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The relationship between adverse childhood experiences (ACES) and substance use: A review of the literature

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The relationship between adverse childhood experiences (ACEs) and substance use: A review of the literature

Abstract

Adverse childhood experiences (ACEs) are potentially traumatic events that happen in a child's life. These experiences can cause multiple negative outcomes for the child even into their adult life. In the United States, roughly one in ten children have experienced three or more ACEs, and nearly half of all children in the United States have experienced at least one ACE. These problems can be physical, mental, personal and social. Of these outcomes, the individual could develop alcoholism or addiction to substances. Substance abuse is the overindulgence or dependence on substances that are addictive, mainly drugs or alcohol. The relevance substance abuse has to ACEs is that a child is more likely to abuse substances if they have even one of these experiences (Dube et al., 2002). They are even more likely to develop substance abuse if their parents abused substances. This extended literature review will explain the correlation between ACEs and substance abuse. In doing so, there will be a better understanding of how many people in the United States have at least one of these experiences, how they can affect the individual and how to heal after the experience. Social workers can be an important part of both prevention and/or care for those who are suffering from ACEs.

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**THE RELATIONSHIP BETWEEN ADVERSE CHILDHOOD EXPERIENCES (ACES)
AND SUBSTANCE USE: A REVIEW OF THE LITERATURE**

By:

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TABLE OF CONTENTS

Abstract.....	3
Introduction.....	4
Adverse Childhood Experiences (ACEs).....	5
Defining ACEs.....	5
Effects.....	7
The ACE Questionnaire.....	10
Statistics.....	13
Alcoholism.....	16
Define Alcoholism.....	16
Relation to ACEs.....	18
Statistics.....	20
Drug Abuse.....	22
Substances Background.....	22
Relation to ACEs.....	26
Statistics.....	28
Treatment of ACEs.....	32
Cognitive Behavioral Therapy (CBT).....	36
Trauma Informed Care (TIC).....	37
Treatment of Substance Abuse from ACEs.....	40
Conclusion.....	45
References.....	47

Abstract

Adverse childhood experiences (ACEs) are potentially traumatic events that happen in a child's life. These experiences can cause multiple negative outcomes for the child even into their adult life. In the United States, roughly one in ten children have experienced three or more ACEs, and nearly half of all children in the United States have experienced at least one ACE. These problems can be physical, mental, personal and social. Of these outcomes, the individual could develop alcoholism or addiction to substances. Substance abuse is the overindulgence or dependence on substances that are addictive, mainly drugs or alcohol. The relevance substance abuse has to ACEs is that a child is more likely to abuse substances if they have even one of these experiences (Dube et al., 2002). They are even more likely to develop substance abuse if their parents abused substances. This extended literature review will explain the correlation between ACEs and substance abuse. In doing so, there will be a better understanding of how many people in the United States have at least one of these experiences, how they can affect the individual and how to heal after the experience. Social workers can be an important part of both prevention and/or care for those who are suffering from ACEs.

Keyword: ACEs, Substance Abuse, Alcoholism

Introduction

ACEs are potentially traumatic events that happen in a child's life. These experiences can cause multiple negative outcomes for the child even into their adult life. Of these outcomes, individuals are at greater risk of developing a substance abuse disorder. Substance abuse is the overindulgence or dependence on substances that are addictive, mainly drugs or alcohol. The relevance substance abuse has to ACEs is that a child is more likely to abuse substances if they have even one of these experiences. They are even more likely to develop substance abuse if their parents abused substances as well.

This literature reviewed will explore ACEs, the long term impact of experiencing one or more ACEs. Additionally, this thesis will explore the correlation between ACEs and developing substance abuse, as well as treating the substance use disorder. Social workers can intervene and provide supportive services to individuals who have experienced ACEs and subsequently developed a substance use disorder. The vital role of social workers will be explored.

Adverse Childhood Experiences

Defining ACEs

ACEs are a phenomenon distinct from single forms of childhood abuse because they capture the cumulative effect of experiencing multiple adversities and have been likened to the germ theory as the root cause of many noninfectious diseases (Bryan, 2019). ACEs may lead to neural changes, such as memory, attention allocation, perceptual cognitive processing, and cortical development impairment. In the past few years, research on child well-being has looked more closely on a few childhood experiences that seemed to be particularly damaging to the development of children (Finkelhor, 2020). ACEs are a subgroup of conditions that are experienced in childhood. These conditions have been consistently associated with long-term negative effects. These negative effects can be both behavioral issues that range from substance abuse to depression, and physical health issues such as heart disease.

ACEs are generally considered developmental experiences that are not typical in child development and often overwhelm the normal coping resources of a typical child. They generally include various forms of violence and threat exposure including physical and sexual abuse, bullying and domestic violence, as well as various forms of deprivation and loss exposure such as parental death, incapacitation, and absence. (Finkelhor, 2020). There is medical research that has been conducted on ACEs that reveals a strong relationship between the extent of childhood adversity, risky adult health behaviors, and the main causes of death in the United States (Larkin et al., 2014).

A large health maintenance organization known as Kaiser Permanente and the Centers for Disease Control (CDC) (Forster et al., 2017) came together in 1994 on a large-scale epidemiologic study. This study was of the relationship between ACEs and social well-being

throughout the life of a child. Research that has been done in the past couple of years has been developed to figure out whether childhood events had long-term health consequences, these are known as the ACE studies (Larkin et al., 2014). These studies are important implications for Healthy People 2020 Policy planning, as well as four key social work roles in disease prevention (Forster et al., 2017).

The ACE study (Bryan, 2019) demonstrated a dose-response relationship that was between ACEs and the health risk behaviors. These health risks behaviors range from substance abuse, physical inactivity, high risk sexual behaviors and the leading causes of death in the United States. The dose-response relationship between ACEs and chronic disease is complex, with many variables affecting gene expression, inflammation, and disease progression; therefore, given the current rigor of research available, causation can be asserted (Bryan, 2019). These causes include ischemic heart disease, diabetes, all forms of cancer, stroke, chronic obstructive pulmonary disease and suicide. Even further research has demonstrated that exposure to trauma as a child alters brain development (Bryan, 2019). This affects the immune and endocrine system, which alters the genetic expression. The ACE score can also be used to see if there is a strong relationship between the risk of drug initiation to drug addiction and parental use. ACEs which often include childhood exposure to maltreatment and household dysfunction may confer risk for a wide range of behavioral health problems, including substance use (Shin et al., 2017). ACEs may lead to neural changes, such as memory, attention allocation, perceptual cognitive processing, and cortical development impairment. Negative childhood experiences are associated with impaired cognitive, emotional, and social development, including maladaptive coping mechanisms that may include substance misuse (Stein et al., 2017).

Effects

Having exposure to different types of ACEs is a common phenomenon. More detailed exploration of patterns of ACEs exposure based on multiple types of traumatic events may constitute an important advance in understanding the widespread ACEs exposure among young adults who are involved in substance use (Shin et al., 2017). It was found that the greater number of ACEs that a child experienced, whether it be abuse, neglect, or household dysfunction, have been correlated with multiple physical illnesses in adulthood. These physical illnesses range from obesity, diabetes, ischemic heart disease and frequent headaches. The ACE score is also associated with psychiatric problems (Stein et al., 2017). These include depressive disorders, psychosis and suicidality. ACE scores are also associated with smoking, alcohol abuse and illicit drug use. Parental substance use and mental health problems may contribute to the risk of children's drug use through heritability through direct modeling of parental behaviors (Stein et al., 2017). An example of these behaviors is using drugs to cope with negative affect states. Another form of heritability comes from exacerbating environmental stressors. Abuse, neglect, poverty, parental criminal justice involvement are forms of these stressors. The effects of these heritability traits are to drain critical resources, disrupt social learning and inhibit skills acquisition in children. As the ACE score increases, the likely hood of smoking, sexual risk behaviors, teenage pregnancy, obesity, and all types of cancers, substance abuse, hallucinations, depression, and suicide attempts (Larkin et al., 2014).

The physical effect that ACEs can have on the developing brain is just as traumatizing as the emotional impact. ACE researchers worked with neuroscientists to integrate data on the neurobiological effects of childhood trauma with the epidemiologic data from the ACE study (Bryan, 2019). It was found that ACEs are the connection between dissimilar but comorbid

social and health problems. This study acknowledged the artificial split that is between mind and body disorders. ACEs also have a strong effect on the physically developing brain. They have an effect on how neurons are wired together based on lived experiences. Some of these effects can cause children growing up in toxically stressful situations to have brains that function in survival mode (Bryan, 2019). Documented brain changes include reduced global volume; alterations in limbic circuitry, particularly the amygdala and hippocampus, responsible for emotion; and alterations in prefrontal cortex development, responsible for attention, executive function, and self-regulation (Bryan, 2019).

