The Effects of Substance Abuse on Adolescent Brain Development

A Research Paper

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Abstract

In this Master’s Project in School Counseling research paper, the importance of educating children against the abuse of substances and the impact on adolescent brain development will be discussed. The available research will be used to illustrate how substances impact the growth of certain areas of the brain. The consequences to the adolescent’s choice to abuse substances will be identified. This research paper will address the importance of educating both middle and high school students to prevent substance abuse. The relationship between this problem area and the Adlerian concepts of belonging, contributing, friendship, and love will be discussed.
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“Joe”

Joe is a typical 12-year old male. He likes most genres of music, action and adventure movies, and playing football. He struggles with his math homework, and is not sure how to ask girls out on a date, particularly Sally (a girl that he really likes). Unfortunately, Joe also has a drinking problem, and he is beginning to experiment with marijuana.

Joe is choosing to use alcohol and drugs because he believes that they give him more confidence, and that they help him to avoid his problems. He is not aware that his substance abuse is beginning to effect his brain development. I feel that as his school counselor, it would be a part of my responsibility to help Joe and his classmates become aware that there are indeed consequences to their actions.

Statistics

After a brief decline in the 1980’s, substance abuse among adolescents has been on the rise during the past few decades (White, 2003). The findings show that a large number of students are using substances during their formative middle school and high school years. It has been reported that during the past year 43% of eighth graders, 65% of tenth graders, and 73% of high school seniors have used alcohol (Spear, 2002). Once high school students reach their graduation day, at least 80% of them will have started drinking alcohol. Drinking heavily is also prevalent, with 18% of tenth graders and 30% of twelfth graders admitting they got drunk in the past month (Brown & Tapert, 2004). According to a 1996 Monitoring the Future study done by the National Institute of Drug Abuse (as cited in Spear, 2000), once adolescents become seniors in high
school, approximately 50% of them have used marijuana/hashish, 65% of them have smoked cigarettes, and 82% of them have tried some amount of alcohol (Spear, 2000).

The research shows that adolescents are not only beginning to experiment with alcohol and drugs, but that they are using those substances to excess. Students are meeting the diagnostic criteria of abusing alcohol and dependence upon it. Six percent of students in high school are using amounts of alcohol that reflect problematic patterns (Brown & Tapert, 2004). In an earlier study, it was shown that over 34% of high school seniors had reported drinking to intoxication, while 27% had reported using an illicit drug in the past month (Tapert & Brown, 1999). An annual survey in 1987, according to a press release issued through the University of Michigan News and Information Service, reported illicit drug use by high school seniors to be at 57%, in the United States alone. That same report stated almost 40% had admitted to an episode of substantial alcohol usage over a two week time span (Bukstein, Brent & Kaminer, 1989).

**Substance Abuse**

Similar to most of their risk-taking behaviors, some amount of exploratory drug use is normal among adolescents (Spear, 2000). However, while it is relatively common that use of alcohol and drugs is quite normal among adolescents, this study will illustrate how abuse can be destructive to the adolescent. For the purposes of this research paper, substance abuse is defined as being the use and overuse of both alcohol and illicit drugs, such as marijuana and cocaine.

Substance abusers usually consume at least one drug type, especially during their youth. Those who use alcohol and marijuana report using, at a minimum, one additional illicit drug, and most times more than one (Tapert & Brown, 1999). Those
who combined use of alcohol, marijuana, cocaine, and crystal methamphetamine during the new millennium are higher than the combined users from the 1990s (White, 2003).

Our knowledge is still rather sparse, but data is beginning to amass that shows how drug use during the ages of ten to twelve demands that we pay extra special attention (Smith, 2003). “Consumption during late development [ages sixteen to eighteen] may induce different effects than consumption in adulthood, and developmental changes may make the periadolescent period [ages ten to twelve] a vulnerable time for inducing persistent effects of abusable drugs” (Smith, 2003, p. 291).

Adolescence

Adolescence is a challenging time for most individuals because youth are no longer associated with being a child, but they are not quite ready to be considered an adult. Further, the timeframe of adolescence is rather imprecise. Adding to the difficulty of an acceptable definition of adolescence, is the absence of a singular threshold that would designate when adulthood is actually reached (Tarter, 2002).

For the purposes of this research paper, adolescence is generally defined as those years between twelve and eighteen, but the studies used for this research paper vary a bit in their timeframes. Adolescence is considered more of a process or series of events than it is just one event. It is a time of gradual transition from childhood into adulthood. Because of this gradual transition, it is hard to define the exact start or stop of adolescence (Spear, 2000).

A teen’s expanding brain development does not only account for their actions. Each parent needs to also be aware of psychological changes that influence the teenagers actions and behaviors (Walsh, 2004). During adolescence there is at least
four psychological changes that can take place. They are rapid physical changes, emotional changes, peer influences instead of parental influences, and the search for personal identity (Walsh, 2004). Because of these changes, adolescence is a vulnerable and critical time not to abuse substances, since the abuse can have potentially long-lasting effects.

