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Barriers in access to substance use treatment for rural adolescents

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Thesis

**BARRIERS IN ACCESS TO SUBSTANCE USE TREATMENT FOR RURAL
ADOLESCENTS**

by

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ABSTRACT

The increasing prevalence of substance use disorder (SUD) is a major public health crisis in the United States. Adolescence is an ideal period for early intervention to reduce the risk of SUDs in adulthood, as research has shown that up to 60% of adult SUD could have been avoided by early intervention in youth. Prior research has typically focused on urban metropolitan areas when describing adolescent substance use. However while the data is varied, several studies have shown that the prevalence of rural adolescent substance use is equal or greater than that of their urban peers, particularly alcohol, tobacco, and prescription drug use, and begin use at an earlier age. There are several methods of treatment for adolescent substance use and SUD, centered on evidence-based practices, which have been shown to be moderately effective at reducing substance use. Despite the existence of these treatment strategies, substantial disparities exist with respect to the number of adolescents who could potentially benefit and the number who actually enroll in treatment. It has been estimated that 90% of adolescents in need of treatment are not able to succeed in receiving it. This highlights the importance of understanding the circumstances in which youth initiate drug use and the unique barriers they must overcome to receive treatment when these behaviors develop into a pattern that impacts daily life. With this information, interventions can be targeted to reduce the magnitude of the most significant barriers in order to increase treatment utilization,

especially in rural areas where adolescents face unique challenges to treatment access as a consequence of their remote locations. A literature review was conducted and found the major barriers in access to substance use treatment for adolescents to be a lack of available treatment programs, lack of treatment options including medication treatment, lack of perceived need or motivation for treatment, social stigma, socioeconomic status (SES), familial relationships, and referral services. These studies were all conducted in the United States and published from 2011-2020. The aim of this thesis is to propose a protocol for the completion of a systematic review to determine which barriers exist to adolescents receiving substance use treatment and to examine them in the context of rurality. Healthcare decisions and policy are informed by the best available evidence from systematic research and incorporated into evidence-based practices. A systematic review will summarize the findings of all relevant studies thereby making the key information more accessible to decision makers, including clinicians and policy makers, in order for substance use treatment to become more accessible to adolescents.

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LIST OF ABBREVIATIONS

ADHD.....	Attention Deficit Hyperactivity Disorder
BU.....	Boston University
DSM.....	The Diagnostic and Statistical Manual of Mental Disorders
ED.....	Emergency Department
FDA.....	Food and Drug Administration
MAT.....	Medication Assisted Treatment
NSDUH.....	National Survey on Drug Use and Health
OUD.....	Opioid Use Disorder
POM.....	Prescription Opioid Misuse
SES.....	Socioeconomic Status
SUD.....	Substance Use Disorder

INTRODUCTION

Background

Substance use disorder (SUD) has become a major public health crisis in the United States. In 2018, approximately 31.9 million- nearly 1 in 5 people- over the age of 12 used an illicit drug in the past month.¹ Additionally, 20.3 million were reported to have a SUD related to their use of either alcohol or illicit drugs.¹ Substance use is commonly regarded as an issue of adulthood, however, there is a significant number of adolescents age 12-17 misusing and abusing substances as well.¹ Adolescents who use drugs are at a particular disadvantage due to the plasticity of the developing brain, which has not yet fully matured.² This state of immaturity leaves youth especially vulnerable to the negative long-term effects of use, including increased risk of developing a disorder related to substance use, cognitive impairment, mental health problems, traffic accidents, and other injuries.³ The most common factors associated with the development of SUDs are mental health disorders, trauma, genetics, family dynamics, and environmental factors, including peer and community influences.⁴ Adolescence is ideal for early intervention to reduce the risk of SUDs in adulthood. There are several methods of treatment for adolescent substance use and SUD mainly centered on evidence-based practices, which have been shown to be moderately effective at reducing substance use.⁵ Despite the existence of these treatments, very few adolescents who report using illicit drugs ever receive care.^{5,6}

While the data is varied, several studies have shown that the prevalence of rural adolescent substance use is equal or greater than that of their urban peers, particularly

alcohol, tobacco, and prescription drug use, and begin use at an earlier age.⁷⁻¹¹ Several cultural values and norms have been implicated in this difference, such as greater acceptance of alcohol use by adolescents, a strong sense of independence and self-sufficiency, and a perception that rural areas are shielded from the problems typically faced by urban communities.¹² Poverty, substance use, and lack of employment opportunities, transportation, education, and health services all increase rural adolescents' vulnerability to poor health outcomes.¹³ In recent years, economic stress had disproportionately affected rural areas leading to changes in the structure of society including an out-migration of the best and brightest as well as unstable labor markets, which is associated with higher prevalence of substance use.¹³ While this uniquely vulnerable adolescent population possesses specific challenges to receiving healthcare, little research has been conducted to examine the barriers that exist to receiving care for substance use.