There was a study done with Kaiser Permanente (Larkin et al., 2014) patients that visited the health clinic that were self-selected. Each of these participants were seeking comprehensive medical evaluation for preventive purposes. Study participation was offered in two waves to 26,000 consecutive adult members undergoing medical examination. Over 17,000 participants agreed to answer an additional questionnaire. This questionnaire was looking for information from their childhood in ten categories of emotional abuse, physical abuse, neglect, and lack of support/closeness within the family, sexual abuse, loss of a parent, witnessing domestic violence, substance abuse, mental illness, or incarceration of a family member (Larkin et al., 2014). The participants must have gone through these experiences within the first eighteen years of life. An ACE Score was created on a scale of 0–10, based on the number of categories (not incidents) experienced. These categories are interrelated and linked to health risk behaviors and health problems (Larkin et al., 2014). There was a statement recently published by the American Heart Association (Bryan, 2019) showing there is a strong association between ACE exposure and cardio metabolic outcomes. These include heart disease, hypertension, obesity and type II diabetes. As the number of ACEs increases the risk for chronic obstructive pulmonary disease

increases from smoking. This suggests that childhood mistreatment was an independent risk factor. ACEs exposure also increases the risk of type II diabetes by 32% compared to those with no ACEs.

Suicide remains one of the overall leading causes of death in the US and the second leading cause of death in adolescents (Bryan, 2019). A dose-response relationship exists between the number of ACEs and the likelihood of depression and suicide, such that a patient with an ACEs score of 6 or more is 24-times more likely to attempt suicide than a patient with an ACEs score of 0. The risk for depression nearly triples with ACEs exposure, as does the risk of drug and alcohol use. A recent study by Bryan (2019) replicated findings from earlier studies, again highlighting the importance of HCP recognition of the role exposure to ACEs plays in overall health and well-being (Bryan, 2019). Having an ACE score of four or more increases the rate of many things. Individuals with four or more ACEs are more than two times more likely to smoke, more than seven times more likely to have alcoholism, more than four times more likely to have substance abuse, more than eleven times more likely to have intravenous illicit substance abuse, more than one time more likely to have severe obesity, and are three times more likely to have sexual intercourse with fifty or more people. With a clear dose-response relationship between the number of ACEs and the adoption of these high-risk behaviors. Having an ACE score of six or above puts a higher risk on individuals of dying early. Compared to individuals who have no ACE score, individuals who have six or more ACEs have a higher risk of dying twenty years earlier. Individuals who have these ACEs are more likely to get diseases that are commonly diagnosed in a primary care setting. The findings have concluded that the impact of ACEs on adult health status is strong and cumulative (Bryan, 2019).

According to a study that was done on cumulative frequency scores and looked at the links between ACEs and substance use later in life shows that different patterns of exposure to ACEs may be associated with specific substance use outcomes (Shin et al., 2017). A Cumulative frequency score is a tally of how many times a specific score occurs, and is then compared to the total number of score occurrences. The cumulative-frequency-score approach was able to find that there is a dose-response between the frequency of different ACEs types and substance use. The number of different types of ACEs that individuals are exposed to was associated with a graded increase in the risk to develop substance use. It was also found that younger individuals with a history of many ACEs were more likely to report alcohol related problems and psychological symptoms. These young adults whose exposures were mainly family and community based adversities or emotional. The study found that different exposure patterns to ACEs may be associated with specific substance use outcomes (Shin et al., 2017).

The ACE Questionnaire

A questionnaire was created in order to assess how many ACEs an individual had experienced within the first eighteen years of their life. The childhood experience questionnaire was developed to determine the long term effects that childhood experiences can have on medical problems and examine a wide array of childhood adversity. The Kaiser Permanente Appraisal Clinic, located in San Diego, California, worked with the US Center for Disease Control and Prevention to create the original ACE study (Forster et al., 2017). The original idea was to focus on the apparent inability of patients to sustain weight loss programs. Over time, the majority of the ACE studies that have been done have used the ten ACEs types from the original questionnaire. These types include five types of child abuse and neglect and five types of household dysfunction (e.g., mental illness, incarcerated family members) (Shin et al., 2017).

Kaiser Permanente reviewed the Conflicts Tactics Scale (Spratt et al., 2019) used in the research of family violence which combines the five indicators of child abuse: psychological, physical, sexual, and physical and emotional neglect. They used this information to develop the ACE Questionnaire. This questionnaire consisted of ten questions that the answers were dichotomous yes or no answers. Some examples of these questions are “Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?” and “Did you often feel that: You didn’t have enough to eat, had to wear dirty clothes, and had no one to protect you? Or your parents were too drunk or high to take care of you or take you to the doctor if you needed it?” and “Were any of your parents or other adult caregivers: Often pushed, grabbed, slapped, or had something thrown at them? Or sometimes or often kicked, bitten, hit with a fist, or hit with something hard? Or ever repeatedly hit over at least a few minutes or threatened with a gun or knife?” When an individual answers yes to any of the questions, they mark one point. At the end of the questionnaire, add up all the ‘Yes’ answers (points) and the individual’s ACEs score is calculated.

The ACEs study and the majority of the studies that have come from it do focus solely on the negative experiences of childhood (Leitch, 2017). The ACE study also focuses on negative events that were limited to the types of ACEs that it included in the questions. The consequence of paying attention to only certain types of ACEs in a child’s life and not looking at the resilience and protective factors will only show a limited view of the client. It will not give a full understanding of the client and what they have been through. The consequence of such limited information is that it can shape intakes, service delivery and research (Leitch, 2017).

The ACE Questionnaire can also lead to some ethical issues. When it comes to collecting data from anyone, it is essential to pay close attention to what could happen to the client. There is

the potential for re-traumatization of the client while gathering information. According to the Substance Abuse and Mental Health Services Administration (SAMHSA) (Leitch, 2017), there are guidelines that were created for avoiding the re-traumatization of the clients. The Institutional Review Board (IRB) is tasked with considering the potential for re-traumatization when working with emotionally charged questions are used in a mail or telephone survey. These are potentially ethical issues can make it challenging for social workers to have these questions answered by clients. These ten questions could potentially not give enough information about the client to get a strong understanding of who the client is. Overall, this questionnaire, when used with other methods, is a great way to understand how many ACEs an individual has and how best to work through them. Within social work there has been significant interest in ACEs in the US (Larkin *et al.* 2014) argue that the biopsychosocial model underpinning ACE research reflects the broad conceptual perspective of social work and that the common childhood antecedents of poor life outcomes are well understood by social workers (Spratt *et al.*, 2019). By considering the inter-relation and accumulation of risk categories and the impact on overall health, the ACE Study enhances social science research. There is a long history of research, in social work, on adverse effects of different kinds of child abuse and maltreatment, which bolster ACE Studies and findings (Larkin *et al.*, 2014). The ACE Study connects social work activities to national health policy through social work's evident role in health promotion and disease prevention. The following steps are recommended to social workers and policymakers to enhance national health outcomes (Larkin *et al.*, 2014). These steps are “1) Utilize the biopsychosocial perspective to appreciate the interactions of human development, cognitive appraisal, and physiological processes within the context of culture and systems, integrating medical ACE research with social science research; 2) Utilize ACE Study findings to point to the need for ACE prevention

and intervention in reaching Healthy People 2020 goals; 3) Draw upon social science research to inform comprehensive ACE response strategies that mobilize protective factors and resilience, highlighting effective family support and culturally relevant parenting services; 4) Integrate services and develop post-disciplinary team ACE responses to streamline and increase service access (especially among disadvantaged communities), evaluating the policies and programs coordinating these activities; 5) Support local communities in promoting culturally competent parenting skills; 6) Mobilize the media to raise awareness of ACEs, positive parenting, and parenting supports on a population-wide basis; 7) Pursue ACE-informed clinical intervention, community development, prevention, and services research; and 8) Partner with economists to analyze cost- savings associated with ACE-informed social work prevention and intervention.” (Larkin et al., 2014).

