

JOURNAL

OF
ADDICTIVE DISORDERS

Genetic Predisposition:

A Review of Primary Chemical Addictions, their Etiology and Possible Implications for Treatment and Recovery¹

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Background

Despite man's millennia of experience with the destructiveness of particular mind and mood altering chemical substances, society today remains mired in the grip of these powerfully addictive elements. These problematic substances, and their derivatives, examined and compared here are alcohol, and the family of substances other-than-alcohol such as marijuana, opiates, and cocaine. Today these chemical substances, and their derivative types, not only remain as a plague on society but, despite monolithic government interventions designed to curtail their use, continue to spread their influence and abuse at an alarming rate.

Historically, since man discovered the mind/mood altering effects produced by ingesting alcohol, reports of drunkenness and loss of behavioral control have been recorded and passed down. Admonitions against excess drinking and drunkenness have been posted throughout history to warn those who follow against indulging to excess. Alcohol was termed a "spirit" as its ability to alter the user's personality was so profound that it was believed to be of a "spiritual" nature. Of wonderment to all was the phenomenon that some individuals who used alcohol became so seemingly enamored with it that they would continue to drink far beyond when most other individuals would stop. These captivated individuals would sometimes continue their use of alcohol beyond all reason, without regard for consequences and to the exclusion of all else in their lives. Similar historical evidence is found of the mood/mind altering effects produced by other chemical substances such as opiates, cocaine, marijuana, and other such naturally occurring organic chemical substances. Through history there is no record of any effective treatment to dissuade individuals, who were so obviously smitten by the affects imbued by these substances, from continuing their use. It was not until the mid-twentieth century that an unlikely method to assist individuals with this condition was stumbled upon.

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Purpose

The purpose of this study is to seek to look into the nature of the primary addictive substance discussed earlier and explore the etiology of their addictive influences. Much speculation has been directed at the origins of the addictive powers of these chemical substances. Up until very recently in history, most societies and cultures viewed substance abuse/addiction as a weakness of will or a willful desire to ingest such substances despite the often tragic consequences of doing so. On June 10, 1935 Dr. Robert Smith, cofounder of Alcoholics Anonymous, had his last drink (Anonymous, 2001). That event launched the program of Alcoholics Anonymous. With the advent of that program came the concept that alcoholism was a "disease." This concept altered the historic worldview on the nature of alcoholism. It changed the course of thought from one that presupposed people addicted to alcohol were "bad," to a perspective that people who suffered from alcoholism had succumbed to a seemingly hopeless disease. By apparent logical assumption, it was generalized that people addicted to the other substances previously discussed, suffered from a disease as well. Along similar lines, with the disease concept perpetuated the discussion of how one might contract this "disease." The ostensible consensus appeared to be that the nature of alcohol addiction, and with it other chemical additions, was that such addictions were "genetic" or at least that there was some sort of genetic predisposition to such addictions.

As the program of Alcoholics Anonymous began to grow and its ability to provide a method of successful remission from the effects of alcoholism were becoming evident, speculation began that if Alcoholics Anonymous worked for Alcoholics, and alcoholism and drug addiction were similar in nature and cause, then shouldn't Alcoholics Anonymous work for drug addicts too? As such, shouldn't those addicted to substances other-than-alcohol be permitted to join Alcoholics Anonymous? This apparently logical assumption is still pondered today. However, the founders of Alcoholics Anonymous demanded strict adherence to the principle that Alcoholics Anonymous groups be confined to the single purpose of helping alcoholics. Bill Wilson, a cofounder of Alcoholics Anonymous, published articles to the membership of Alcoholics Anonymous on at least three separate occasions, addressing the issue of allowing drug addicts to join the fellowship of Alcoholics Anonymous. Excerpts of those articles are printed in an Alcoholics Anonymous pamphlet titled "Problems Other Than Alcohol" (Wilson, 1958). These statements are of interest in their explicit definitiveness and are based not on scientific research of the day, but on "experience." Though Mr. Wilson expresses compassion for addicts, and permits that they are welcome as non-AA visitors in Alcoholics Anonymous meetings, he denies them entry into the program unless they are also "alcoholic." At first it might appear to the reader that Mr. Wilson is advocating denial of AA membership to drug addicts solely for the purpose of AA unity. However, a more in-depth reading brings to light other experiential reasoning. Mr. Wilson states: "It has also been learned that there is no possible way to make nonalcoholics into AA members." "I see no way of making nonalcoholic addicts into AA members. Experience says loudly that we can admit no exceptions, even though drug addicts and alcoholics happen to be first cousins of a sort." "We must accept the fact that no nonalcoholic, whatever his affliction, can be converted into an alcoholic... and an AA member."

