The first facet involves the traits which color an individuals interactions with others, and ultimately lead for interpersonal problems. These characteristics include glibness, superficial charm, grandiose self-worth, pathological lying, and conning or manipulative behaviors (Ogloff 2006). The second facet, which describes the psychopathic affect, does not require direct social interactions

to be understood. It is characterized by a lack of guilt or remorse, shallow affect, lack of empathy, callousness, and a failure to accept responsibility for one's actions (Ogloff 2006). These two facets together comprise the basis of the psychopathic personality, and establish a foundation for severe problems in living and interacting with others.

The second factor in psychopathy is social deviance. This factor explains the harmful lifestyle and antisocial behaviors typical for psychopaths, and also closely approximates the DSM-IV's criteria for Antisocial Personality Disorder. The first facet, lifestyle problems, involves the need for stimulation, proneness to boredom, a parasitic lifestyle, a lack of realistic or long-term goals, impulsivity, and irresponsibility (Ogloff 2006). The second facet, antisocial behaviors, comprises the characteristics which are most easily noticeable, including poor behavioral controls, early behavioral problems and juvenile delinquency, revocation of conditional release, and criminal versatility.

Diagnosing Psychopathy

The primary method of evaluating psychopathy is with the Psychopathy Checklist, Revised, developed by Robert Hare and most recently revised in 1991 (Hare online). The PCL-R is considered a state of the art clinical and research tool, which when used properly is the best currently available predictor of violence (Hare online). The twenty characteristics, described earlier as falling into each facet of psychopathy, are evaluated on the PCL-R. Each is rated on a scale of 0 to 2, 0 being the score given if the trait or behavior is absent, 1 being the score for evidence of the trait, and 2 being the score which equates to the trait being clearly present (Semple et al 449). Interpretations of the PCL-R are based on an individual's summed score, a

numerical value out of 40. This raw score can then be converted to a percentile based other's scores in various populations. Interestingly, the cut-off scores for determining the presence of psychopathy vary by population; in the United States a score of 30 or higher is used as the criteria for diagnosing psychopathy, while in the United Kingdom a score of 25 or higher is used (Semple et al 449).

Because a psychopathic diagnosis can have profound implications, extreme care must be taken in performing a PCL-R evaluation. According to Hare, the checklist should only be administered by clinicians who possess a Ph.D., D.Ed., or M.D. in social, medical, or behavioral sciences and who are registered with their local state psychological or psychiatric regulating body. Clinicians administering the PCL-R should also be experienced with forensic populations, ideally in the form of several years experience in a clinical-forensic setting (Hare online). The PCL-R has not been validated empirically with all populations, and is most accurate for adult male populations. There is now evidence to also support the used of the checklist with certain female, adolescent, and sex-offender populations as well (Hare online). Ideally, scores from at least two independent clinicians should be averaged when using the PCL-R, in order to increase reliability (Hare online).

Since the development of the PCL-R, Hare has created several modified versions of the original checklist. The PCL: Screening Version (PCL:SV) was developed as a screening tool that focuses on 12 items, rather than twenty. This abbreviated version of the checklist can be used in a variety of evaluation settings to determine the possible presence of psychopathy and whether a full PCL-R evaluation is necessary (Hare online). The Hare P-Scan is a tool used primarily in law enforcement or correctional settings. It is a nonclinical tool which screens for psychopathic

features in a person of interest (Hare online). Hare has also recently adapted a PCL:Youth Version for the assessment of psychopathic traits in juveniles, aged 12-18. The youth checklist is closely structured to the original PCL-R, and has many of the same elements. It can be used as both a clinical tool and a research tool (Hare online).

When evaluating psychopathy, it is crucial to be aware of how psychopathy and the PCL-R differ from the DSM-IV's Antisocial Personality Disorder and its diagnostic criteria. Antisocial behaviors are only one component of psychopathy, and while the prevalence of APD in incarcerated populations has been estimated between 50% and 80%, the prevalence of psychopathy is significantly lower, approximately 15% (Ogloff 2006). Forensic clinicians must be aware of the fundamental conceptual differences in APD and psychopathy, and that psychopathy is a much narrower disorder than APD.

Defining Addiction

The definition of addiction is one of the most controversial topics in modern drug research. Defining a construct is a critical first step in being able to research its causes, mechanisms, and effects on an individuals and society. However, in the case of addiction, no true consensus has ever been arrived at in regards to what specifically defines an addict. One of the major arguments is over physical versus psychological dependency, and whether dependency alone is necessary and sufficient to define addiction. Physical dependence is often equated with the physiological effects of a drug, the tolerance which results from continued use and the withdraw symptoms which occur during non-use (Merck online). Tolerance can be seen in the need for an increased quantity of drug use to create the original high. While tolerance has

generally been accepted as a side effect in drug use and abuse, the role of withdraw effects in addiction is more hotly contested. Withdraw symptoms are believed to occur as a result of physiological adaptations to a specific drug. When that drug is removed from the body, these adaptations become noticeable, physical symptoms that are generally very unpleasant (Merck online).