The earlier the use of alcohol and drugs, the more likely long-term problems will develop. Individuals that begin to drink alcohol before the age of fourteen will have a 41% chance of developing dependancy on alcohol during their lifetimes (Brown & Tapert, 2004). Early use of alcohol raises the risk for a multitude of both mental health and social problems. It is believed that the rates of conduct disorder, antisocial personality disorder, nicotine dependence, and illicit drug abuse and dependence are quite high among individuals that choose to drink earlier in life, namely during adolescence (Brown & Tapert, 2004). Use of alcohol during adolescence also raises the likelihood of developing serious brain development challenges.

*Typical Adolescent Brain Development*

Healthy brain development is vital to a child’s ascension into adulthood. However, when substances are abused while the brain is still in the adolescent stages of development, there are dire consequences. Decisions made by an adolescent will influence the experiences they have, and those experiences help to direct the development of their brain (White, 2003). “Heightened plasticity of the brain during adolescence is a double-edged sword. While it provides a unique opportunity to guide brain development in healthy ways, it also appears to increase vulnerability to the disruptive effects of both acute and chronic substance abuse” (White, 2003, p. 39).
Brain organization and functioning enter a unique period of fluctuation during adolescence. As individuals make the transition from childhood to adulthood, from depending on others towards striving for independence, the changes in their behavior are dramatic. Obviously, the changes in brain function that give rise to these behaviors is also rather significant (White, 2009).

Adolescence is a challenging time for many people, with one of the biggest changes being both the body and the brain's continued growth. A person's developing brain structure sheds light into the source of adolescent behavior changes. Paul MacLean (2004), a neuroscientist, has explained the human brain as being made up of three different brains that are wired together, and that function as one “triune” brain (in Walsh, 2004). MacLean’s triune brain includes the brainstem or reptilian brain, responsible for unconscious functioning like our breathing and our heartbeat; the limbic brain, which is responsible for our emotions; and the cortex, which is responsible for conscious thought and reason.

Neurons. A person’s brain is essentially an electrical system. The neurons of our brain are specially designed to conduct electrical signals. Each neuron shares a common structure: they all have a cell body with a long cable (or axon) extending from it. Electrical impulses travel down the cable to branches (or dendrites), where they pass out of the cell through those branches, jumping across a tiny gap, and then enter into the branches of neighboring neurons (Walsh, 2004).

A central theme in early childhood brain development, from birth to adolescence, is the body’s overproduction of neuronal tissue. Infants are born with a magnitude of neurons, with far more than are present in an adults brain (White, 2009). As a child
grows and develops further, neurons continue to be produced based upon their life experiences, until they reach adolescence when “pruning” takes place.

The research has clearly shown that during adolescence the brain is highly moldable and is in a constant state of change. It is shown that there are many outside factors influencing why the brain’s synapses are being sculpted or pruned; that it is not just a natural automatic process but that the outside world also plays a part in the process. “Cells that fire together wire together, and those that do not make meaningful contacts with other cells do not survive. One key benefit of this process is that it allows a child’s brain to be sculpted by his/her interactions” (White, 2009, p. 1).

*Frontal Lobes.* The frontal lobes of the brain play a critical role in a person’s memory, their voluntary motor behavior, impulse control, a person’s decision-making abilities, their planning, and their higher order cognitive functioning. Some of the more intriguing changes that have been observed so far in neural development have occurred in the frontal lobes (White, 2009). The volumes of our frontal lobe gray matter represent a thick concentration of neuronal tissue, which increases during childhood. They do not reach peak levels until around the age of twelve, when they then begin to decline throughout adulthood (White, 2009).
At the same time as the increase in gray matter takes place, an increase in a person’s metabolism occurs in their frontal lobes. At the onset of adolescence, the metabolism begins to decrease, until it reaches normal adult levels around the ages of sixteen to eighteen. Just as important, the decline of metabolism during adolescence does not reflect a decrease in the functioning of the frontal lobes (White, 2009).

The research used in this paper illustrates that there is increased reliance on frontal lobes during adolescence, specifically in the control of one’s behavior. Running parallel to decreasing gray matter and metabolism, the neural activity that appears during the performance of certain tasks is becoming quite focused and efficient. This represents a unique change in an adolescent’s frontal lobe brain development (White, 2009).

Cortex. Typical adolescent brain development includes changes in the cortex (which is the outer layer or covering of the brain), effecting how we process sensory information, how we evaluate spacial relationships, how we process visual information, and how we form memories. “The cortex is what most of us mean when we use the word brain: it contains the gray matter that gives us conscious thought and reason; it is the seat of ‘higher’ brain functions like calculating, planning, and language” (Walsh, 2004, p. 30).

Research has suggested that similar changes are occurring elsewhere in a person’s cortex during the adolescent timeframe. Similar to the frontal lobes, a person’s gray matter volumes in their parietal lobes reach peak at around the age of eleven, and they then begin to decrease throughout adolescence. The parietal lobes are involved in
the processing of sensory information, and in the evaluating of spatial relationships (White, 2009).

A person’s gray matter volumes in their occipital lobes increase through adolescence and into their early twenties. The occipital lobes are dedicated to the processing of visual information. A person’s gray matter volume in their temporal lobes do not reach maximum developmental levels until roughly the ages of sixteen to seventeen. The temporal lobes are critical to the formation of memories (White, 2009).