On the surface, these statements appear nonsensical. However, this co-founder of Alcoholics Anonymous was not one to make nonsensical statements or judgments with regard to the issue of recovery. Thus, further exploration into these remarks is warranted. As a result of Mr. Wilson's statements and beliefs however, AA's sister program, Narcotics Anonymous (and

other splinter programs) were created utilizing, with minor alterations, the steps and principles of Alcoholics Anonymous (NA World Services, 2010). These alternative programs are apparently effective and offer that same “solution” as Alcoholics Anonymous. However, the purpose and approach utilized to reach “the solution” and thus recovery, are in some way then necessarily different. In order to ascertain the treatment differences Bill Wilson so adamantly alluded to, it would be prudent to first gain a foundational knowledge and understanding of the nature and differences in the addictive properties of alcohol and other dependence producing chemicals. Any differences discovered may lend assistance to formulating differences in treatment approaches.

Review of Previous Research

In an effort to discover the origins of alcoholism and drug addiction researchers have sought to find a genetic link to such maladies. Discovery of a genetic link would certainly be a monumental breakthrough in subsequent prevention and treatment of chemical addictions and dependencies. Although some breakthroughs have occurred, the one-size-fits-all genetic link has apparently eluded researchers.

Alcohol

With regard to a genetics and links to alcoholism there are numerous studies available. Most studies generally conclude that although conclusive evidence of specific genetic link criteria has not been fully met, there appear to be significant indicators that such a link is manifest. One such recent study was conducted at the University of California San Francisco. This study examined the link between 565 participants who met DSM-IV criteria for alcohol dependence and 1080 first-degree relatives who were administered the Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA) scale. Although this study did not meet the criteria necessary to achieve genome-wide significance, it reported that linkage peaks were identified on various chromosomes that were consistent with various alcohol symptoms. The study reports: “Follow-up analyses were conducted by performing linkage analysis for the 12 alcohol dependence symptoms assessed by the SSAGA across the support intervals for the observed linkage peaks. These analyses demonstrated that different collections of symptoms often assessing distinct aspects of alcohol dependence (e.g., uncontrollable drinking and withdrawal vs. tolerance and drinking despite health problems) contributed to each linkage peak and often yielded LOD scores exceeding that reported for the alcohol dependence diagnosis. Such findings provide insight into how specific genomic regions may influence distinct aspects of alcohol dependence.” (Gizer, et al., 2011).

Another Study published in the American Journal of Psychiatry (Bankole A. Johnson, (Published online January 19, 2011), as discussed in the National Institutes of Health News release (NIH News, 2011), reported in this, and a previous study, the discovery of a gene that controls a protein which regulates the concentration of serotonin as it is transported between nerve cells. Of importance is that variations within this gene can significantly influence the intensity of drinking. This study was conducted to determine the effectiveness of a new medication, Ondansetron. The results of the study concluded that Ondansetron did in fact reduce drinking intensity over the control group, and purported to be noteworthy in its possible effectiveness for the treatment of alcoholism. While that aspect of the study was certainly interesting, for the purpose of this paper what was apropos is that there was a positive link

established between a gene variant and increased alcohol consumption. The conclusion then might be cautiously drawn that alcoholism may, at least in some cases, be genetically predetermined. For the purpose of Dr. Johnson's study of Onansetron, it was concluded that problem clients could be screened for (LL and TT) variants of this gene and, if positive for those variants, then the drug Onansetron would be effective in remediating their alcohol related symptoms.