The physical symptoms associated with drug use and cessation are commonly regarded as physical dependence. Some consider true addiction to be the result of psychological dependence. Psychological dependency is characterized by compulsive urges and cravings for the addictive substance. It can result in the manifestation of many other symptoms, such as irritability, insomnia, or depression. Psychologic dependence is generally believed to be tied to the brain's dopaminergic reward systems, and theoretically, psychologic dependence can result from any pleasurable activity and is not limited to drug use.

The biological model of addiction centers primarily on genetics and the belief that certain biological factors, determined by genes, cause vulnerability to addiction, and different biological factors result in resistance to addiction. This model relies heavily on the belief that genetic components alter the normal resting state, such as increased levels of anxiety or susceptibility to stress. Those who support biological models of addiction point to twin studies, such as the one conducted by Prescott and Kendler in 1999. They found that concordance rate among male monozygotic twin pairs for DSM-IV alcohol abuse or dependence was 8% higher than the concordance rate in dizygotic male twins (Prescott & Kendler 1999). Using the data gathered, they concluded that genetic variance has a greater influence in the development of addiction than environmental factors. However, the difference between the influence accorded to genetics, and

that attributed to environment is not enough to discount the environmental influence on the development of addiction.

Social factors and realities of living comprise the environmental model for addiction. According to this model, addiction results from the specific social environment of the individual addict, generally one which includes elements of poverty, poor education, and lacking economic opportunity (DiClemenete 19). The social influences such as peer pressure, deficient family systems, and drug availability serve as the specific mechanisms for the adoption of addictive behaviors. This model is supported by evidence that different types of drug use and addictive behaviors appear to be more prominent in specific subsets of society, indicating sociocultural connections to drug use (DiClemente 7). A central mechanism in the environmental model of addiction is familial influence. In particular, many researchers point to parental modeling of problematic behaviors, including interpersonal difficulties and excessive drug and alcohol use, as critical influences on juvenile substance abuse (DiClemente 8). Addiction trends shift dramatically over time, as do social influences. However, certain static factors, particularly the continual presence of poverty, economic disparity, and deficient family units, remain constant despite widespread shifts in social and addiction trends. It appears that environmental factors are important contributors to addiction development, but cannot be the sole explanation.

In fact, none of the proposed models of addiction adequately explain the emergence of addictive behaviors across diverse populations. Which is why new models increasingly include a multi-faceted approach to explaining addiction. The classic Two-Hit model emphasizes the importance of underlying genetic pre-dispositions for addictive behaviors which are ultimately expressed as a result of environmental conditions. The biopsychosocial approach emerged in the

late 1980's as a revolutionary way of integrating a wide range of causal factors in addiction, including biological and genetic "disease" models, psychological based coping and behavioral models, and social influence and learning theories. This model remains popular because it allows researchers to emphasize an particular facet of interest, such as social learning, while delegating any unexplained results to the other factors, such as genetic influence. One rarely sees the biopsychosocial model used in a way which fully values and integrates all three contributing elements.

Diagnosing Addiction

Despite extensive research and public interest, an actual, concrete definition of addiction remains elusive. And without a definition, diagnosis is extremely difficult. The Diagnostic and Statistic Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR) makes no attempt at diagnostic criteria for any type of addiction. Instead, it provides criteria for substance-related disorders, including substance dependence and substance abuse (American Psychiatric Association 191). Substance refers to any drug of abuse, medication, or toxin, and substance dependence is defined as "a maladaptive pattern of substance use, leading to clinically significant impairment or distress" (American Psychiatric Association 197). The criteria for diagnosing dependence are the presence of any three of the following during a 12 month period: tolerance, withdrawal, taking larger quantities of the substance than intended or taking it for longer amounts of time than intended, a persistent desire or unsuccessful efforts to cut down on or control substance use, a great deal of time spend procuring the substance, giving up important social, recreational, or occupation activities because of substance use, or continuation of

substance use despite knowledge of a persistent or reoccurring physical or psychological problem that is likely caused or exacerbated by the substance (American Psychological Association 197). Physiological dependence is specified based on the evidence for the presence of tolerance or withdrawal. While the DSM-IV-TR is careful not to indicate the use of these diagnostic criteria for addiction, it is generally actually the presence of substance dependence that it evaluated when diagnosing addicts.