Adlerian Concepts

Some of the concepts of Alfred Adler go hand-in-hand with some of the typical foundations of normal brain development, including: the goals of misbehavior, belonging and contributing, and friendship and love. Alfred Adler was born in Austria in February 1870 and lived until May of 1937. He was a practicing psychiatrist for most of those years after first beginning his professional career in general medicine.

Alfred Adler was passionate about the common person. He was very outspoken when it came to practices regarding child-rearing, school reform, and the prejudices that came about when people had conflicts (Corey, 2005). He tried to speak and write in a simple and non-technical language, so that all people could understand his beliefs and could apply his individual psychology principals (Corey, 2005).

Adler’s Individual Psychology stated the importance of the unity of a person’s personality. He felt that people could be best understood as being integrated and complete beings. All behavior is purposeful and Adler believed that we should focus more on where a person desires to go, and less on where that person has actually been. He viewed each person as being both the creator and the creation of their own
experiences and lives, and felt that we each develop a style of life that moves us toward our expressed desires and goals. Adler said that we create who we are instead of being shaped and created based upon our past experiences (Corey, 2005).

Adler has an extensive history of work in school settings. Post-World War I, he founded in excess of thirty child guidance clinics in and around Vienna, Austria. Adler believed these clinics could train parents, their children, and the teachers to live in a cooperative and democratic setting. Many people have since continued to mirror Adler’s work in schools throughout the world.

After Adler’s death in 1937, there were many other psychiatrists who continued practicing his theories, including Erich Fromm, Viktor Frankl, Abraham Maslow, Rudolf Dreikurs, and Harold Mosak. Adler’s theories are still being followed today, including his beliefs that are easily used in most school environments such as the goals of misbehavior, a person’s need to feel that they belong and can contribute, and a person’s desire for friendship and love.

Goals of Misbehavior

The theory of the four mistaken goals is based upon the notion that all people (including children, students, and adults) need to feel like they belong and have significance, so the goals of misbehavior take place when a person feels insignificant and they believe that they do not belong. Rudolf Dreikurs provided psychologists with an important discovery: he found that when children misbehave, no matter how different their personalities might have been or their backgrounds varied, that their behavior followed one of four distinct “goals.” These goals were to achieve attention, to
demonstrate their power, to seek revenge against someone, or to totally give up and become discouraged (Terner & Pew, 1978).

When a child behaves in such a way to gain undue attention, they are acting that way because they feel that they belong only when they are being noticed or are getting special attention. The recommended way to deal with this child is to avoid giving them special services, and to redirect them by giving them a task so they can gain some useful attention. When a child is determined to gain misguided power over someone else, they are acting this way because they feel that they belong only when they are the boss and in control. The recommended way to deal with this child is to not fight with them or to give in to them, and to redirect them towards gaining positive power by asking them for their assistance.

When a child is acting out in revenge towards someone, wanting to get even with them, they are acting this way because they don’t feel like they belong so they will hurt others because they feel hurt themselves. The recommended way to deal with this child is to acknowledge their hurt feelings, to avoid punishment and retaliation, and to build trust by making amends. And when a child has completely given up and is discouraged, they are acting this way because they feel like they don’t belong because they are not perfect, they are helpless and unable to succeed, and they can’t do it right anyway. The recommended way to deal with this child is to breaks all tasks down into small steps, to avoid all criticism of them, to encourage any positive attempt they make, and to set up opportunities for their success. The more a person knows about why a child is acting in a certain way, the better they can combat their actions and redirect that child accordingly.
Alfred Adler viewed alcoholism and drug use as a form of misbehavior, usually associated with avoidance or aggression. The individual tends to use the alcohol or the drug to avoid feelings of inferiority and discouragement, by masking those feelings with the substance. In this way, they are self-medicating themselves and are thereby avoiding their true feelings. Why was this person unprepared to face a certain situation? By asking this question we assume that they have progressed through life and are now encountering a problem they are trying to avoid (Stein, 2005).

Other reasons people choose to abuse substances are to either gain attention or to seek revenge against someone. In this regard, a person’s family holds a unique place in their lives. They seek to gain attention from other family members, or they are upset by those same people and they choose to abuse substances to deal with their frustrations. The substance user and their family need to be made aware of the family strife, and learn better ways in which to deal with the issues. There are better coping mechanisms to explore and teach to the family, so they can replace their old coping mechanisms of using alcohol and dependence upon other family members (Pancner & Carlson, 1991).

People tend to use substances because they believe it alleviates their feelings of inferiority and discouragement. A school counselor can try to assist the student to break those abusive habits and to focus on the actual problems themselves, freeing the person from that substance and helping them feel that they can be a useful person without the alcohol or the drug. “In the cases of addiction all failures will be attributed to the unconquerable vice, whether the failure be in social relations, in work, or in love” (Ansbacher & Ansbacher, 1964, p. 423).
Belonging and Contributing

As learned through the student’s goals of misbehavior, it becomes quite clear that the goal of any person is to indeed feel that they belong and can contribute to something; that they do have significance. Alfred Adler’s theories continued to evolve over his years of practicing, and by others after his death. One of the last enhancements in the 1950’s was made to his theory that people strive for completion and belonging. The goal is contributing and to feel like they belong. Individuals will try to find their place among a group of people. They attempt to answer the question of ‘How will I fit in while also being all that I am capable of being?’ (Oberst & Stewart, 2003). This is a common fear among most students - do I belong, and can I contribute and be successful? It is a school counselor’s task to help students feel that they belong and contribute to their school.