A further study appears to assist with the understanding of the broad range of genetic susceptibility in alcohol disorders (V A Ramchandani, 2010). Why alcohol affects people differently is based on understanding the neurobiological underpinnings that render certain individuals vulnerable to alcohol addiction. This research studies the release of dopamine by a mu-subtype of opioid receptors in the brain following consumption of alcohol. Individuals who carry a specific variant of this receptor (118G) experience increase euphoria following alcohol consumption whereas people who carried the more common (118A) receptor did not experience such feelings. Using a PET scan to measure the dopamine activity in the brain, individuals involved in this study were divided into two groups based on those who were ascertained to possess the gene for the 118G mu-opioid receptor variant, and those who possessed only genes for the common 118A receptor variant. Both groups were administered alcohol. Researchers then compared dopamine release in the two groups of people. They discovered that only people with the 118G variant had a dopamine response to alcohol – no such response happened in subjects with the 118A receptor variant.

Addiction Producing Drugs Other than Alcohol

Genetic research into the etiology of drug addiction is also prevalent. For the purposes of this study the examiner looked at general broad based information from researched based articles and studies. It is not within the scope of this study to examine the possible existence of a genetic link to each individual addictive chemical. However, the nature and prevalence of genetic origins of any particular substance will necessarily emerge in any and all general research of addictive substances. Such incidents or lack thereof will be explored and discussed should they arise.

In "NIDA Notes," found in the archives of the National Institute on Drug Abuse (NIDA), Staff writer June Wyman discussed then current status of NIDA sponsored research studies and their attempts to discover a genetic link between genes and drug addiction (Wyman, 1997). She starts her article describing a fictitious major scientific meeting during which a researcher announces the discovery of gene mutations that lead people to abuse marijuana, heroin, cocaine, and other drugs. However, she then states that such a discovery is, to date, mere fantasy. The author then goes on to describe current research studies that are being sponsored by NIDA and their progress. Those studies were:

1) Exploring the effects of drugs on twins by comparing survey results of identical twins verses fraternal twins. The survey hoped to show that similar effects would be found in the identical twins and dissimilar effects in the case of fraternal twins. Although some prospective heritability traits were noted and further research initiated, the conclusions were speculative.

2) Another sponsored study looked at "Candidate Genes." These genes are the ones speculated to be those most likely to influence drug abuse/addiction. The candidate genes were

those responsible for the regulation of dopamine in the brain. The study speculates that dopamine-containing nerve cells may be deficient in people who are vulnerable to substance abuse. The scientists surmise that if the genes that control the nerve cells containing dopamine are damaged, then people “may be using drugs in an attempt to counteract the deficiency.” As such, they propose that should they discover this gene-nerve relationship, they could “develop medications to interact with the damaged genes and regular dopamine levels in the brain.” However, to date no such gene-nerve interaction has been discovered.

3) Yet another study discussed by the NIDA author was one that compared the DNA of drug abusers to that of people who do not abuse drugs. This study found evidence of a candidate gene that directs the body to produce an enzyme called COMT. This enzyme helps break down inactive dopamine and comes in two forms, high activity and low activity. Researchers noted that drug abusers typically have more of the high activity enzyme. These researchers then proposed to develop drugs that lower the activity level of this enzyme. However, they did not determine if this gene and its related enzyme caused people to abuse drugs, or if the abuse of drugs caused the gene to increase the activity of the enzyme.