Statistics

According to the National Survey of Children’s Exposure to Violence (NatSCEV) (Shin et al., 2017), 60% of children in the United States have reported having been exposed to at least one ACE in the past year. There have been many other studies that have also found that early exposure to ACEs increases an individual’s risk for substance use (Shin et al., 2017). There are many individuals that have been exposed to at least one ACE in their first eighteen years of life. General population studies have found that more than 60% of youths have experienced a trauma in their lifetime. It was also found that 37% of this population had experienced more than one trauma (Leza et al., 2021). Looking deeper into this study of the general population, 214,157 adults in the United States found that more than half, 61.55%, of the respondents experienced at least one ACE. Looking at other countries, there have been many studies that have been relatively the same as the United States. Other countries’ ACE studies have found that

individuals who have at least one ACE is between 46.2% and 66.2% just in the adult population. The prevalence of ACEs in adolescents is much higher. Adolescents who have at least one ACE ranges from 75% to 85%. These percentages have shown that there is a high prevalence of ACEs among both the adult and adolescent populations across all different countries and cultures. ACEs are important to look at and examine, not only because of the high prevalence, but because these experiences have an impact on the development and health of those who have experienced them (Leza et al., 2021).

A study done by the CDC and Kaiser Permanente (Bryan, 2019) looked closer at ACEs. In this study, it was found that traumatic events during childhood, ACEs, were common among different individuals with different backgrounds. This study found that over half, 64%, of the original 17,337 participants were mostly white, mostly college educated and had at least one ACE. They then found that 40% of the participants of this population had two ACEs, and that 12.5% of this population had at least four ACEs. This study found these percentages based on the original ten categories of ACEs. These are having experienced physical, emotional, and sexual abuse; physical and emotional neglect; witnessing domestic violence, having a family member affected by mental illness, substance abuse, or incarceration, and losing a parent to separation or divorce.

The Chicago Longitudinal Study by Mersky & Reynolds (2013), examined the development of a cohort of racial and ethnic minority children who were born into underprivileged, urban-dwelling families. The study consisted of 1,142 participants between twenty-two and twenty-four years of age. The study found that four out of five (79.5%) participants reported having experienced at least one ACE, and a little less than half (48.9%) experienced multiple ACEs. The study also concluded that their ACE exposure was higher among men than women.

The findings of this study indicated that 25.2% of women were not exposed to an ACE, compared to the 14.8% of men that were not exposed. Around 5% of women participants have been exposed to five or more ACEs, while around 12.3% of male participants were exposed to five or more ACEs. Overall, 20.5% of all the participants had no exposure to an ACE, 31.6% of all the participants have been exposed to at least one ACE, 20.8% of all the participants have experienced at least two ACEs, 18.8% of all the participants had exposure to three or four ACEs, and 8.3% of all participants have been exposed to five or more ACEs.

According to the CDC's web-based Injury Statistics Query and Reporting System (WISQARS) database (Finkelhor, 2020), there are significant findings on different ACE exposure. In this study ranging from 2005 to 2018, the amount of unintentional drug poisoning deaths had increased 126%. The amount of non-fatal poisonings also increased, it went up by 174%. Both of these findings show the growing problem of drug abuse among the adult population. It was also noted that these increases were likely the result of the increased exposure to both impaired parenting and traumatic overdose episodes. There were similar results found when it came to alcohol related deaths. From 2000 to 2016, alcohol related deaths increased by around 25%. Looking a little closer, the bulk of this increase happened between 2008 and 2016, among those between the ages of twenty-five and thirty-five years (Finkelhor, 2020). This shows there is a worsening of alcohol abuse in the 21st century in those who are a part of the parent-aged population. A study done to examine the associations between ACEs and substance use and psychological outcomes used a series of linear and logistic regression models (Shin et al., 2017). The sample or participants was 14% who reported being current cigarette users. There was an average of 9.7% alcohol related problems (Substance Disorder = 10.8) were reported. This was reported with a major difference between male, which was 11.6%, and females, which

was 7.8%. According to this study, the mean of lifetime drug dependence symptoms was 1.6% (range 0-7). Regression models were estimated by entering the class variable and covariates simultaneously for each outcome (Shin et al., 2017). ACEs have an effect on emotional regulation. This causes an inability to modulate distressing emotions in a healthy and adaptive way. This means that substance use could be used as a way to try and cope with these and alleviate these emotions. This could explain the relationship between ACEs and substance use disorders. This, in turn, means that having a history of ACEs may increase the risk of developing substance use disorders (Leza et al., 2021). Alcoholism and drug abuse are two forms of substance use that correlate with ACEs. Either alcoholism or drug abuse could be the cause of an ACE or the result of an ACE.

Alcoholism

Define Alcoholism

Alcohol is one of the more common addictive substances. Alcohol and its use have been a part of American culture dating back nearly 300 years to the emigration of Europeans to North America (Dube et al., 2006). Alcoholism has a malevolent impact on the families of the user. This impact was the motivation that was needed in order to create the 18th amendment of the United States Constitution. This amendment, known as Prohibition, was created in order to reduce alcohol consumption, morbidity and mortality that was present in the beginning of the twentieth century (Finkelhor, 2020). After the Prohibition era, there was a spike in the amount of alcohol consumption along with its consequences. This spike then began to fall again around the start of the 1970s. This was indicated by the cirrhosis deaths that were assessed from death certificates and by the amount of people with liver disease caused by alcohol consumption that was gathered from hospital admission data (Finkelhor, 2020).

Alcohol dependence (alcoholism) is a complex disorder attributed to the interaction of genetic and environmental factors that form a collage of “disease” predisposition, which is not identical for every alcohol-dependent individual (Hines et al., 2022). As a psychoactive compound, it can elicit a spectrum of behavioral effects. This included gregariousness, aggression, loss of executive function and cognitive deficits (Hines et al., 2022). All complex diseases can be thought of as clinical outcomes, as can alcoholism. These clinical outcomes can be generated by a combination of multiple risk factors. The population dependent on alcohol represents the spectrum of individuals who are displaying different symptoms and severity of disease. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) (Hines et al., 2022) the craving of alcohol can be defined as a strong desire to consume alcohol. It has been associated with the loss of control over drinking. This is part of the alcohol dependence syndrome. There has been a lot of controversy over what the definition should be for alcoholism and how to use the term. The end phenotype of craving is a construct that is central to alcohol. It is also often a target of the intervention effort. One of the more damaging effects of alcoholism is not what is felt by the alcohol consumer, but the ones around them. A lot of the time there are unintended and unrecognized consequences that take a toll on their families, but more importantly their children. Alcohol consumption has been identified as an important risk factor for illness, disability and mortality (Rehm, 2011). Due to a comparative risk assessment done by the World Health Organization (WHO) (Rehm, 2011), it was determined that the impact of alcohol consumption on a global burden of disease and injury. In turn, alcohol consumption surpasses risk factors such as unsafe water and sanitation, hyper-tension, high cholesterol or tobacco use. There are more than thirty conditions that are listed in the WHO International Classification of Disease, 10th Edition (Rehm, 2011). Included in these conditions is the term

alcohol. This indicates that alcohol consumption is a necessary cause underlying these conditions. The most important disease of these conditions in this group are alcohol use disorders (AUDs). This does include alcohol dependence and harmful use or alcohol abuse. According to the WHO, AUDs are less fatal than other chronic disease conditions, but are linked to considerable disability (Rehm, 2011). There are many diseases that are entirely or partly caused by alcohol consumption. Some of the most common of these diseases are infectious diseases, diabetes, unintentional and intentional, cardiovascular disease, liver and pancreas diseases, different types of cancer, and neuropsychiatric diseases (such as alcohol use disorders) (Rehm, 2011).

Relation to ACEs

Alcoholism is believed to have multiple factors that play into it. It has been found that children who grow up with parents that abuse alcohol have both a familiarity and experiential factor that does increase their risk to abuse alcohol later in their lives. Multiple studies have shown that there is a relationship between a child being exposed to alcohol abuse and the risk of that child using and abusing alcohol in their adult life. Being a child with an alcoholic parent, more times than not, means enduring the stress and trauma of a dysfunctional or chaotic home life (Dube et al., 2002). These stressors, along with witnessing domestic violence and exposure to childhood abuse, often lead to a negative impact that will have lifelong effects.