Trait Model of Addiction

While Hare developed a rich, personality based approach to understanding psychopaths, there has been little modern research done on examining the intrinsic, personality based traits which underlie addiction. In the past, many philosophers, religious leaders, and early physicians proposed moral or character weakness, embodied by a variety of traits, as an explanation for the abuse of intoxicating substances. However, in modern research, these personality based explanations have fallen out of favor. The genetic approach, which proposes a predisposition for the development of addictive behaviors based on the presence, absence, or modification of certain genes, comes closest to approximating a personality and trait based theory of addiction comparable to psychopathy.

Several distinctive traits have been identified in addicted populations which bare a remarkable resemblance to the constellation of hallmark psychopathic characteristics, including uncontrollable urges, impulsivity, a reduced response to natural rewards, increased risk taking behavior, abnormal stress response, and novelty seeking. It has long been argued that these characteristics and adaptations are symptoms resulting from chronic drug use. However, by

reversing that theory and viewing these characteristics as innate traits which predispose drug addiction vulnerability, it is possible to more richly understand how addiction manifests in some individuals and not others, and why many of these individuals are predisposed to other significant problems in living, including psychopathic behaviors.

Uncontrollable urges have long been considered prominent features in addictive behaviors and are increasingly being used as diagnostic criteria for drug addiction. Arguably, the uncontrollable drive to seek drugs or alcohol is the defining difference between social and addicted patterns of drug use (Kalivas, Volkow, & Seamans 2005). This loss of control over drug intake is often characterized as a response to drug craving . It appears that these cravings, or uncontrolled urges, are highly stimulus bound and most commonly result from exposure to drug stimuli or drug related cues (Tiffany & Carter 1998). However, while it is increasingly difficult to dispute that cravings occur, and may cause uncontrollable drug seeking behaviors, there is wide spread debate over the actual craving mechanisms and whether these uncontrollable urges are actually a driving force behind addictive behaviors or not.

Impulsivity, defined by Hare as a lifestyle factor characterized by the inability to weigh the pros and cons of a course of action or to consider its consequences, is emerging as a trait with profound implications for how individuals interact with the world (Hare 58). Accumulating evidence demonstrates the role of impulsivity in a wide range of problematic behaviors, including both psychopathy and addiction. Little argument exists over the characterization of impulsive behavior in addicts; the challenge instead lies in determining whether impulsivity pre-dates addiction or vice-versa. Many current models hypothesize that “long-term drug use impairs inhibitory controls,” while other researchers argue that intrinsic impulsivity drives

chronic drug use (Dalley et al 2007). Animal models are extremely useful in teasing out these differences. Dalley's work with rats demonstrates that impulsivity can be predicted in rats never exposed to cocaine by examining their dopamine receptors. These innately impulsive rats show an increased likelihood of developing cocaine addiction once exposed to the drug (Dalley et al 2007). This research suggests, at least in the case of animal models, that impulsivity pre-dates addiction and can be used in predicting drug vulnerability.

Kreek et al's 2005 study also explores the role of complex personality traits, including impulsivity, in vulnerability to addictive diseases with an emphasis on how genetics influence these traits and their manifestation into addiction. They define impulsivity as behavioral disinhibition, satisfying desires through sudden or unplanned actions, and are careful to maintain that it occurs on a spectrum and cannot be used as a singular criteria for any kind of pathology, including addiction (Kreek et al 2005). Several genes in the serotonergic system have been identified in association with either alcoholism or other addictions. Now, the possibility that these genes may also be linked to behavioral characterizations of impulsivity is also being explored and it is believed that several candidate genes which encode proteins controlling major neurotransmitter systems have variants associated with increased impulsivity (Kreek et al 2005).

A widely explored area of addiction involves reduced response to natural rewards. Again, the controversy falls over whether drugs of abuse create a natural reward deficit, or if a pre-existing natural reward deficit drives individuals to seek enhanced rewards from drugs. Certain natural rewards, particularly those related to survival, should hold higher salience for all individuals than the unnatural rewards, such as drugs, which are not only not necessary to sustain

life but also are generally harmful. However, the very nature of addiction indicates that this is not a universal truth; everyday addicts are placing a higher value on drugs than on other rewards.