4) Finally, the author ventures an opinion of what it might take in the future to locate specific genes involved in drug addiction. She speculates that a genome-wide scan will need to be used to look for a manner of genetic markers and then compare them to the characteristics of those individuals from which they were drawn. Categorizing all information available may then allow researchers to draw some conclusions regarding the possibility of a genetic link to drug addiction.

In a related study (Li, 2004), the researchers attempt to dispel the notion that drug addiction, the compulsive drive to take a drug despite repeated negative consequences, is the result of “bad choices” that people voluntarily make. The findings of their research indicate that “repeated drug use leads to long-lasting changes in the brain that undermine voluntary control.” They conclude that their findings, “combined with new knowledge of how environmental, genetic and developmental factors” that contribute to addiction, should produce changes in the approach to prevention and treatment of drug addiction. This study is informative in that it broaches the topic of brain alterations based on the abuse of chemical substances. What is important about this concept is that if/when researchers discover genetic alterations in the makeup of substance abusers it must be determined if those alterations are responsible for the subject’s substance abuse, or if the subject’s substance abuse is responsible for the genetic alterations.

Discussion

Chemical dependency is a rapidly growing problem that is having a detrimental effect on current society. Much speculation exists as to the nature of this negative trend, the etiology of its addictive properties, and to ascertain if the data could provide some clues for enhanced remediation techniques that could be helpful to counselors and therapists in assisting addicted individuals in the achievement of lasting recovery.

The research articles presented in this study are a representative sample of a significant quantity of like studies that appeared to reach very similar conclusions. This study was conducted for the purpose of examining the available research to determine if genetic links exist

between the chemically dependent individual and the chemical substance to which the individual client is addicted. Despite exhaustive and ongoing research conducted for the purpose of discovering a genetic link between people and chemical substances such as heroin, cocaine, marijuana, morphine, methamphetamine, etc., to date, no such link has been conclusively found. Familial genetic heritability links to such drug addictions have not been discovered for specific addictions. However, noted familial links are typically found to be due to environmental and behavioral influences and situational factors.

On the other hand, research appears to display convincingly conclusive evidence that certain individuals have a strong genetic predisposition to become alcoholics while others, obviously, do not. The seeming conclusions that may be assumed from these statistics are that those individuals diagnosed with alcoholism were predisposed to contract this addictive disease. Conversely, those individuals addicted to the other types of drugs indicated, were not predisposed to become addicted to them. In other words alcoholics have a *disease*, or a reaction to alcohol that the majority of other people do not have. Essentially then, it can be reasonably stated that there is evidence for the proposition that alcoholics are *born that way*. Conversely, those individuals who become addicted to the drugs discussed previously, do not suffer from a heritable disease, but rather have succumbed to the primarily *universal addictive properties* of the chemical(s) they assimilate into their bodies. As such, a reasoned assumption would be that any person, who is exposed to these *addictive* chemical substances, is likely to become addicted. Stated simply, *anyone* can become a *drug addict*, but typically, only those individuals with a genetic predisposition to alcoholism become *alcoholic*.

Allergy: Is there a Genetic Link?

Often currently overlooked in the discussion of genetics and addictions, particularly alcohol addition, is the genetic origins of allergies. A general definition of an allergy, according to MedlinePlus (U.S. National Library of Medicine, 2011), is "... is a reaction of your immune system to something that does not bother most other people. People who have allergies often are sensitive to more than one thing. Substances that often cause reactions are: pollen, dust mites, mold spores, pet dander, food, insect stings, and medicines. How do you get allergies? Scientists think both genes and the environment have something to do with it. Normally, your immune system fights germs. It is your body's defense system. In most allergic reactions, however, it is responding to a false alarm." Although this is a simplistic definition, when viewed in light of an alcoholic's reaction to alcohol, it seems to correlate with the symptoms.