Two of the questions from the original ACE questionnaire have to do with whether the individual had experienced some form of substance use in the first eighteen years of their life. These questions asked whether the individual lived with a problem drinker or alcoholic or with anyone who used street drugs during their childhood. Growing up with at least one alcoholic parent was found to cause a higher risk of heavy drinking, self-reported alcohol problems,

self-reported alcoholism, and marrying an alcoholic in adulthood (Dube et al., 2002). These risks were higher among individuals in adulthood who have reported having at least one ACE than those who have reported having no ACEs. This also showed that there was a strong relationship between having an ACE score and each adulthood outcome. This concludes that, among individuals who have experienced no ACEs, the risk of adult alcohol outcomes is much lower than those who grew up with at least one alcoholic parent

Comparing adults who have been exposed to ACEs and those who have not, those who have at least four ACEs are twice as likely to report heavy drinking and are three times as likely to report having alcohol problems in adulthood (Dube et al., 2002). According to a study done (Dube et al., 2002), ACEs showed a strong graded relationship to each of the measures of alcohol misuse and abuse for persons either with or without parental history of alcoholism. This study was able to show that ACEs do have an effect on the risk of alcohol misuse that is independent of alcoholism. In other words, the effect that ACEs have on later-in-life AUDs are strong, but it does not have to be because their parents had an alcohol use disorder. However, it was found that the increase of prevalence of AUDs was always higher among individuals who had a parental history of alcoholism. It was also found that ACEs interact with heritable factors to greatly increase the likelihood of alcohol abuse or marriage to an alcoholic as an adult (Dube et al., 2002). The risk of alcohol use disorders, psychopathology and other medical and social problems have been reported to be higher among adults who grew up with alcoholics in the home than other adults who did not. Children who are growing up with families with alcohol abusing parents are far more likely than others to have an unpredictable home life and will have to carry the burden of secrecy (Dube et al., 2002). This burden is a result of the child's attempt to hide the alcohol abuse from others.

The time frame of these consequences is sooner rather than later. Having an ACE score can increase the likelihood of an individual starting to consume alcohol by the early age of fourteen years old (Dube et al., 2006). This was found in a graded manner for each of four cohorts dating back to 1900. Meaning, the effects of ACEs on the initiation of alcohol use early in adolescence appear to be a persistent rather than transient or intermittent influence throughout successive generations (Dube et al., 2006). The relationship between the initiation of alcohol use and late adolescence is a little bit different than the relationship with young adolescence. Late adolescence, between eighteen and twenty years of age, is less likely to initiate in alcohol use than young adolescence. There are many reasons for this to happen (Dube et al., 2006). One of the reasons is that during the early point in an individual's life, they are around the family environment. On top of this, individuals who are in their late adolescence years are separated more from the family environment that has been affected by ACEs and decreases the likelihood of alcohol initiation at this point in the individual's life. Another reason for this to happen is that as an individual's age increases from adolescent to adulthood, the use of alcohol becomes more of a normal phenomenon (Dube et al., 2006). This has an effect on the weaker connection between the ACEs and alcohol use that would be expected during late adolescence and adulthood. With this in mind, the data still suggests that ACEs have a strong influence on the initiation of alcohol use throughout adolescence.

Statistics

According to a survey done by the National Longitudinal Alcohol Epidemiologic Survey (Dube et al., 2006), it was found that less than 50% of people born before World War II, between the years 1894 and 1937, had experienced alcohol use in early adulthood. Early adulthood is seen between the ages of 20 to 24 years. The amount of people who experienced alcohol use in early

adulthood increased to 75% during the Vietnam War era, which was between the years 1968 and 1974. Between the years of 1973 and 1997 cirrhosis deaths went down 75%. During this time, alcohol consumption also went down. During the years 2000 and 2016, alcohol related deaths went up by around 25% (Finkelhor, 2020). This was among individuals aged between 25 to 35 years. This provides evidence that there was a worsening amount of alcohol abuse among parent-aged individuals in the twenty-first century. There is evidence to estimate that about 25% of the children in the United States are exposed to alcohol abuse or dependence in their family (Anda et al., 2002). During the 1980s there were around twenty-one million adults in the United States that grew up with at least one alcoholic parent. Around 1977, the Adult Children of Alcoholics movement was started (Anda et al., 2002). This movement started to address the issue of the physical health and social problems children have faced from exposure to an alcoholic parent. Substance abuse of all kinds pose a significant threat to public health in the United States. The CDC estimate that excessive alcohol use was directly responsible for 88,000 deaths and cost the United States \$223.5 billion just in 2006 alone (LeTendre & Reed, 2017). According to the CDC, excessive drinking was responsible for one in ten deaths. This averages around 2.5 million years of potential life lost in the four year span from 2006 to 2010

All of the categories of ACEs can increase the likelihood of alcohol use during early adolescence. In particular, for each of the ten categories of ACEs there was a two- to three- fold increased likelihood of initiating alcohol use by the age of fourteen (Dube et al., 2006). Another finding that shows that exposure to ACEs can increase the likelihood of alcohol use was found by attributable risk fractions. It was found that early initiation use of alcohol was 55% among ever-drinkers that were exposed to at least one ACE. These findings also show that ACEs in the childhood family environment are strongly associated with the initiation of alcohol use in the

early to mid-adolescence of an individual's life. The highest risk of heavy drinking (24.2%) and self-reported alcohol problems (30.7%) was observed among adults with both an ACE score of four or higher and a history of parental alcoholism (Dube et al., 2002).

Looking a little later in life, ACEs still have an effect on slightly older individuals. According to the Substance Abuse and Mental Health Services Administration, college students report more frequent daily drinking and binge drinking of alcohol than other adult peers who have not attended college. SAMHSA has also found that illicit drug rates have gone up significantly from 34% to 41% and have increased in prescription medication misuse.

Drug Abuse

Substances Background

Substance use issues are widespread throughout the world. These are associated with many short- and long-term health risks as well as with substantial personal, societal and economic costs (Leza et al., 2021). Drug abuse refers to nonmedical use with the specific intent to create a desired alteration in mental state or physical performance (Hernandez & Nelson, 2010). This altered state may be euphoria in the case of opioids, anesthetics, and sedatives. All over the world, there are over 76 million people who have problems with alcohol. There are an additional 15 million people worldwide who have problems with drugs. In the United States alone, there are currently over 65 million people who have reported that they acknowledge their misuse of alcohol. In the United States there are also over 25 million people who have reported using illicit drugs. Substance abuse is normally divided into subtypes of alcohol abuse and drug abuse. Substance abuse itself refers to the overindulgence in and dependence on a drug or other substance leading to effects that are detrimental to the individual's physical and mental health, or the welfare of others (Smedslund et al., 2011). Alcohol may be the most common substance that

is abused in the United States, but illicit drug use has as much of a negative effect on society. Drug abuse of all kinds cost the United States around \$193 billion because of the crime and healthcare costs, loss of productivity and premature death all in 2007 alone. In just one year, 2010, there were 40,393 deaths that were drug-induced just in the United States. The start of the rise of drug abuse in the United States was in the 1970's. This was indicated by overdose and poisoning deaths according to CDC's WISQARS database (Finkelhor, 2020).

Prescription drugs are one of the most commonly abused drugs in the United States (McHugh et al., 2014). The use of prescription drugs has been rising over the past ten to fifteen years, and is now one of the most rapidly growing sectors of healthcare in the United States. These drugs were designed with clinically efficacious sedative, analgesic, anxiolytic, anesthetic or stimulant properties that led to the emergence of a penchant for their abuse (Hernandez & Nelson, 2010). Examples of these drugs are narcotics, opioids, tranquilizers, sedatives and stimulants. One of the most widespread drug of choice in the United States is opioid use disorders. Opioid use disorders have a morbidity rate and mortality rate that is highly prevalent, which means that the number of incidents of overdose has nearly quadrupled over the past ten years. The term opiate comes from the substance opium poppy (Hernandez & Nelson, 2010). Opium poppies are a part of substances like morphine and codeine. Opioid is used more loosely and covers a lot more ground. Opioid is an umbrella term that covers opiates and other substances that are capable of binding the μ -opioid receptor (Hernandez & Nelson, 2010). This allows for more production of the morphine-like effect. Some of these opioid substances include: heroin, fentanyl, methadone, codeine and oxycodone (OxyContin). Going down the list, the most common drug that is abused after opioids are tranquilizers and stimulants. In 2012, there were 6 million people that were abusing tranquilizers (McHugh et al., 2014). There were around 3.3

million people abusing stimulants in the same year. Prescription drugs are chosen by individuals living in areas where illicit drugs that are inexpensive are not available. Between the years 2002 and 2004, there was a national survey that there is little to no use of prescription drugs in larger cities where heroin use is higher (Hernandez & Nelson, 2010). The survey also found that prescription drug abuse is mainly found in rural areas, suburbia and in small to medium sized urban areas in the United States. Prescription opioids and heroin dependent individuals report having very different life concerns. Individuals who are dependent on prescription opioids are often less concerned with infectious diseases than those who are heroin dependent. On the other hand, those who are dependent on prescription opioids are a lot more concerned about alcohol use than those who are heroin dependent (McHugh et al., 2014). Prescription and other drugs have a range of reasons why there is abuse of them. These reasons include getting high, coping with or getting rid of pain and negative effects and to improve sleep (McHugh et al., 2014). This focused particularly on adolescence found that the reasons they abuse prescription drugs is much different. Their reasons for abusing prescription drugs are not for the intended purpose of the drug. These studies show that adolescents don't use prescription opiates for pain relief or sleeping aids to improve sleep. Adult data suggests that the most typical reason for starting abuse of opioids is for pain relief, but the primary reason often changes over time to manage withdrawal symptoms and the negative effects, to get high or to cause them to fall asleep.