David Redish proposes a computation model which accounts for the high value placed on drug rewards through temporal difference reinforcement learning (2004). He argues that an agent, or individual, moves from various states based on the value assigned to each state, and that people engage in specific actions in order to achieve specific states; the more highly valued a given state is, the more likely an individual is to act in a way which leads to that state. Drug addiction occurs because while rewards associated with natural states approach a finite limit, the rewards associated with drug state are able to increase without bound. The likelihood that a state will be selected is based on its relative value over other states, and because the value of a drug state is proposed to increase without bound it becomes increasingly likely that the drug state will out-value the natural reward, which has a finite limit on the value it can attain (Redish 2004). These values are assigned based on expectation errors in the dopamine system; if a state results in less dopamine being released than anticipated by the agent, the expectation error is negative and the value of that state will decrease. Similarly, if a state results in more dopamine release than anticipated by the agent, the expectation error is positive and the value of the state will increase (Redish 2004).

Ahmed adds to the argument, in his response to Redish, that the fact that cocaine (the substance used in Redish's study) is a dopaminergic drug is what causes the reward value to grow without bound (2004). Regardless of the expectation of cocaine's reward, the drug will always result in a positive release of dopamine in the brain's reward system, creating the positive expectation error and boundless growth (Ahmed 2004). However, as Ahmed points out, this

model, and many dopamine reward based models of addiction, fails to account for addictions to non-dopaminergic substances, particularly alcohol and opiates.

Risk taking behaviors displayed by addicts often come into play during drug seeking activities or during an intoxicated state. This contrasts with risk taking by psychopaths, which appears to be characterized by both impulsivity and novelty seeking behaviors. Kreek indicates that the risk taking by addicts is related to novelty seeking and a high reactivity to novel stimuli (2005). Individuals prone to seeking novel stimuli appear to be vulnerable to experimentation with drugs of abuse, and the novelty seeking characteristic is implicated in the progression from drug use to drug addiction (Kreek et al 2005). The mechanisms relating novelty seeking behavior to drug abuse seem to relate to the same brain system as in impulsivity and abnormal drug rewards, the dopaminergic system (Bardo et al, 1996). Bardo argues that genetics may exert some control over these individual trait differences, but that they are also modifiable by early environmental exposure.

Common Ground: Traits Consistent in Psychopathy and Addiction

When examining psychopathy and addiction in the context of the traits embodied by psychopaths and addicts, certain commonalities reveal themselves. A lack of impulse control and increased novelty seeking emerge as two traits playing a powerful role in the lives of individuals battling with both conditions. These characteristics are not simply symptoms or results of either condition, they are defining and contributing characteristics in the development of psychopathy and addiction.

In the face of the raging debate over whether the traits of novelty seeking and impulse control precede the development of these conditions, or rather are symptomatic results of the conditions, there is profound evidence for the former. Genetic studies into the causes of these traits become increasingly important in understanding their development. The wide-spread acceptance of the so-called “adventure genes” and “will-power genes” will have significant consequences socially, legally, and in clinical settings.

Impulsivity, sometimes popularly considered a lack of “will-power,” is deeply rooted in the brain’s dopaminergic pathways, also known as the reward pathways. It has long been known that all drugs of abuse, cocaine and amphetamines, opiates, nicotine, THC, and ethanol, interact with the dopamine system (Ahmed & Koob 1998). Recently, the involvement of dopamine in serious mood and personality disorders (especially manic depressive disorder) is receiving increased interest (Muglia 2002). Emerging evidence, primarily taken from violent and sexual offender populations, appears to implicate the dopaminergic system, and other neurotransmitters, in violent and aggressive behavioral traits displayed by both adults and children.

In their initial study of 22 offenders undergoing pre-trial forensic psychiatric evaluations using the PCL-R, Soderstrom et al discovered a relationship between high levels of homovanillic acid (HVA), a dopamine metabolite, in the cerebral spinal fluid and high scores on interpersonal and behavioral psychopathic features (2001). From these results, they hypothesized that high dopamine turnover may be involved in impulsivity, resulting from a disinhibition of destructive impulses. The same group replicated their results in a 2003 study using 28 violent and sexual offenders undergoing pre-trial forensic psychiatric evaluations using the PCL-R. After this confirmation, they concluded that “violent and aggressive behavioral traits with childhood onset

and adult expression as psychopathic features are associated with changed activity in the brain dopaminergic system” (Soderstrom, et al 2003).