These symptoms, and the introduction of the concept of alcoholism being an *allergy*, were originally proposed by Dr. William D. Silkworth in a section he authored in the book "Alcoholics Anonymous" entitled "The Doctor's Opinion." In that section he writes "We believe, and so suggested a few years ago, that the action of alcohol on these chronic alcoholics is a manifestation of an allergy; that the phenomenon of craving is limited to this class and never occurs in the average temperate drinker. These allergic types can never safely use alcohol in any form at all; and once having formed the habit and found they cannot break it, once having lost their self-confidence, their reliance on things human, their problems pile up on them and become astonishingly difficult to solve." (Silkworth, 2001).

In the Chapter 10 "To Employers" of the book "Alcoholics Anonymous" (Anonymous, 2001), which was originally published in 1939, Bill Wilson writes "I well remember the shock I

received when a prominent doctor in Chicago told me of cases where pressure of the spinal fluid actually ruptured the brain. No wonder an alcoholic is strangely irrational. Who wouldn't be, with such a fevered brain? Normal drinkers are not so affected, nor can they understand the aberrations of the alcoholic." Upon first reading, this statement seems rather unreasonable and possibly included for 'shock value.' However, when viewed in the context of an *allergy* or an *allergic reaction*, it begins to seem at least plausible. Further, when considered in light of the definition of allergies and their genetic origins, the statement "Normal drinkers are not so affected" begins to come into greater clarity.

In an article on the website Healthtree.com (Genetic Allergies and Research, 2010), evidence of a genetic link to allergies is discussed. Some of its comments include: "Strong evidence suggests a link between allergies and genetics. The evidence for genetic allergies lies in family histories of allergies and asthma as well as clinical studies of genetic allergy in twins. The situation, however, is neither clear nor obvious: most studies suggest we inherit an inclination toward getting allergies, rather than specific allergies themselves." In discussing the body's reaction to the introduction of a substance of which it is "allergic," the article goes on to state: "The Allergic Response: An allergy occurs when the body's immune system mistakes a harmless substance for a threat. This substance becomes the allergy trigger, or allergen. Upon exposure to the allergen, white blood cell action is activated by IgE antibodies, resulting in the release of histamine and a rapid inflammatory response." The article further indicates that "An allergy attack can be mild, (or). More severe or in the worst scenarios life-threatening anaphylaxis." The article goes on to state that allergic reactions or symptoms may only affect a single part of the body, or more dangerous reactions may affect the whole body.

Allergic inflammation is a significant symptom of, or reaction to, an allergy. Knowledge of this inflammatory reaction to an allergen is important to understanding the possible implications to those who suffer from such a reaction. Reference to such allergic inflammation is provided in the Medical Dictionary (Farlex, 2011) as: "a localized protective response elicited by injury or destruction of tissues, which serves to destroy, dilute, or wall off both the injurious agent and the injured tissue. The inflammatory response can be provoked by physical, chemical and biological agents... Although these infectious agents can produce inflammation, infection and inflammation are not synonymous. The classic signs of inflammation are heat, redness, swelling, pain and loss of function. These are manifestations of the physiological changes that occur during the inflammatory process. The three major components of this process are: (1) changes in the caliber of blood vessels and the rate of blood flow through them (hemodynamic changes); (2) increased capillary permeability; and (3) leukocytic exudation." As noted, allergic inflammation can have potentially devastating effects. As discussed in the January 1998 Washington University in St. Louis Scientific News Article (Diane Duke, 1998), they reviewed the December 11, 1997 issue of "The New England Journal of Medicine" in which scientists reported that they had discovered a strong association between a particular gene mutation and allergies. They stated: "We have found that if you have this mutation, you are 10 times more likely to be allergic." The News article further states that: "The immune system normally defends the body against invading agents, such as bacteria and viruses. But it sometimes confuses other foreign substances,, with harmful intruders." The body then defends against these perceived intruders sometimes by producing "powerful inflammatory chemicals like histamine, prostaglandins and leukotrienes. The production of these chemicals in various parts of the body,, initiates an allergic reaction,"