Prescription drugs are mainly obtained legally and are commonly present in homes all over the world, but this is not the only way to obtain them. There are meaningful differences between prescription and illicit drugs of the same class (McHugh et al., 2014). There are also differences among different adults. To older adults the prescription of medications that can be addictive, such as opioids and benzodiazepines, are more prevalent in this age range. This

highlights the importance to better understand how likely it could be for individuals of this age range to abuse these medications. Among older adults, benzodiazepines is the most common prescription to be abused, and is under-recognized among adults who are sixty-five years or older. Another group that seems to be more likely to abuse prescription medication are pregnant women. Between the years of 1992 and 2012 there was a constant rate of women who were pregnant to be admitted to substance use treatment (McHugh et al., 2014). This was mainly found among pregnant women that lived in rural areas. Among these women were those who were being admitted mainly for the abuse of prescription medication. Between these years the amount of women who were admitted for prescription drug abuse had increased 14-fold.

Another factor in drug abuse that is important is whether or not a drug causes, what is seen to be, the essence of addiction. Compulsive drug seeking and use means that the individual is constantly looking for a drug to cope with different ailments (AI; 2022). This also means that they will seek these drugs out no matter what the health costs or social consequences. These are the characteristics that ultimately matter most to the patient and are where treatment efforts should be directed (AI; 2022). Each drug that has been studied has some idiosyncratic mechanisms of action. Almost all drugs that can be abused have roughly the same effects. Either directly or indirectly, these drugs have the same effects on a single pathway that is deep within the human brain. This circuit in the brain is affected by these addictive substances. Drug abuse not only hinders the function of the brain, but drug abuse overtime can cause widespread changes in the function of the brain that can have negative effects on the individual long after the individual stops taking the drug. A brain that is affected by addiction is different from a brain that hasn't been addicted to drugs. These changes consist of metabolic changes, receptor availability, gene expression, and responsiveness to environment cues. Initially, drug use is a

voluntary behavior, but when that switch is thrown, the individual moves into the state of addiction, characterized by compulsive drug seeking and use (AI; 2022).

Relation to ACEs

In the past few years, factors that were related to childhood have been analyzed many times in order to understand how substance abuse and addiction really begin. Among these reasons, there has been an increase in the role of ACEs. ACEs was first described as “the exposure to psychological, physical or contact sexual abuse and household dysfunction, including substance abuse (drug or alcohol) by a household member, having a household member with mental illness, witnessing a mother or stepmother being treated violently, and criminal behavior in the household during the first eighteen years of life” by a man named Felitti et al. back in 1998. Not much about this definition has changed since it was created. There was a study done by the American Academy of Pediatrics (Dube et al., 2003) that looked closer at ACEs and substance abuse. The American Academy of Pediatrics examined how drug use and the ten questions of the ACEs and the final scores of ACEs were correlated. Their study consisted of 8,613 adults who attended a primary care clinic in California that completed a survey about household dysfunction, childhood abuse and neglect. The survey also asked about drug use and other health issues. The outcomes that were the most common was self-reported use of drugs (Dube et al., 2003). These included the initiation during three age categories, which were less than or of fourteen years of age, fifteen to eighteen years, or as an adult who was nineteen years or older. The findings of this study showed that each ACE that an individual had increased the likelihood of early initiation 2- to 4-fold (Dube et al., 2003). The final ACE score had a strong correlation between the initiations of drug use in all three categories. ACEs also had a strong correlation between drug use problems, drug addiction, and parental drug use.

Individuals who had five or more ACEs were seven to ten times more likely to report drug use problems, addiction to drugs and parental drug use than individuals who have no ACEs. ACEs substantially increase the number of prescriptions and classes of drugs used for as long as seven to eight decades after their occurrence. The increases in prescription drug use were largely mediated by documented ACE-related health and social problems (Anda et al., 2008).

One of the most common drugs that adolescence individuals' abuse are prescription drugs. Adolescents with ACEs are more likely to abuse prescription drugs. According to a study done of youth presenting to emergency departments (McHugh et al., 2014), there was found to be a number of risk factors. These factors included poor school performance, interpersonal violence and other forms of substance use. Among adolescents who have these risk factors, prescription drug abuse is associated with exposure to violence, co-occurring psychiatric disorders and delinquent behavior (McHugh et al., 2014). According to many studies, prescription drug abuse is strongly linked with psychiatric severity, violence exposure and stress in cross-sectional studies. These prescription drugs that adolescence abuse come from a variety of different sources. These sources range from a doctor prescribing them, given or taken from close friends and family, or bought illegally. Of these three sources, the most common one for adolescence to report is being given or taking them from a close friend or family. This is the most common way for adolescents to get these drugs, but there are plenty of adolescents that have reported getting them all three ways. There was a study done on adolescent individuals and young adults (McHugh et al., 2014) between the ages of fourteen and twenty years old. This study was on those individuals who were in emergency departments, it was found that almost 10% reported that they have been abusing prescription drugs, but less than 15% of this group actually had valid prescriptions for these drugs. Prescription medications are not the only form of

opioids that individuals can be abusing. ACEs have been linked to opioid dependence that is done by injection drug use (IDU) initiation (Stein et al., 2017). Many of these types of opiates are commonly known as heroin, fentanyl, cocaine, and methamphetamine. There is also a strong relationship between substances that are seen as less harmful in life than drugs. ACEs exposure and smoking nicotine has been repeatedly demonstrated, with recent research expanding the association to other substances, such as marijuana (Bryan, 2019). It has also been found that a specific ACE causes the likelihood of smoking to increase, and that ACE is household substance abuse.

Statistics

Research that has been done on ACEs: including common forms of child maltreatment and related traumatic stressors, found that prescription drugs account for about 11% of the national health expenditure (Anda et al., 2008). On average, the amount of prescriptions has increased as the ACE score increased as well. An individual with an ACE score of six or more had rates of prescription drug use increase by 40% compared to individuals who have an ACE score of zero. This relationship was found among all age groups: 18 to 44, 45 to 64 and 65 to 89 years of age. These relationships were seen for the risk of being in the upper decile of the number of classes of drugs used, persons with scores of five or more have this risk increase 2-fold. Adjustment for ACE-related health problems reduced the strength of the associations by more than 60% (Anda et al., 2008). Three out of five adults in the United States filled at least once prescription for prescription drugs in 2000 alone. Between the years 1993 and 2005 the amount of prescription drugs that were purchased increased by 75% (Anda et al., 2008). This increase shows that the amount of prescriptions for these drugs went from 2 billion to 3.5 billion per year. Around 45% of adults in the United States were taking these prescription drugs on a

regular basis in 2004, and 27% of them were taking these medications occasionally (Anda et al., 2008). This increase in prescription drug use was also seen in the expenditures for these medications. In the United States, almost \$180 billion (about 11%) of total national health expenditures was in 2003 alone. This amount of spending on these prescriptions was more than four times the total amount spent in 1990 on prescription drugs. There was a study done by BMC public health (Anda et al., 2008). They found the same result as most studies do: that as the ACE score increased, so did the rate of prescription drug use. There were some slight differences with this study than previous studies. When they entered the variables for the health and social problems for rates of prescriptions, the relative rates were reduced for each level of the ACE score. The reductions found ranged from 67% to 70%. It was also found that, for individuals of all ages, the risk of being prescribed multiple classes of drugs increased as the ACE score increased. It was then found that when the ACE related health problems into the model showed a decrease in risk by 26% to 67%. The pattern that the number of ACEs increased the number of prescriptions increased as well. This was seen mainly in the adolescent age group. The rates of this age group increased by 60% for individuals with an ACE score of five or more (Anda et al., 2008). In this study, the multivariable-adjusted relative rate of prescriptions as well as the relative risk of use of a high number of classes of drugs increased with a higher ACE score.