Similar to Adler’s theories, Abraham Maslow’s theories focused on an individual’s social embeddedness (involvement in relationships) and their need to meet the responsibilities of others. On Maslow’s pyramid of a person’s hierarchy of needs, the third level pertains to their need for belongingness and love. At their core, Maslow felt that all people want to believe they are a part of something bigger and stronger than themselves (their need for belonging). The point is that we desire to get along with others and that we want to contribute to others (Oberst & Stewart, 2003).

Friendship and Love

Obviously, it is the goal of most people and students to have meaningful friendships and to feel loved by others. Another of Alfred Adler’s theories involves the three life tasks of work, love, and friendship. Adler believed that fulfillment of these
three tasks depended on a person’s development of social interest, and their readiness to cooperate. If one task is not met, there will be difficulties in meeting the others also. Sometimes it appears that one task is completely met, without any effort being made to meet the others (Dreikurs, 1989).

No single person is totally in touch with the entire human community. An individual person is only connected to just a few people, but through those relationships that person expresses their attitude towards the whole community (Dreikurs, 1989). Once a school counselor gets to know their student body better, they will have a good understanding of a student’s friendships, or lack thereof. By getting to know a student, the school counselor is given a key look into their personality and can help them with the existing or future friendship concerns based upon the student’s personality strengths or weaknesses. As humans, we need to establish relationships and to constantly be in contact with others to satisfy our needs (Dreikurs, 1989).

Many of today’s students come from homes that are in trouble. Parents are either divorced or are separated with some children coming from single-parent homes. The need to feel loved is at the core of every person, and students need to feel loved as well. When a student is struggling with their home life and has doubts about being loved, they have the tendency to bring those feelings of doubt with them to school. Any struggle at school can be compounded by the child’s feeling of not being loved at home, and will become magnified.

A school counselor’s role can be to make each student feel like they are a part of the school community, and to feel like they belong and are valued, i.e. “loved.”

“[F]ulfillment of the love task demands a maximum of social interest, because it involves
the closest of all contacts between two human beings, tests their capacity for co-
operation to the utmost and destroys the distance in social relationships” (Dreikurs,
1989, p. 96).

Effects of Substance Abuse on Adolescent Brain Development

Now we will take a look at the effects of an adolescent choosing to abuse
substances, and how they pertain to the brain’s development. It has been made quite
clear recently that the use of alcohol has different impacts on behavior and brain
functioning for adolescents than it does for adults. This information should not be so
surprising because of the many important changes that are occurring in an adolescent’s
brain (White, 2009).

For most people, some of the more precious treasures we possess are the
images that are stored in our brain’s memory. It’s from these stored memories that we
gain our sense of personal identity, and how we feel connected to those people who are
around us (Amen, 1998). “Our experiences are enormously significant in making us
who we are. The temporal lobes, on either side of the brain behind the eyes and
underneath the temples, store the memories and images [that] help us define our sense

Learning and Memory

When an adolescent chooses to abuse substances, they are risking doing grave
damage to their cognitive abilities, including their learning capability and their memory
bank. Research has shown that alcohol abuse can lead to both learning and memory
impairments. On the left side of the brain (the dominant side for most), the temporal
lobe deals with the processing and understanding of language, memory (both
intermediate- and long-term), precise memories, retrieving words and language, the
stability of emotions, and processing (both auditory and visual) (Amen, 1998).

When an adolescent begins to abuse substances, their memory begins to
become slightly impaired. But when they continue to abuse those substances at a
larger dose, they are doing even greater damage to their memories. Accordingly, long-
term substance abuse produces significant cognitive damage. Alcohol abuse interferes
in establishing any new memories, but does not greatly interfere with how we recall
previously stored information. Rybak (1971) mentions that as the amount of alcohol
rises, the severity of impairments to memory rises as well (what Rybak called a
‘continuum of encoding deficit’) (White, 2009).

Those who chronically abuse substances are significantly decreasing their
thiamine levels. Thiamine is a B vitamin which is essential for healthy cognitive
functioning. Chronic abuse can put individuals at risk for developing Korsakoff’s
Syndrome (KS). KS is a disorder that effects how people record new memories, which
in turn can lead to someone lying excessively because they cannot recall this missing
information. The individual is still able to carry out certain complex tasks learned before
contracting KS, but they cannot learn new tasks and skills (Amen, 1998).

Substance abuse has been shown to effect both males and females, as neither
sex is immune to it. However, some studies have shown that the effects of the abuse
are different among males and females, specifically in the areas of memory and
learning. In an ongoing study of seventy adolescents followed over eight years, young
females were observed with signs of adverse cognitive effects from alcohol and drug
use, particularly in their working memories and their visuospatial functioning, while
young men had a more adverse connection between their verbal learning skills and substance abuse (Brown & Tapert, 2004).

Not only is alcohol abuse dangerous among adolescents, but studies have also shown drug use, including inhalants, is detrimental to their cognitive development. Studies performed by Tapert and Brown (1999) on young inhalant users provided strong evidence that there are cognitive deficits caused by the abuse. The studies found that attention, memory, fine motor skills, and visuospatial skills were indeed impaired when compared to those who did not abuse inhalants (Tapert & Brown, 1999).