If the results of these recent scientific studies are viewed taking into consideration the statement written in 1939 (Anonymous, 2001): "I well remember the shock I received when a prominent doctor in Chicago told me of cases where pressure of the spinal fluid actually ruptured the brain," and we view from the "Doctor's Opinion" quoted from the same publication, the belief that those who suffer from alcoholism may derive this disease from the manifestation of an allergy, then a possible genetic connection between an allergic inflammatory reaction and the disease of alcoholism, with all its various patterns of occurrences and continuum of severity, may show promise of emerging. Such emergence may then lead to greater scientific understanding and the possibility of improved preventions and treatments.

Interpretation of findings

The purpose of this study was essentially two fold. 1) To ascertain the etiology or origins of the addictive properties of particular prevalent chemical substances and 2) if a difference in etiology was discovered, to ponder those differences with an eye toward treatment approaches. From the data gathered from the extensive, though not always conclusive, body of research literature, it appears evident that there exists a significant difference in the etiology of addictions between alcohol and other dependency producing chemical substances. The nature of the differences in addictive properties lies in both the chemicals themselves and within the individual user of the substances. In general terms it is evident from the research that *dependency* producing drugs are capable of producing *dependency* in *anyone* who uses them.

There have been numerous research studies that have attempted to discover a genetic link or predisposition to dependency on particular substances / drugs. Studies, though not cited here, have even been conducted in an attempt to find a genetic link to the behavior of individuals that would predetermine their use of addictive substances. However, these studies typically concluded that there was some evidence of a possible genetic link, none was discovered.

Conversely, the studies attempting to reveal a genetic link to alcoholism were fruitful and promising. Specific genes and their mutations were discovered that, if present in an individual, would significantly increase his or her likelihood of developing alcohol addiction. As such, the majority of people who use alcohol will not become addicted to it. Apparently, only those individuals who possess a genetic predisposition to alcoholism will become *alcoholic* at some point in their drinking careers.

Finally, with strong indication in the likelihood that alcoholics possess a genetic predisposition to alcoholism, those findings were compared to statements in the book *Alcoholics Anonymous* (Anonymous, 2001) that based on the science available in 1939, suggested the possible etiology of the *disease* of alcoholism and its physical and mental ramifications. Those writings suggested that alcoholism is a manifestation of an allergy. It speculates that once an individual develops this allergy then significant and uncontrollable reactions can occur. The more severe of these reactions were noted to even produce such a reaction/inflammation in the spinal fluid that it actually ruptured in the brain producing death in the alcoholic sufferer. A further review of research literature was undertaken to ascertain the etiology of "allergies." Although no specific data was discovered at this writing regarding a genetic link between alcohol and allergies, what was discovered was that the etiology of allergies is primarily genetic. Additionally, the chemical and physical substances that can produce allergies are potentially

endless. Therefore, although alcohol was not specifically studied as an allergy producing substance, the broad term of allergies to *chemicals* was reported as a common producer of allergic reactions. It might be assumed then, that such allergic reactions may also occur with the use of drugs other-than-alcohol. However, if that were in fact the case, then it could also be assumed that the vast majority of the population would similarly possess such an allergy because essentially all users of such chemicals become addicted. On-the-other-hand, only those individuals predisposed to alcoholism appear to react allergically to alcohol.

Conclusion

From the bulk of the research reviewed it is believed that this study has generally determined that chemicals that produce *dependency* can do so in any individual who uses them. As such, people who are predisposed to alcoholism are also susceptible to the habit-forming effects of certain drugs. However, the reviewed research also determined that the etiology of alcoholism is typically genetically predetermined. Additionally, that genetic link may take the form of an allergy. Those individuals who are genetically predisposed to a reactionary response to the ingestion of alcohol suffer its effects, symptoms and consequences though they see others ingesting similar quantities who do not acquire the lasting allergic effects, or classic alcoholic symptoms.