In the period between 2005–2018, unintentional drug poisoning deaths increased by 126% and non-fatal poisonings by 174%. Both reflect the exacerbating problem of drug abuse among the adult population, likely resulting in children's increased exposure to both impaired parenting and traumatic overdose episodes (Finkelhor, 2020). Between the years 2000 and 2010, accidental prescription opioid overdoses increased nearly 400% (McHugh et al., 2014). This amount surpassed the rate of accidental overdose deaths that were caused by heroin, cocaine and

other stimulants all combined. In 2012, marijuana was first in prevalence, and prescription drugs were second in prevalence of both illicit use and drug use disorders (McHugh et al., 2014). The prescription drug that is most commonly abused are opioids and they seem to be the main contributor to the increase. In 2012, the National Survey on Drug Use and Health (NSDUH) (McHugh et al., 2014) gathered that there were more than 16.7 individuals twelve years old or older in the United States who abused prescription drugs. It was discovered that almost 2.6 million individuals met the criteria for a diagnosis of a substance use disorder that was related to prescription drug use. This shows that, over the past twenty years, prescription drug abuse has gone up by around 250%. The dramatic increase in the need for substance use treatment is due to the increase of prescription drug abuse and substance use disorders that relate to prescription drugs. Surveys, like the ones done by NSDUH and the Treatment Episode Data Set (McHugh et al., 2014), estimate large increases in the amount of treatment for prescription drugs between 2000 and 2012 as high as 250% and 400%. It is common for patients in substance treatment that report having prescription drug abuse to report more pain symptoms than those who use heroin. The most commonly abused prescription drug in the United States, after opioids, are tranquilizers and stimulants. It was found that 17% of inpatients sampled at a substance use disorder treatment facility had abused antipsychotic medications, such as quetiapine (McHugh et al., 2014).

In Canada, New Zealand, and India and among other countries, there are significant amounts of prescription opioid abuse that have been reported, but the United States seems to have the highest rate of prescription drug abuse internationally (McHugh et al., 2014). There was a study done in Canada (McHugh et al., 2014) with a large population that revealed that nearly 5% of the population abused opioids in the past year. In the U.S., increasing rates of prescription

drug abuse have paralleled increases in the prescription of these medications. In 2012, there were as many opioid prescriptions written, nearly 259 million, as there were adults in the United States (McHugh et al., 2014). This data is also reflected among adolescents in the United States. The Monitoring the Future study from 2013 (McHugh et al., 2014), did an annual survey of 8th, 10th, 12th grade and young adults and reported very high rates of nonmedical use of prescription drugs. The highest among them were opioid and stimulant medications. Almost 13% of the 12th graders studied reported having lifetime prescription opioid abuse, making opioids the most common medication abused within this age group. There has also been a study of college students and trends with prescription medication abuse (McHugh et al., 2014). This study found significant increases in prescriptions for stimulants and decreases in opioid prescriptions between the years 2003 and 2013. It was found that, during this time, the amount of individuals abusing stimulants had increased, while the amount of individuals abusing opioids decreased. College students are more likely to abuse stimulants than college-age young adults who are not enrolled in higher education, which is not consistent with other stimulants, such as cocaine (McHugh et al., 2014).

Over an eight month period in 2015, Stanley Street Treatment and Resources, Inc. (SSTAR) in Fall River, Massachusetts (Stein et al., 2017) approached individuals who were trying to get inpatient opioid detoxification treatment to participate in a survey. With this sample of individuals entering into detoxification treatment, the amount of ACEs were correlated with three landmarks in the trajectory of opioid use. These three landmarks were age of initiation, ongoing IDU, and lifetime experience of overdose. The findings of this study support that the ACE items in general populations in which higher ACE scores correlated with recent illicit drug use, parental drug use, and an earlier age of initiation of street drugs (Stein et al., 2017). There

have been significant relationships noted between ACEs and constant heavy drug use. 78.4% of individual's abuse heavy drugs had experienced at least one adverse childhood event, compared to the 55.1% of heavy drug users that were not (Zlotnick et al., 2004). It has also been found that individuals in treatment for an addiction have a prevalence of ACEs than the general population. The rates of having been exposed to at least one ACE ranges from 85.4% to 100% among individuals in addiction treatment. There was a study done by the Journal of Addictions Nursing (Chandler et al.) that thirty clients participated in the interviewing process. All of the 29 participants who completed the questionnaire had reported having at least one ACE. Of these 29 participants, 82.8% of them had reported having experienced six or more ACEs. About 96.6% of the 29 participants reported having experienced four or more protective factors. 40% of these participants were referred for further mental health counseling after the interviews were done.

Treatment of ACEs

The primary prevention of ACEs is that they are reduced at the population level. This will have the largest impact on both the individual and society. The way to accomplish this is by interventions that focus on strengthening individual and community resilience (Oral et al., 2015). This should be done instead of focusing mainly on identifying and responding to each individual ACE. In doing so, the communities will be strengthened and there will be a reduction in resource disparity. An example of this are programs to prevent child abuse. Some of these programs are emergency nurseries, program referrals such as homeless shelters and local food pantries, and increased space and staffing at mental health and substance abuse treatment centers (Oral et al., 2015). All of these programs can help reduce the risk of ACE exposure at the population level. The secondary strategies focus more on the individual and family instead of the population level. Child protective services is an example of one of these strategies. CPS is a widespread agency

that focuses mainly on the more severe cases of child maltreatment (Oral et al., 2015). There are other new programs that are trying to identify and respond to ACEs as early as possible, before they become so severe that they require hospitalization or an official agency response (Oral et al., 2015). These new programs are growing in priority. One of these programs is home visiting programs. These programs have been effective in reducing child maltreatment and improving family function. There have been interventions done in non-family settings that have provided the opportunity to help identify children who have been affected and to increase program reach earlier. These interventions are called psychological first aid (PFA) (Oral et al., 2015). Some of these non-family settings include schools and health care facilities. PFA identifies children and their caregivers immediately after a life stressor and provides information, education, comfort, and support, which results in acceleration of recovery, promotion of mental health and increased resiliency (Oral et al., 2015). All of these programs fall under the umbrella of social work. Social workers are the ones who work with these programs to aid those who need it.

Since ACEs are correlated with health risks that arise later in life, Healthy People policy goals require implementation of effective ways to take on healthy development (Larkin et al., 2014). This makes it important to take notice of both susceptibilities and protective factors to mobilize each child's resilience. Resiliency research supports response strategies involving the cultivation of strengths to reduce outcomes such as depression, substance abuse and health problems (Larkin et al., 2014). If there is an increase of protective factors, then this can decrease the risk of long term psychological outcomes of abuse, neglect and foster care placement. The biopsychosocial concept framework suggests that context plays a major role in healthy development, and the mind and body are simultaneously responding to both interior and exterior events, contributing to behavioral outcomes (Larkin et al., 2014). The widespread effect of ACEs

can be helped with the development of community services that are there to support healthy parenting through accessible and effective interventions. Resources and support may prevent adverse events in the first place and can play a role in both the cognitive appraisal process and the body's responses to various types of events, thereby contributing to healthy coping behaviors and physiological health (Larkin et al., 2014). Due to the emphasis on prevention and supportive responses, the interest in family support programs have been on the rise. These programs have been known to improve child welfare and family functioning. Having access to integrated, multidisciplinary family support is necessary to help these families. This has been found in many different programs that have contributed to the reaching of positive outcomes for families, and, more importantly, the children. By having both resilience research and community services, there can be a decrease in ACEs and the health risks that come from them. It has also been viewed, from a biopsychosocial standpoint, that intervention with a family can enhance the protective resources for the generations that follow (Larkin et al., 2014). In doing so, this may prevent the spread of ACE exposure throughout the generations that follow. Parenting improvements can be addressed by a mix of a few different things. Participation, program factors and support program characteristics are a great mix to help parents that are high risk. Families and Schools Together (FAST) is one of these programs (Larkin et al., 2014). FAST is a school-based family support program that has made an increase in adaptability among families. They have also sparked a decline in child behavior challenges. In providing this level of support, FAST, and other behavioral-oriented and group-based family support programs, have been successful and calling for future evaluation (Larkin et al., 2014).