One area of the brain that is highly involved in the formation of memories is the hippocampus. The hippocampus is a cortical structure which is located deep in our brains in the area known as the temporal lobes (White, 2009). Substance abuse has been shown to impair an adolescent’s hippocampus.

“Alcohol disrupts the functioning of the hippocampus. This has been demonstrated using a variety of methods. The effects of alcohol on hippocampal function have also been assessed in a variety of experiments examining the impact of alcohol on Long-Term Potentiation (LTP)” (White, 2009, p.7). LTP is only a model of the potential changes in hippocampal circuitry that might occur during learning (White, 2009). LTP itself is not learning, but is a model of what takes place in a person’s brain.
during learning. LTP is one way for us to weigh the impact of drugs on a person’s hippocampus and its neural plasticity.

**Balance and Motor Coordination**

When adolescents choose to abuse substances, they are also doing harm to their balance and motor coordination. For reasons that are not yet understood, the sedation effects of alcohol are not as obvious in an adolescent’s brain. We do know, however, that the awareness of the impairment of their motor coordination is delayed (Walsh, 2004). This means adolescents are not aware of the two major warning signs within their brains - tiredness (sedation) and the slurring of their words or stumbling (motor problems) - that tell them they have had enough (Walsh, 2004). Without receiving these warning signals sooner, the adolescent can become extremely intoxicated before they notice the impact of the substance abuse.

It is believed that it takes an adolescent drinker ingesting more alcohol than an adult drinker before sedation and motor coordination problems become noticeable. Adolescent drinkers have the tendency to drink more alcohol and do more damage because they lack the warning signals to tell them to stop. When the warning signals finally do show up, the physical harm has already taken place, where their reactions are impaired and their memory has been damaged (Walsh, 2004).

Research shows that there are indeed differences between adolescents and adults when it comes to sedation and motor coordination. Those differences play a vital role in the development of the adolescent. The effects of alcohol on sedation and motor coordination in humans helps to limit the amount of alcohol they can consume. The
abuser becomes intoxicated at some point during their drinking binge, and they usually cannot continue to drink, even if they wanted to do so (White, 2009).

We know that the effects of alcohol are somewhat different between adolescents and adults, but both are indeed impacted by the use. It is challenging to compare directly how alcohol affects the motor coordination of adolescents and adults. However, the evidence suggests that the effect of alcohol on motor coordination will continue to increase as human-beings age (White, 2003). It is believed that adolescents are less sensitive than adults to the effects of alcohol on their motor coordination. Motor coordination is our ability to maintain our balance, for us to walk without stumbling and falling, and our ability to drive a motor vehicle. It is well known, however, that alcohol abuse does disrupt our motor coordination (White, 2009).

Even though the adolescent abuser does not feel the effects of the abuse as soon as an adult does, it is doing more mental damage to the adolescent abuser. Even though some adolescents might be able to stay awake longer and continue to drink longer than some adults can, the adolescent is more likely than the adult to have reduced mental functioning when they consume the same amount of alcohol (White, 2003).

Adolescents who abuse alcohol are more likely to have negative impacts on their cognitive abilities than are adults. “Thus, the reduced susceptibility to alcohol-induced sedation and motor coordination, combined with an enhanced susceptibility to alcohol-induced cognitive deficits, could be a potentially very dangerous combination of effects” (White, 2009, pgs. 11-12).
Long-Term Effects

Excessive use of drugs and alcohol can be a problem for anyone, but when adolescent’s use them they can become a serious problem forever. Due to the adolescent’s window of sensitivity when their neural circuits are still being formed, the negative impact on the brain of alcohol, nicotine use, and other drugs is quite faster and more severe and it occurs with less of a warning than it does in an adult’s brain (Walsh, 2004). The negative effects of substance abuse are not just a temporary altered state of mind. Indeed, they can permanently damage a developing adolescent brain.

The adolescent brain is one that is in a constant state of flux, and those that choose to abuse substances during adolescence are indeed impacting their brain development, affecting their growth into adulthood. There is extensive evidence that explains that adolescent’s who continually abuse are impacting long-lasting deficits in their cognitive abilities, including their learning and memory (White, 2009). The effects of the abuse are not just short-term but also have potential long-term effects. One of the most common findings with drug and alcohol users is their brain scans show a significant toxic look. Basically, they are not healthy and their brains are less active and more shrunken (Amen, 1998).

Most adolescents go through a natural process of novelty seeking, sensation seeking, and risk taking as part of their progression into adulthood. However, when the use of alcohol and drugs is involved, this activity greatly increases. The evidence proves that in spite of the adolescent’s knowledge of the risks involved, they continue to engage in dangerous activities. Adolescents usually do not weigh the risks and
consequences of their behavior, instead their actions are mainly influenced by their feelings and by their social influences (Steinberg, 2005).

Drug use also leads to risky behaviors, as their effects can give a person a bloated ego. Cocaine use is both physically and psychologically dangerous to an individual, because its use affects our brain's transmitters (Walsh, 2004). Those neurotransmitters affect the reabsorption of dopamine, leading to euphoria; increases the serotonin, leading to an inflated sense of confidence; and higher levels of norepinephrine, resulting in greater energy.