Opinion regarding possible meaning and implications of the study's findings

Determining the most probable source or etiology of the addictive properties of particular substances is meaningful in terms of understanding the nature of particular groups of chemically dependent individuals. It appears logical in some ways that the emotional/psychic nature of certain groups of individuals addicted to particular classes of substances would take on certain *attitudes* and *emotional demeanors* that may have implications relevant to more effective treatments.

Some individual clinicians involved in the therapeutic field for the treatment of addictive disorders may feel that *an addiction is an addiction* and therefore the treatment philosophy is often essentially the same. However, in light of the findings of this study, it presents as logical that there would conceivably be a fundamental difference in the way the addicted individual views/sees himself or herself. This individual self-perception then may be the logical focal point to which counseling and therapeutic interventions might be centered.

Of course, prior to entering treatment, chemically dependent individuals don't typically comprehend the scope of their addiction. Discovering and internalizing the fact that they in fact have an addiction is instrumental to the recovery process. However, at this juncture individuals who suffer from alcoholism are taught that they suffer from a disease, an allergy. They learn that they have it, and that it cannot be cured, but only remediated through abstinence. They come to understand that there is something medically amiss and that they are not responsible for their problem – it's genetic. However, armed with the information that they have, and the *tools* they have at their disposal, they are responsible for the solution. To the alcoholic, there is a certain amount of comfort in this understanding. To the drug addict however, they have no particular genetic link or other malady that they can point to to say "that's the problem." Typically their problem is the physical addiction to or dependency on a chemical. And, except in certain rare instances, they are responsible for initially and knowingly ingesting the dependency producing

chemicals. The therapeutic approaches to successful remediation of these individuals are as varied as the addict. However, often it is difficult to reach a chemically dependent individual who, once the chemical is purged from their system, does not feel or believe that they have a dependency problem. They may believe their dependency is the fault of the chemical and not of something within themselves. It is the belief of the researcher that it is for this reason Mr. Bill Wilson (Wilson, 1958) adamantly insisted that the program of Alcoholics Anonymous should remain an organization geared strictly for the recovery of alcoholics and, although compassionate toward those with addictions other than alcohol, did not believe in integrating them into the Alcoholics Anonymous program of recovery. As such, and rightfully then, they could utilize the principles of Alcoholics Anonymous, but find unity in a program focused on chemical dependency.

A Discussion of this Study's Shortcomings and Limitations

This study was broad in scope and general in nature. I reviewed primarily reported outcomes of specific studies, but did not research in-depth, the particulars of the studies cited. In other words the studies reviewed were not generally scrutinized as to methodology, sample size, strict significance of findings, etc. However, the results of this study were not dependent on the results of a single study, but rather were surmised from a preponderance of conducted studies that produced similar conclusions. Additionally, although the conclusions of this study raised issues important to the therapeutic approaches used in treatment and recovery, these treatment philosophies were not explored in-depth, but rather left to the individual counselor/therapist to incorporate into practice as they found value in such information.

Another weakness of this study was that it tended to lump all dependency producing drugs-other-than-alcohol together without regard to their individual natures, effects, and qualities. Of particular note is marijuana, which in the mind of the researcher, often tends to produce patterns of addiction more similar to alcohol than it does to other drugs.

Proposed Future Research

In this line of study, it is suggested that future research focus on an in-depth analysis of individuals who are addicted/dependent on specific types of drugs/chemical substances and devise screening instruments that 'pull for' personality type, background, other disabilities, psychological profile, cognition, educational background and abilities, etc. in order to determine if there are any prevalent *types of patterns* in existence that could be indicative of those individual's preferences in addictive substances.

Future research might also be conducted into the specific addictive properties of each drug and its effect on the typical user. As such, drug type and personality type of the typical user might be compared for consistency.

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ACKNOWLEDGEMENTS AND NOTICES

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