At Kaiser-Permanente the HCPs were taught how to respond to patients with ACEs (Bryan, 2019). This response was “I see you said yes to this question. Can you tell me how that

has affected you later in your life?” Asking, listening, and accepting are the powerful ways they help patients get relief (Bryan, 2019). If patients seek guidance, modalities to recommend include practicing mindfulness, such as meditation and yoga, creating a narrative, journaling, theater, and sometimes therapy (Bryan, 2019). HCPs create safe environments by performing trauma-informed and universal precautions. Clients who have experienced trauma often feel a lost sense of control and an increased need for safety (Bryan, 2019). Simple things can create this safe environment. Small things that clinicians can do are knocking before entering their room, draping and allowing a loved one to stay in the room with them if they would like. Clear communication and understanding of what is expected can increase predictability which can help the client feel safe and that they have control over their situation (Bryan, 2019). Some ways this can be done is by calling the client and clearly explaining to them their test results and understandable explanations. Doing this instead of waiting for the next visit can also increase the client’s sense of control.

There is another form of treatment that has a significant impact on the trauma-exposed brain. Eye Movement Desensitization and Reprocessing (EMDR) is a treatment modality that focuses on the brain’s information system and desensitizing the traumatic memory through bilateral stimulation (BLS) and short imagined exposure (Dye, 2018). Image, thoughts, emotions and the body sensations are all dimensions of memories that are accessed by BLS in EMDR processing. Looking at eye movements, auditory tones, tapping or music all activated the right and left hemispheres of the brain. This is used in BLS in order to access traumatic memory. This is intended to cause dual attention to BLS and allow the clinician to pay attention to the traumatic memory. This dual attention is required during EMDR since it works with both hemispheres of the brain. In doing so, it facilitates both the left and right hemispheric

connections and disrupts the traumatic memory network. Research has stated that EMDR has been found to help clients with taking in and processing new information, on top of helping clients' process overwhelming material (Dye, 2018).

Cognitive Behavioral Therapy

Cognitive Behavioral Therapy (CBT) is one of the most researched and evidence based treatments used for trauma symptoms (Oral et al., 2015). CBT focuses mainly on addressing and alleviating dysfunctional thoughts, behaviors, and emotional responses (Dye, 2018). This is done by clinicians teaching clients to get their feelings under control. This is done by changing their thoughts and behaviors. CBT addresses symptoms of re-experiencing avoidance and arousal (Dye, 2018). Another reason why CBT is the most common approach to reduce psychological symptoms of trauma is because it can be directed to all family members, not just the client (Oral et al., 2015). The results of CBT on adults shows that it has an effect on causing symptoms of post-traumatic stress disorder, depression, and anxiety to decrease. CBT also has the ability to change dysfunctions of the nervous system (Oral et al., 2015). According to recent research, CBT for children is mixed and increasing knowledge about pediatric brains may help inform child based approaches, but it is suggested that family approaches, such as CBT, are best (Oral et al., 2015). There is a psychological treatment that includes psychoeducation, parent skills development, relaxation, affective modulations, cognitive reprocessing and creation of trauma narratives known as Trauma-Focused CBT (TF-CBT) (Dye, 2018). TF-CBT is an evidence based therapy that has been validated by children and parents. It has been studied and found that TF-CBT is the only validated treatment to be considered statistically significant and superior to psychosocial placebo. It has also been seen as the only well-established treatment for children who have been exposed to traumatic events (Dye, 2018).

Trauma Informed Care

Another form of care for ACEs is Trauma Informed Care (TIC). According to the SAMHSA (Oral et al., 2015), TIC is a comprehensive, multilevel approach that shifts the way organizations view and approach trauma. SAMHSA created the National Center for TIC back in 2005 (Oral et al., 2015). This center was to train and provide technical assistance to communities and organizations who were interested in becoming trauma informed. This was done by in-person consultations and through virtual networks. They also accomplished this by providing the materials, curricula and the resources necessary to become trauma informed. The SAMHSA promotes six broad principles for TIC. The first principle is safety. According to SAMHSA, promoting a sense of safety involves a conscious effort to ensure that all members and clients of an organization are physically and emotionally safe (Oral et al., 2015). The second principle is trustworthiness and transparency. This is accomplished through the organizations (Oral et al., 2015).. Organizations must handle decisions with transparency in order to have trust with staff and their clients. The third principle is peer support (Oral et al., 2015).. Peers are individuals who have also lived with histories of trauma. This can include family members of the client. Peers can be a critical resource for support. The fourth principle is focused on collaboration and mutuality (Oral et al., 2015). This brings to light how all members of the organization can contribute equally to the healing of children who have been impacted by adverse experiences. The fifth principle looks at empowerment, voice and choice (Oral et al., 2015). This entails developing a plan of action that requires a patient-centered approach. This can help empower clients to have a say in their own action plan. The sixth and last principle is about culture, historical and gender issues (Oral et al., 2015). The efforts made by clinicians must be culturally sensitive and free of prejudices based on biases and stereotypes (Oral et al., 2015). In TIC there are key goals that

include promoting wellness and a therapeutic experience for the child, preventing crisis, and intervening at the early signs of a problem (Hodas, 2006). A key principle involves the avoidance of coercion – both verbal and physical – in favor of approaches that promote partnership with the child and build on comprehensive knowledge by staff of the child’s individualized strengths, needs and treatment plan (Hodas, 2006). For TIC there are three forms of prevention that are required to make a positive, safe and successful environment for a child. Primary prevention requires interventions that are intended to prevent crises (Hodas, 2006). This is so children benefit from the program and are less likely to experience more trauma or re-traumatization. Primary prevention involves creating an environment that should treat the child as an individual, where there aren’t as many rules, where staff listen, where there is no shame and where the child doesn’t have to feel like it is them against the staff. An environment like this is safe for the child, which will build hope and resilience in the child. Secondary prevention requires that the children who are at risk of entering a crisis or who are already provoked and upset (Hodas, 2006). Staff must come with the want to resolve the situation calmly and therapeutically, without the need for restrictive procedures. Secondary prevention is only required when primary prevention is not executed correctly. The third prevention when the situation escalates and the second prevention is no longer effective (Hodas, 2006). Tertiary prevention is required when the crisis gets beyond the point of no return. This is when it is necessary to use seclusion, restraint, or other coercive interventions (Hodas, 2006). In situations such as this, the need for tertiary prevention reflects the failure of primary and secondary prevention to meet the needs of this specific child. When these situations occur, it is important to terminate the crisis and the restrictive procedure. It is also important to have a process of

debriefing and learning from this incident. When tertiary prevention is necessary, it shows that there was a failure in treatment and that there has to be changes made for program improvement.

TIC is being integrated into healthcare service agencies for high risk families and correlational facilities (LeTendre & Reed, 2017). This is to help service providers to have a better understanding of the effects of ACEs and how to give compassionate care to those who have been exposed to these adverse experiences. The impetus for TIC stems from a realization that systems of care that serve children are often unaware of trauma experiences of their clientele (Oral et al., 2015). This can potentially lead to re-traumatization and a failure to provide appropriate referrals. This is partly due to the fact that TIC requires more validation and recognition of how ACEs can affect the individual, what coping strategies they have taken on and what treatments are effective for them. By adding TIC to the findings from the ACE study, there can be a reduction of symptomatic behavior (Leitch, 2017). This is done by viewing symptoms as normal reactions to abnormal experiences shape staff practices that strengthen relationships between providers and clients, enhance personal safety, create a sense of welcome and respect in service delivery spaces and inspire delivery of preventative services to vulnerable individuals and families as early as possible (Leitch, 2017).

In TIC there are key goals that include promoting wellness and a therapeutic experience for the child, preventing crisis, and intervening at the early signs of a problem. A key principle involves the avoidance of coercion – both verbal and physical – in favor of approaches that promote partnership with the child and build on comprehensive knowledge by staff of the child's individualized strengths, needs and treatment plan (Hodas, 2006). For TIC there are three forms of prevention that are required to make a positive, safe and successful environment for a child. Primary prevention requires interventions that are intended to prevent crises. This is so children

benefit from the program and are less likely to experience more trauma or re-traumatization. Primary prevention involves a certain environment that needs to be created. This environment should make the child feel as though they are treated as individuals, where there aren't as many rules, staff listen, where there is no shame and where the child doesn't have to feel like it is them against the staff. An environment like this is safe for the child, this will build hope and resilience in the child. Secondary prevention requires that the children who are at risk of entering a crisis or who are already provoked and upset attend. Staff must come with the want to resolve the situation calmly and therapeutically, without the need for restrictive procedures. Secondary prevention is only required when primary prevention is not executed correctly. The third prevention when the situation escalates and the second prevention is no longer effective. Tertiary prevention is required when the crisis gets beyond the point of no return. This is when it is necessary to use seclusion, restraint, or other coercive interventions. In situations such as this, the need for tertiary prevention reflects the failure of primary and secondary prevention to meet the needs of this specific child. When these situations occur, it is important to terminate the crisis and the restrictive procedure. It is also important to have a process of debriefing and learning from this incident.