Identifying the mechanisms in the dopamine system which influence impulsivity in both psychopaths and addicts is crucial for a practical knowledge and understanding of dopamine’s role in the conditions. Several researchers have identified the dopamine D4 receptor (DRD4) as an area of interest, in particular the polymorphisms in the DRD4 gene. In 2004 and 2005 studies, Kreek’s team identified the DRD4 gene as a candidate gene for associating with alcoholism, opiate addiction, and cocaine addiction and in 2005 they specified the possible role of the gene and its polymorphisms in impulsivity. The DRD4 gene displays a 48 base pair repeat sequence which varies from two to eleven repeats (Canli 103). The 7-repeat and higher alleles show interesting correlations to a variety of characteristics, many of them associated with extroversion. A 2005 study by Congdon, Lesch, and Canli explored the relationship between impulsivity and DRD4 polymorphisms. By examining the different measures of impulsivity, the Barratt Impulsiveness Scale, Immediate Memory Task, and Delayed Memory Task, in relation to four different DRD4 genotypes, they were able to conclude that higher levels impulsivity were associated with the presence of the 7-repeat DRD4 polymorphism (Congdon, Lesch, & Canli, 2005).

In 2007, Eisenberg et al explored the effect of possessing a DRD4 genotype with seven or more repeats, as well as a variant of the DRD2 gene, on delayed discounting task performance, a behavioral measure of impulsivity. While they were primarily examining the effects and interplay of both gene variations, Eisenberg et al did find that the genes had both interactive and independent effects on the impulsivity test, “suggesting that genetically-based functional

differences in the corticostriatal-mesolimbic dopamine system are responsible for variation in impulsivity from a delay discounting perspective” (Eisenberg et al, 2007).

As the link between the DRD4 gene polymorphisms and impulsivity variance grows stronger, the role of the dopamine receptor in addiction will become more clear. For now, the well established link between the presence of an impulsive personality and the growing link between certain DRD4 polymorphisms can be coupled to tentatively link DRD4 polymorphism with addiction. Similarly, due to impulsivity’s defining role in psychopathy, the DRD4 gene can also be cautiously linked to psychopathy. However, it is crucial to recognize that impulsivity occurs across a wide spectrum, and on its own does not characterize any specific conditions, other than the trait of being impulsive. It is only one of a constellation of traits characterizing both addiction and psychopathy, and must be remain in context.

Novelty seeking, a trait characterized as one facet of risk taking behavior, involves high reactivity to novel stimuli and a continual seeking of novel stimuli (Kreek et al 2005). A great deal of research has been done relating the presence of the DRD4 gene to increased novelty seeking behavior. In 1996, Ebstein et al used the tridimensional personality questionnaire to measure individual variations in the novelty seeking trait. They compared these variations to the presence of the 7-repeat DRD4 allele in 124 subjects and found an association between high novelty seeking scores and the allele (Ebstein et al 1996). This work, done on normal, healthy volunteers, opened up the possibility that pathological variants of normal traits may result from genetic variation in normal genes.

Kotler et al attempted the first association specifically linking a genetic polymorphism with opioid addiction (1997). The growing association between the novelty seeking personality

trait and the 7-repeat variant of the DRD4 gene, coupled with existing knowledge that substance abusers are more likely to display the novelty seeking trait than non-abusers, led them to examine the relationship between the 7-repeat allele and opioid addiction (Kotler 1997). While they demonstrated an over-representation of the 7-repeat allele in the opioid dependent population, they concluded that the risk conferred by the possessing the DRD4 variant was modest, suggesting that it is only part of an overarching genetic and environmental architecture contributing to opioid dependence (Kotler 1997).

Further evidence for the role of the DRD4 variation as one component of a larger genetic pattern for novelty seeking can be seen in studies which examine other genetic variations and their combined relationship to novelty seeking. Several studies have failed to demonstrate a link between novelty seeking and DRD4 7-repeat variants, however Benjamin et al argues that this “failure to replicate associations between personality factors and some genes may be partially due to the presence of additional modifying common polymorphism” (Benjamin et al 2000).

Strobel et al hypothesized, after conducting two studies in which one confirmed the association and one did not, that the presence of a specific serotonin transporter gene promoter-linked polymorphic region (5-HTTLPR) and the val/val catechol *O*-methyltransferase gene (COMT) polymorphism influenced whether the DRD4 7-repeat allele was associated with increased novelty seeking (2003). Further evidence for the importance of all three genotypes in the expression of novelty seeking is seen in Benjamin et al’s 2000 study. They found that when the short 5-HTTLPR allele was absent and the COMT val/val genotype was present, higher novelty seeking scores on the tridimensional personality questionnaire were associated with the

presence of the DRD4 7-repeat allele (Benjamin et al 2000). This combined effect of all three polymorphisms was supported by evidence that siblings who share all three polymorphisms has significantly correlated novelty seeking scores while siblings with even one difference showed no correlation (Benjamin et al 2000).

As the association between the DRD4 receptor and novelty seeking strengthens, it is important to begin establishing a direct link between psychopathy, addiction and the DRD4 receptor. Lusher, Chandler, and Ball examine the existing evidence for the role of the DRD4 gene in substance abuse and conclude that “ there may be an association with DRD4 and Novelty Seeking amongst severe drug-dependent populations. Therefore, the DRD4 gene may not predisposed individuals to addiction, per se, but having the genetic variant may predispose substance abusers to a severe dependency” (2001).