Accordingly, there are studies (Bukstein, Brent, & Kaminer, 1989; Spear, 2000; and Spear, 2002) that have also shown that depression can be a long-term effect of substance abuse, from the adolescent years into adulthood. Those who are depressed will often choose to abuse substances as a form of self-medication, trying to alleviate their feelings of depression through substance use. This is a vicious cycle that needs to be broken. One way to break that cycle is to screen adolescents for depression during chemical dependancy evaluations.

Affective disorders (including depression) are one of the most studied psychiatric problems existing within those who abuse substances. Adult substance abusers with depressive symptoms are highly established. Various studies performed on adults show significant levels of depressive symptoms within the alcoholics, in addition to affective disorders from a sample of those same alcoholics (Bukstein, Brent, & Kaminer, 1989).

The early use and abuse of alcohol by adolescents has been shown in studies to be a powerful predictor of later adult abuse and dependence (Spear, 2000). The earlier
an adolescent uses and abuses alcohol, the more likely they will have addiction
problems in adulthood. “Exposure to alcohol and other drugs during adolescence may
alter critical ongoing processes of neural development occurring at that time, with long-
term effects on neurobehavioral function that increase the propensity for later abuse”
(Spear, 2000, p. 427).

The escalating use of alcohol during adolescence is quickly becoming a problem.
Compared to those individuals who initiate drug use during adulthood, adolescent users
have accelerated dependence (Spear, 2002). Newer research illustrates that chronic
drug use does indeed induce changes in the function of a person’s neurons, that can
last for weeks, for months, or even for years after their last fix (Bloom, 2007).

While the above effects of substance abuse are indeed more external, there are
internal effects too, such as potential brain damage. Many consider the use of alcohol
and substances during adolescence the equivalent of long-term brain damage. Using
substances will alter the course of brain development which is difficult to correct if the
abuse continues throughout adolescence. While adolescents who continue to abuse
alcohol may have long-lasting effects similar to brain damage, there is additional reason
to believe those effects will also produce alterations within their normal brain
development (White, 2009).

Practical Implications for School Counselors

In the delivery system model (American School Counselor Association, 2005) for
school counselors there are four main pieces: a curriculum for school guidance,
planning for individual students, services that are responsive in nature, and system
support of both teachers and administrators. Every school counselor activity that’s
included in a program should fit into one of the four areas of the delivery system model (American School Counselor Association, 2005). Not every school counselor or school counseling program adheres to this delivery system model, but most include some combination of the recommended pieces.

According to the American School Counselor Association (ASCA), part of a school counselor’s role is to focus on student needs in the areas of personal, social, and academic development, through individual counseling, group counseling, and classroom guidance. “The responsive service component responds to the direct, immediate concerns of students and includes, but is not limited to, individual and group counseling, crisis counseling, referrals and consultation with parents or guardians, teachers or other professional specialists” (American School Counselor Association, 2005, p. 40). But what then is the role of a school counselor when it comes to educating against the use of substances, and their effects on an adolescent’s brain development?

The role of the school counselor is to educate students on the effects of substance abuse by helping them to delay the risk taking behavior and by teaching them refusal skills. Additional roles of the school counselor are to locate useful interventions to use with students who are abusing substances, to assist in preventing dropping out due to that abuse, and to steer students away from committing crimes and violence because of their substance abuse.

In addition to the school counselor, the role a parent plays in a student’s education and prevention of substance abuse is also vitally important. Maintaining the authority while staying connected to the teen is really an ongoing task, where parents attempt to guide them to healthy and responsible choices (Walsh, 2004). Adolescents
do indeed care how their parents might react to their actions, including their choice to use or abuse substances, so parental influence is a major factor in preventing and delaying adolescent substance abuse (Walsh, 2004).

**Education**

Just like teachers educate students in the academic realm, school counselors educate students about the personal and social dangers of substance abuse and how that abuse effects their brain's development. We need to help adolescents learn to grow their own roots, because they are not capable adults yet. If they do not know how to anchor themselves, they will be in danger of being tossed about from whatever breezes life will bring them (Walsh, 2004).

There are indeed some challenges for school counselors in educating students against substance use and abuse, such as the differences in each student, the student’s families being different, each situation they encounter being different, and not every solution applying to every student. However, the knowledge being gained through research on adolescent abuse is vital and necessary in assisting school counselors in educating students and maintaining involvement in their lives. “[I]nsights about the adolescent brain can help [educators] avoid some of the traps that are so easy to fall into, the no-win arguments that can typify so many adult-adolescent interactions” (Walsh, 2004, p. 230).

Parent’s involvement in educating their children is just as important as a school counselor’s. Adolescents will make mistakes, and it is the role of a parent to turn those mistakes into teachable moments. Parents can help their children realize that there are consequences to their actions, and by teaching them those consequences, hopefully
they will develop better methods for making future decisions. It is the job of a parent to change a mistake into a learning opportunity, by assuring that the child deals with the necessary consequences (Walsh, 2004).