Treatment of Substance Abuse from ACEs

Having the understanding that addiction is a consequence of fundamental changes in brain function means that the goal of treatment is to either reverse or to compensate for those changes in the brain. Either medications or behavioral treatments can achieve these goals. Behavioral treatment has been successful in altering brain function in many psychological disorders as well. In a study done by the Journal of Addictions Nursing (Chandler et al.) that stated the findings from the interviews, that were notable, were the general lack of awareness of

the relationship between ACEs and substance use disorders among their participants. After the study, having knowledge on the impact that ACEs can have on their recovery seemed to give them a sense of relief and a feeling of being normal. Since ACEs account for at least one half to two thirds of serious problems with drug use, the process of meeting the national goals for reducing drug use will necessitate serious attention to these types of common, stressful, and disturbing childhood experiences (Dube et al., 2003). Being able to recognize how childhood adversities affect health throughout the life span is crucial to healthcare practitioners. These practitioners can use this information to shape intervention efforts. Research on this subject has found that substance abuse treatment that uses a trauma informed approach has led to better treatment outcomes (LeTendre & Reed, 2017). Some of these outcomes include greater symptom reduction and increased retention of treatment. TIC approach is meant to help with mindfulness in regards to the effect that ACEs have on substance abuse in the population. Screening for ACEs is necessary if effective interventions are to be provided, with the goal of improving client outcomes (Chandler et al.).

In 1992 there were 4.9 million adults abusing prescription opioids, this increased to around 12.5 million adults in 2012, but the rate of treatment that was received for prescription opioid use disorders is second only to alcohol (McHugh et al., 2014). Even with the rise in adults abusing these medications, the data has shown that, as well as other substance use disorders, the majority of adults who abuse prescription drugs do not seek any kind of treatment. The most common type of treatment for prescription drug abuse is self-help. The largest study done on prescription drug abuse treatment is the Prescription Opioid Addiction Treatment Study (POATS) (McHugh et al., 2014). This study had 653 participants across ten sites in the United States. The results of this study have shown that 7% of the participants that responded to

treatment with buprenorphine-naloxone. This consisted of a two week stabilization and a two week taper. After the treatment, it was seen that the response improved. It required extended treatment that included twelve weeks of buprenorphine-naloxone stabilization which increased the response by 49%. This did drop during the following second taper to less than 9%. Many studies have examined the best length of buprenorphine tapers with naltrexone that found that a four week taper created the best outcomes and retention than tapers that lasted between one to two weeks. There have also been secondary analyses from a clinical trial that was done of buprenorphine taper for those who are dependent on opioids. This analysis found that these individuals have no benefit from a 28 day taper over a 7 day taper. There have been many other studies on the treatment of opioid dependence, many of them have compared treatment responses of individuals who primarily use heroin and prescription opioids. Those who have a dependence on prescription opioids seem to have superior post-buprenorphine taper outcomes that closely resemble those who are dependent on heroin. A four week buprenorphine stabilization has shown that individuals who are dependent on prescription drugs have outcomes and retention that are stronger than those who are dependent on heroin. This is a response to treatment with buprenorphine and naloxone and behavioral therapy. There is another form of treatment that is also beneficial to those who are dependent on drugs. This form of treatment is known as Environmental Enrichment (EE). EE appears to consistently reduce dopamine neurotransmission in the prefrontal cortex (Solinas et al., 2010). Dopamine in the prefrontal cortex modulates their cognitive performance. The data that has been collected shows there are cognitive-enhancing effects of EE. Serotonin system plays an important role in many different emotional and cognitive traits. These traits include depression and being impulsive that increase the feelings of being vulnerable to addiction. These systems are affected by EE. The noradrenaline system is

critically involved in arousal, cognition, stress and emotions. There have been a few studies done to look into the effects of EE on the monoamine systems. They have demonstrated the EE-induced effects are stronger in the hippocampus than in other parts since it is less consistent. EE does not have an effect on the levels of acetylcholine in the prefrontal cortex. Although EE does reduce the amount of acetylcholine that is released. This amount is released because of stress or dopamine D1 receptor agonists. EE is able to structurally and functionally alter all the main neurotransmission systems in the brain (Solinas et al., 2010).

There is another form of treatment that doesn't require medication. Motivational interviewing (MI) focuses around the client, and is a semi-directive way to enhance motivation to change (Smedslund et al., 2011). MI is a psychological treatment that is meant to help individuals cut back or even stop the use of substances. The way this is done is between the client and the counselor to meet with each other at least once a week and each for an hour at a time. The counselor needs to express that they understand what the client feels and is going through about their issue and support the clients with making their own decisions. When using MI, the counselor will not try to impose the need to change on the client, but they should discuss the potential consequences of what could happen with not changing and with changing. After this is discussed, the client and counselor need to work on the clients goals.

There is not just one single treatment that is effective for everyone that is dependent on substances. There are so many factors, like ACEs that contribute to the reasons why they are dependent on alcohol that not one size treatment fits all. After all the research that has been done, it has been proposed that to improve outcomes the best way to do so is to assign patients to treatment based on each client's individual needs and characteristics (Huebner & Kantor, 2011). These needs may include ACEs that will need to be focused on. All of the behavioral approaches

of treatment of substance abuse combine general behavioral principles with therapeutic techniques that are designed to facilitate healthy behavioral changes (Huebner & Kantor, 2011). Coping skills training, cognitive behavioral treatment, brief interventions and relapse prevention also introduced concepts from cognitive therapy and social learning theory (Huebner & Kantor, 2011). An individual having the belief and the ability to stop their substance abuse plays a large role in helping them take control, which leads to playing a role in cognitive-behavioral treatments and relapse prevention. The way this can be achieved is the focus on locating high risk situations and then finding the right coping skills that will help the clients take on these situations without the use of substances. This can be done by coping skills and relapse prevention. Treatments such as these can take place in individual sessions with counselors or in group formats. Many of these forms of treatments have been adopted and put into play in many other settings as well: residential facilities, outpatient programs, computerized, medical facilities and even in workplace settings.

There are also forms of treatment that focus directly on alcohol abuse. Alcoholics Anonymous (AA) is one of those treatment methods. AA's program of spiritual and character development, the twelve steps, is based on the premise that turning one's life and will over to a personally meaningful "higher power," is the key to recovery (Huebner & Kantor, 2011). Another essential idea is that sobriety or recovery depends on the admission of powerlessness with respect to alcohol or other substances (Huebner & Kantor, 2011). Even though there have been significant advances in pharmaceutical and behavioral treatments, groups such as AA, also known as peer-run mutual-help groups (MHGs), play a significant role in helping millions of individuals achieve their recovery (Huebner & Kantor, 2011). In the realm of alcohol and drug abuse in the United States, MHGs are the most commonly sought out source of help. These types

of groups are extremely valuable for those who suffer from chronic and recurring alcohol use disorders (Huebner & Kantor, 2011). These can involve going through the cycle of a treatment facility, abstinence and then relapse. The ways to put an end to this vicious cycle include a form of treatment (inpatient, outpatient care) that is based on the twelve step principle. The next step would be continued care like MHGs, twelve step meetings, or individual therapy. Many individuals with substance use disorders realize that they have a problem well before they decide to seek help for it. This shows that the help could be provided earlier. Reducing the amount of time from when the individual realizes they have a problem to when they seek services depends on the understanding of the correlation between recovery patterns and the processes at the population and individual levels (Huebner & Kantor, 2011). MHGs, among other forms groups, can help bridge the gap and start those individuals on the path to recovery earlier.

Conclusion

There are many outcomes that could take place after an individual has been exposed to ACEs. One of these outcomes can be substance abuse of all kinds. Even if the parents of the child did not have an issue with substances, if a child experiences ACEs, there is still a higher chance for the child to abuse substances later in life. Having at least one parent who does abuse substances increases this outcome even more. The research presented in this Senior Thesis looked at what ACEs are, how trauma affects children and later in life, what substance abuse is and how ACEs can affect them, and how to treat both ACEs and substance abuse triggered by ACEs. Several of these resources have shown how important it is to take ACEs into consideration when it comes to substance abuse. This is important in order to find the underlying cause of substance abuse and help individuals find their way into a life of recovery. Researchers, healthcare workers and social workers will need a better understanding of what ACEs are, how

to spot them and how to help individuals cope with them in order to continue to help those who suffer from substance abuse.

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