Research on the role of DRD4 in the development of psychopathy has not been nearly as pervasive as DRD4 research in addiction. In 2007, Beaver et al conducted a study on the DRD2 and DRD4 genes based on the premise that the development of maladaptive behaviors may be associated with genes modulating or relating to the modulation of neurotransmitters, particularly dopamine. They suggest that antisocial behaviors are the result of a polygenic phenotype in which gene x gene interactions, when the effect of certain polymorphisms are conditioned by the presence of other polymorphisms, are occurring (Beaver et al 2007). Similar to some addiction and novelty seeking studies discussed earlier, they concluded that the DRD4 polymorphism did not consistently effect the antisocial phenotype, however the interaction between DRD2 and DRD4 did predict variation on the antisocial behavioral scales.

The DRD4 7-allele polymorphism has been linked rather strongly to increased novelty seeking, a hallmark trait thought to play a developmental role in substance addiction and a characteristic trait of psychopaths. However, it is not yet possible to determine an absolute link between the DRD4 variant and novelty seeking. Many studies still dispute the relationship and others strongly implicate that other genetic polymorphisms may be of equal or greater importance when predicting novelty seeking behaviors. It is also important to note that many of the studies conducted that have successfully associated the 7-repeat allele with novelty seeking were conducted on normal, healthy volunteers without a history of either addiction or psychopathy. Both the interaction of DRD4 with other genes and its presence in normal individuals imply that the DRD4 7-repeat allele is not a sufficient causal agent for either addiction or psychopathy. Alternatively, a wide constellation of traits and genetic variants must be considered to interact in forming these conditions, along with an environmental component.

Evidence implicates the DRD4 gene variation in the phenotypic display of both impulsivity and novelty seeking. It has been observed in both drug addicted populations as well as psychopathic populations. While it has become obvious that the presence of the DRD4 7-repeat allele does not automatically confer addiction and psychopathy, it appears to be a crucial element in the development of traits which predispose the two conditions. Drug addiction and psychopathy display a remarkably high co-morbidity, however not all psychopaths have drug addictions and not all addicts display psychopathy. As increasing evidence shows similar underlying causes for both conditions, understanding the environmental conditions which appear to control the manifestation of these conditions becomes increasingly important.

Developmental Timeframe and Distribution of Psychopathy Across the General Population

Psychopathy is rarely diagnosed in juveniles because it confers a life-long, deficient personality pattern which can have grave negative consequences for how the youth is viewed and treated by both society and the legal system. Despite the reluctance to diagnose youth with psychopathy, there are distinctive features of the condition which can be identified throughout development. Psychopathy does not develop instantaneously during adulthood, and instead the emergence of psychopathic traits can be traced throughout childhood and adolescence. In young children, neuro-cognitive impairments and psychopathic tendencies have been identified which carry through to adulthood and emphasis has been placed on those which confer emotional dysfunction (Blair et al 2006). Acts of planned and proactive aggression used for achieving desired goals, such as attaining another's possessions, are a core feature in the behavioral profile of children who ultimately develop psychopathy (Blair et al 2006).

One of the earliest signs of psychopathic tendencies in childhood involves moral socialization (Viding 2008). Viding proposes that children are able to begin making distinctions between moral (victim based) and conventional (society based) transgressions around the age of 3.5 years. These distinctions between moral and conventional transgressions indicate whether the child understands that some transgressions are rule dependent and would therefore be acceptable if the rule was removed and some transgressions are never acceptable, regardless of the rules. A lack of understanding moral transgressions seems to indicate the child's deficiency in being able to identify other's distress and victimization (Viding 2008).

It appears that, in general, psychopathy in childhood mirrors psychopathy in adulthood (Lynman & Gudonis 2005). One of the ways proposed for distinguishing childhood conduct

problems from future psychopathic disorders is characterizing callous-unemotional traits (Frick et al 2003). Frick et al found that while all children displaying significant conduct problems tended to also display problems with emotional and behavioral regulation, children who displayed callous-unemotional traits (either with or without conduct problems) also displayed a lack of behavioral inhibition.