**Delay the Risk Taking**

The longer a student waits to become involved with substance use, the better their odds of not becoming addicted. As a school counselor, similar to a discussion on sexual activity, students need to hear that abstinence from using substances is usually the best option. Another way to delay the risk taking behavior is to break the many stereotypes surrounding drug and alcohol use and abuse, such as “a little drug and alcohol use won’t hurt you [as an adolescent].”

Using certain research-based curriculum will also assist school counselors, to prevent children eight to fourteen-years old from even becoming involved with drugs. An example is the Guiding Good Choices (GGC) curriculum (Bilchik, 1999) which aids parents and educators by equipping them with skills to use. The “Setting Clear Family Expectations on Drugs and Alcohol” session helps parents to identify their hopes and dreams they have for their children, and explains how the hopes and dreams become jeopardized with drug use. The session helps parents clarify their expectations when it comes to alcohol and drug use (Bilchik, 1999). The more school counselors can do to show students that substance and drug abuse does affect their brain development and is addictive, will help in delaying the use altogether.

Again, parent’s involvement in delaying the risk taking behavior is just as important as a school counselor’s. A parent’s role in delaying the risk taking behavior in their children is multi-faceted; including modeling responsible alcohol use, not using
illegal drugs themselves, having a zero tolerance policy at home, regularly talking to
their children about alcohol and drugs, and clarifying the consequences of teen use
(Walsh, 2004). When parents take the steps above, it has been shown that a child’s
use of substances is greatly tempered due to the concern of their parent’s reactions. A
parent’s involvement and their reactions are key to reducing the risk of an adolescent’s
potential substance use.

Refusal Skills

Teaching students different ways to say “no” to substances is a role for all school
counselors. There can be many challenging situations facing the student and they will
need to have a repertoire of options to use in each challenging situation. Saying “no” by
itself will usually not suffice, so helping students to develop their options is key for their
success. Project ALERT (Best Foundation for a Drug Free Tomorrow, 2005) has a
curriculum that is designed to assist in giving students refusal skills.

Project ALERT is a program that began in 1984, is school-based, is research-
based, and is designed for use with middle school students. The program focuses on
the use of alcohol, tobacco, marijuana, and inhalants. Some of the goals of the
program are to prevent adolescents from experimenting with drugs, and to help those
adolescents who are using from becoming more regular users. Project ALERT teaches
students the skills that they will need to better understand and resist pro-drug
influences, and it is a good resource for school counselors.

Interventions

There are several highly-researched and successful curriculums to use as
substance abuse interventions, including the aforementioned Project ALERT, and the
Guiding Good Choices programs. Guiding Good Choices is a program formerly known as Preparing for the Drug Free Years. The program was formed in the mid-1980’s, to assist with the increase in youth drug use. It is designed to work with K-12 students. Similar to Project ALERT, Guiding Good Choices focuses on alcohol, tobacco, and illegal drugs. The program is based on the social development model which believes that strong bonding towards positive influences will reduce the problem behaviors. This program is another good resource to use as an intervention for school counselors.

In addition, another good intervention to use as a school counselor would be Amen’s (1998) research utilizing brain scans. Specifically, Dr. Amen has developed a poster titled “Which Brain Do You Want,” which compares the brain scans of a normal brain to those of a heroin addict, a cocaine abuser, an alcoholic, and a chronic marijuana abuser. The damage caused by the substance abuse is very apparent, as each of the abusing brains is noticeably affected due to the use of the particular substance. This would be an effective poster to display in a school counselor’s office.

Also, evaluation of students for potential substance abuse would be a positive intervention, including the use of the Drug Use Screening Inventory (DUSI) (Bukstein, Brent & Kaminer, 1989). Once we identify the subtypes of risk factors, we can develop specific at risk groups for prevention, treatment, and eventual follow-up (Bukstein, Brent & Kaminer, 1989). An effort should be made to obtain a family history, as well as a chronology of the onset of symptoms. Individuals would then be placed into subgroups, with each subgroup thereby benefiting from a certain program or set of interventions (Bukstein, Brent & Kaminer, 1989). One of the more important interventions would be screening adolescents for depression during the chemical dependency evaluation.
The Drug Use Screening Inventory (DUSI) would be a vital tool to use as an intervention, by allowing a school counselor to better understand each student and their struggles. The DUSI was created to document the severity of disturbances of common factors that are associated with alcohol, tobacco, and other drug abuse, along with substance use disorders (Tarter, 2002). This would be an efficient method to use as a school counselor in detecting those youth who are at high risk for substance abuse, thereby requiring an intervention.

*Dropout*

School counselors can assist in preventing students from dropping out due to substance abuse and helping steer students away from committing crimes and violence because of substance abuse. Creating a school culture that helps the individual student feel like they are part of a community where their wants and needs are considered will help each student feel like they are part of the bigger picture of success for all students and will deter most from dropping out. “To design programs effective in keeping youth in schools and, once there, in promoting the positive developments, schools can provide: knowledge, abilities and skills, self-esteem, social relationships, and the opportunity to contribute productively to self, family, community, and society” (Lerner & Galambos, 1998, p. 426).