As discussed earlier, despite the growing validity and use of the PCL-R-Youth Version for diagnosing juvenile psychopathy, the vast majority of psychopaths are diagnosed as adults and almost always in response to interactions with the criminal justice system. Many psychopaths will not be formally diagnosed until significantly after the development of a full-blown psychopathic personality. Interestingly, one study found that up to 50% of psychopathic juveniles studied displayed moderate levels of psychopathy by the age 14 and 25% displayed a severe level of psychopathy by age 15 (Klaver et al 2009). They indicated that the largest score increases on the PCL:YV occurred between the ages of 12 and 15, implying that this is when psychopathy actually emerges and manifests into lifelong personality traits.

Prevalence of psychopathy in the general population is difficult to measure, as psychopathy is generally diagnosed as a result of criminal action. It is estimated that psychopaths account for approximately 1% of the general population and up to 20% of the incarcerated population (Hare online). Research has indicated that psychopathy is more common in males than females, in both the incarcerated and general populations (Pitchford 2001).

Developmental Timeframe and Distribution of Drug Addiction Across the General Population

Pinpointing the developmental timeline for drug addiction is a highly individualized process. Because the onset of addiction is based on factors such as the initial interactions with

substances of abuse and their accessibility, addiction has the capacity to develop very differently under different circumstances. Unlike in psychopathy, where the psychopathic personality either exists or does not by adulthood (or even early adolescence), addiction can develop at any time in an individual's life, from early adolescence to late adulthood.

However, similar to psychopathy, addiction is prevalent across both the general population and the incarcerated population. As mentioned earlier, estimates for alcohol addiction hover around 5% of the general population and estimates for all substance addictions range up to 10%. These figures are significantly higher than the rates of psychopathy, indicating that addiction in the United States is a much more widespread problem than psychopathy in the United States. However, some would argue that, although psychopathy afflicts a significantly lower percentage of the population, it has a much larger affect on society as a whole due the extremely damaging acts carried out by psychopaths.

Environmental Factors

As the evidence mounts in support of a genetic role in the development of addiction and the presence of the psychopathic personality, it also becomes increasingly difficult to discount the role of environmental factors. One can simply examine the existence of the DRD4 7-repeat (as well as other candidate genes) in the normal population and see that it alone cannot account for either condition. A wide range of environmental conditions seem to account for the activation of addiction, psychopathy, or both in specific individuals.

Four distinct sets of environmental factors contribute to the development of addiction, community, family, peer, and educational risks (Genetic Science Learning Center online). Within the community, wide-spread social and cultural values play a significant role in shaping

individual views on the acceptability of drug use and abuse, which are essential stepping stones on the road to addiction. Different communities vary vastly in the levels of both acceptability of substance use and specific type of substance being used, helping to account for why specific addictions are more prevalent in certain communities. In general, communities which promote addiction are characterized by easy access to drugs and alcohol, community disorganization, low neighborhood attachment, and norms and attitudes favoring drug use (Genetic Science Learning Center online). The 1997 National Household Survey on Drug Abuse found drug availability is the predominant community risk factor influencing adolescent drug abuse (Lane et al 2001).

Family dynamics overwhelmingly influence almost every aspect of human development. They play a profound role in the formation of addictions, especially those which begin during childhood or adolescence. Family history and patterns of substance use, as well as general familial attitudes towards drugs and alcohol, are crucial in shaping a child's attitudes towards substance use, and ultimately individual patterns of use. A variety of studies, across several different cultures, have found familial attitudes to be a dominant influence over drug use. Coombs, Paulson, and Richardson reported that among Latino youth, parental attitudes were more influential than peer attitudes (1991). Similarly, a Hungarian study found strong family sanctions against alcohol use to be a strong deterrent for female youth (Swaim, Nemeth, and Oetting 1995). These findings indicate the power of the influence of parental attitudes. More specifically, parental interactions with children, such as parenting styles, supervision, discipline, and nurturing styles strongly influence the future development of addiction (McArdle et al 2002). While living with both parents is associated with reduced drug use, other factors, especially a positive attachment to the mother more robustly inhibit drug use, indicating that a positive

relationship between one parent and the child is more important than the physical presence of both parents (McArdle et al 2002). Parenting styles which include unclear rules or expectations, as well as inconsistent consequences, are associated with substance abuse in their offspring. While children who fulfill the “hero” role in their family appear to be resistant to drug abuse, those who fall into the “scapegoat” role display particular vulnerability (Fischer & Wampler 1994). Conflict and frequent disruptions in an individual’s childhood home environment are also linked to later addiction (Chassin, Pitts, & Prost 2002). Childhood abuse, both physical and sexual, also seems to elevate risk for future substance abuse problems; one study conducted in 1982 found that 84% of the 178 adults surveyed, who were undergoing treatment for drug/alcohol addiction, reported a history of abuse or neglect (Cohen & Densen-Gerber 1982). A strong relationship exists between exposure to household dysfunction during childhood, especially violence and abuse, and adult health risk factors, including alcoholism and drug abuse (Felitti et al 1998).

Evidence indicates that the family environment is, arguably, the most significant environmental contributor to the development of addiction, as well as in psychopathy. The direct relationships between parents and the child appear to be critical in the development of the psychopathic personality. Psychopathic individuals often are characterized by traits which make them difficult to parent from a very early age (Hare 1999). These initial traits can incite parents to turn away from their own children, resulting in a non-nurturing environment in which the child will not attach to the parents positively. The lack of appropriate attachment and lack of nurturing, often to the point of abuse and neglect, seems to be a hallmark of the type of environment which furthers the development of psychopathic traits (Hare 1999).

In the case of addiction, it is important to note that both non-familial peer groups and educational factors are also key environmental elements. Peers influence substance use and abuse through three main mechanisms, availability or offers of the substance, modeling abuse behaviors, and contributing to perceived social norms surrounding use and abuse (Borsari & Carey 2001). Educational factors are becoming increasingly controversial as they relate to addiction. Historically, it was believed that individuals with academic problems and a lack of interest or commitment to school were at an increased risk for substance abuse (Hawkins et al 1985). Recently, it is becoming more evident that substance abuse and subsequent addiction problems are also prevalent in higher achieving educational settings, such as universities, especially in relation to alcohol abuse and "study drugs" (O'Malley & Johnston 2002). Peers have less effect on the development of psychopathy, which as personality type begins to develop before meaningful peer relationships develop. Once the psychopathic personality emerges, it can be exacerbated by associations with peers who accept and encourage psychopathic behaviors. Interactions with peers resulting in opportunities for manipulation can also hone these tendencies and skills in psychopaths by providing them opportunities to practice their anti-social interactions.

Conclusions

Psychopathy and substance addiction are linked by extremely high co-morbidity. This co-morbidity can be understood through a series of underlying traits. These traits do not serve as simply common characteristics among addicts and psychopaths, but rather as an explanation for the emergence of both addictive and psychopathic behaviors in certain individuals. Impulsivity

and novelty seeking are hallmarks of both conditions, and are linked not only to the two disorders, but also to the DRD4 receptor gene.

The presence of the DRD4 7-repeat allele in the context of a specific genetic environment may explain the emergence of high impulsivity and high novelty seeking in specific individuals. This trait pair creates the vulnerability for psychopathy and addiction to develop. This vulnerability is manifested into full blown disorders through abusive and neglectful family and home environments, as well as by environments which encourage specific behaviors, such as drug use and abuse or aggression and hostility. It appears that the specific environment of a vulnerable child will determine whether they develop either addictions, psychopathy, or both.

Substance abuse to the point of addiction and the psychopathic personality both serve as coping mechanisms for operating and understanding the world in the absence of appropriate mechanism. There are very limited treatment options with successful outcomes for both conditions. Ideally, by identifying a genotype which predicts vulnerability to addiction and psychopathy, it will be possible to identify the individuals most at risk for manifesting these coping mechanisms. By knowing that a child is already at risk for developing addiction or a psychopathic personality, it offers hope that they can be immersed in a highly nurturing and supportive environment which would lessen the likelihood that the vulnerability would ever be realized. Unfortunately, in practical reality, it is extremely difficult, if not impossible, to ensure that the parents of a vulnerable child provide the right environment for the child to become a healthy adult. Another possibility is to identify at-risk individuals early on and teach them alternate coping mechanisms for navigating the world and non-destructive outlets for their

impulsivity and novelty seeking behaviors. This treatment option offers more hope because it places the emphasis and responsibility on the child rather than the parents.

Ultimately, there may be an option for gene therapy which can replace the DRD4 7-repeat allele with an allele not associated with high impulsivity and high novelty seeking. However, there are important ethical concerns when considering gene therapy. Both impulsivity and novelty seeking traits are not only associated with negative behaviors, but also positive. In attempting to eliminate these traits, there may be the accidental elimination of positive and social behaviors as well as the intended elimination of the negative, anti-social traits.

Rather than attempting to eliminate the psychopathic personality or addictive behaviors, a more realistic and attainable solution may be to identify recreational activities and professions which allow at-risk individuals to act impulsively and seek novelty without engaging in self-harm or behaviors that are harmful to others. Perhaps it is possible to find, or develop, a niche in society which embraces these traits and can maximize their potential for productivity. Should psychopathy and addiction become recognized as coping mechanisms which develop in response to a genetic predisposition to impulsivity and novelty seeking in a non-nurturing environment, it will become possible to explore these treatment solutions and begin lessening the extensive harm addiction and psychopathy impart on society.

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