*Crime and Violence*

The research has shown that adolescents who abuse substances are also likely to commit crime and violent acts of aggression. People have a fear of territorial battles, and violence and shootings caused by drug trafficking. They point to the random street violence and to the younger ages of those who commit increasingly violent crimes.
(Lerner & Galambos, 1998). A school counselor does have a vested interest in their students, so it is common sense that they should do whatever is required to create a positive environment for their students, hopefully lowering the need for students to commit crime and to use violence as an answer to their problems. All people [including school counselors] who have a stake in a youth’s positive development, should be pooling their resources to protect that youth, and in turn to promote some positive outcomes in their life (Lerner & Galambos, 1998).

By educating students through classroom guidance that substance abuse can lead to crime and violence, school counselors can help to reduce the amount of crimes being committed. In addition to classroom guidance, school counselors need to talk with students who are struggling with substance abuse to inform them of potential violence that their abuse might cause, alleviating some of the crime and violence.

“Joe”

Once Joe received personal guidance from his school counselor and classroom instruction on the effects of substance abuse, he is now a more healthy teenager. He greatly reduced the amount of his drinking and stopped experimenting with marijuana. Joe has become more confident in his own abilities and strengths, due in part to meeting with his school counselor on a weekly basis. He now feels like he belongs as part of his school’s community, and that he does indeed contribute to his classmates’ well-being. With Joe’s increased confidence, his grades improved and he even asked out the girl that he likes (Sally), and they are beginning to date.
Methodology

The methodology of empirical studies is an important determinant of their validity. If the research done is both accurate and effective, the empirical study can be considered useful. This masters project research paper will review and critique some of the chosen empirical studies.

All of the articles used in this research paper studied adolescents who ranged in age from fourteen to eighteen (eighth grade through twelfth grade), while most of the studies also included comparisons of individuals in their early to mid-twenties. Even though most of the studies did include individuals in their twenties who were outside of the adolescent age range (ages twelve to eighteen), they were still beneficial in determining the long-term effects of substance abuse, by shedding light on their struggles into and throughout adulthood.

Most of the articles used for this research paper indicate that there is some factor behind why an adolescent chooses to abuse substances, such as parental substance abuse and peer pressure. All of the studies used illustrate that there are indeed significant effects to those choices to abuse, such as impacting learning and memory, balance and motor coordination, and several long-term effects.

The articles used included studies with both males and females, with study sizes ranging from approximately 12 individuals to 30,000. Some of the study sizes were too small (12 individuals and 15 individuals) to have been considered generalizable findings. Studies in adolescent substance abuse should be performed with student size ranges in the thousands, with not less than 100 individuals being involved.
The types of studies varied from assessments and analysis, surveys and interviews, and longitudinal and cross-sectional studies. Some of the tests used in the studies include The Customary Drinking and Drug Use Record (CDDUR), the Monetary Incentive Delay (MID) task, the Neuropsychological Test, and test batteries such as the Wechsler Intelligence Scale for Children-Revised (WISC-R), the Wechsler Memory Scale Visual Reproduction subtest (WMS-VR), and the California Verbal Learning Test-Children’s Version (CVLT-C). The types of scans that were used in the studies included MRIs of the brain, noninvasive neuroimaging brain scans, and SPECT (single photon emission computed tomography).

Recommendations for Future Research

Additional research is suggested in several areas, including more studies with adolescent subjects, investigation toward creating better diagnostic systems for substance abuse, and studies that look at potential environmental factors in order to make a stronger case for educating students on the effects of substance abuse on adolescent brain development. There are quite a few existing studies that used adult brain functioning data, but more research with adolescents is critical. “The rather piecemeal observations of the adolescent brain to date need to be integrated within a broader characterization of adolescent brain function” (Spear, 2000, p. 447).

Current diagnostic systems that are used to gauge an adolescent’s substance abuse need to be improved upon in order to gather updated information for use in studies. The need for establishing a valid system of classification should be a vital part of further studies (Bukstein, Brent, & Kaminer, 1989). Those studies should then be using the same diagnostic systems to further validate their findings.
The possible role that a person’s environment plays in their struggles with substance abuse also needs to be included in studies. For example, it is believed that a person’s primary caregiver has some influence over their substance abuse in later years. In spite of the lack of data, it is believed that a person who self-regulates is indeed influenced by both their environment and their genetics (Tarter, 2002).

Conclusion

The importance of educating children against the abuse of substances was demonstrated in this Master’s Project in Schooling Counseling research paper. It was also shown that substance abuse has a substantial impact on an adolescent’s brain development, particularly certain areas of the brain. Further, this paper identified the consequences to the adolescent’s choice to abuse substances. It is clear that there is an importance in educating both middle and high school students in order to prevent substance abuse. This is clear that part of the responsibility of a school counselor is to educate against and aid in preventing abuse of those substances.

One of the key findings identified in this research paper is that an adolescent’s brain is constantly developing, so any substance abuse has a major short- and long-term impact on the brain. It is also key to educate students at a young age (both middle school and high school) about the effects of substance abuse, because the earlier they become aware of the effects the more likely it will be to prevent abuse. Delaying the risk taking behavior is also key, as the longer a person waits to use substances the more likely they will not have issues with them. Educators and parents alike need to teach the students refusal skills, and prepare them with more than a “no” to use against those who want them to try substances. Lastly, parental involvement is vital. It is
important for parents to be involved in all aspects of their children’s lives, including their education against substance abuse, and the consequences of that abuse.
References