Statement of the Problem

Adults with SUD, a majority of whom began use in adolescence,⁵ often have difficulty in obtaining treatment, and only approximately 18% are able to do so.¹⁴ This highlights the importance of understanding the social contexts in which youth initiate drug use and the unique barriers they must overcome to receive treatment when these behaviors develop into SUD. With this information, interventions can be targeted to reduce the magnitude of the most significant barriers in order to increase treatment utilization.

A majority of the current research is focused on adult and young adult populations, so a systematic review of the barriers to the access of treatment for adolescents has never been conducted. Additionally, while there is literature available on adolescent substance use, adolescents living in rural areas are a subset of the population that is rarely addressed. In recent years, illicit drug use by rural adolescents has increased to an equal or greater level than that of urban adolescents.¹¹ Little to no research has been conducted on whether the barriers that rural adolescents face to receiving treatment are the same as the general adolescent population or whether they face unique obstacles as a consequence of rural characteristics.

Hypothesis

A systematic review will answer the question, “What are the barriers to adolescents receiving treatment for substance use disorders?” and will examine these barriers in the context of rural populations.

Objectives and Specific Aims

The goal of this study is to propose a systematic review to explore the barriers to treatment of adolescent substance use in the general adolescent population of the US and to examine barriers associated with rurality. Using a clearly identified search strategy with defined inclusion and exclusion criteria, papers will be identified for the future completion of this project. The exact barriers that are the most obstructive to adolescents need to be identified and targeted so that future interventions can address the most significant public health problems with adequate resources. This is especially true in rural areas, which possess unique challenges to healthcare delivery.

- Identify the barriers to treatment faced by adolescents
- Analyze key themes across reported barriers.
- Examine the reported barriers in the context of rural populations.

REVIEW OF THE LITERATURE

Overview

In the United States, substance use disorder (SUD) is a pervasive disease effecting individuals, communities, institutions, and policy across the country. Substance use disorder is defined according to the DSM-V criteria for either dependence or abuse of alcohol or illicit drugs which significantly impairs an individual's health and functioning (Figure 1).¹⁵ In the most recently published National Survey on Drug Use and Health (NSDUH) from 2018, the most commonly reported illicit drug disorder was for marijuana (4.4 million), followed by misuse of prescription pain relievers (1.7 million).¹ Long term effects of SUD can be either direct or indirect and include chronic pain conditions and cardiovascular disease, as well as an increased risk for trauma, violence, and the contraction of communicable diseases.¹⁶ Substance use affects not only individuals, but also society at every level from interpersonal relationships to small town and urban communities to institutions and national policy. In 2017, the White House Council of Economic Advisors corrected previously lower estimates, determining that the misuse of prescription opioids in 2015 alone cost the US approximately \$504 billion dollars in healthcare, criminal justice, lost productivity, and value of lives lost.¹⁷ This cost is on the magnitude of other major chronic disease such as diabetes.¹⁶

	DSM-IV Abuse ^a		DSM-IV Dependence ^b		DSM-5 Substance Use Disorders ^c	
Hazardous use	X	} ≥1 criterion	-	} ≥3 criteria	X	} ≥2 criteria
Social/interpersonal problems related to use	X		-		X	
Neglected major roles to use	X		-		X	
Legal problems	X		-		-	
Withdrawal ^d	-		X		X	
Tolerance	-		X		X	
Used larger amounts/longer	-		X		X	
Repeated attempts to quit/control use	-		X		X	
Much time spent using	-		X		X	
Physical/psychological problems related to use	-		X		X	
Activities given up to use	-		X		X	
Craving	-		-		X	

Figure 1. DSM-IV and DSM-V criteria for the diagnosis of substance use disorders. Adapted from Hasin et. al. 2013.¹⁵

While substance use is typically viewed as an issue facing adults, the number of adolescents age 12-17 misusing and abusing substances has also reached a significant level. Adolescents are a uniquely vulnerable population with similar yet separate healthcare needs from adults. The adolescent period is marked by the development of adult psychological and social behaviors, including the development of neuronal circuits in the brain.² An executive function deficit is thought to exist in the adolescent brain, reducing the ability to inhibit or control the impulse to pursue rewarding behaviors, leading to an increased likelihood of developing an SUD following substance use.² The 2018 NSDUH found that adolescents were less likely to perceive “great risk” from use of heroin and cocaine one or twice weekly than young adults and adults.¹ The perception of “great risk” of once or twice weekly use was reported by 83.0% of adolescents compared to 93.3% of young adults aged 18-25 and 95.7% of adults over 26 for heroin use and 79.6% of adolescents, 82.6% of young adults and 87.9% of adults for cocaine use.¹

The lower perceived risk of drug use by youth is especially problematic because the majority of substance use starts during this developmental period. The onset of use before the age of 18, even if occasional, predicts the development of SUD in adulthood,⁸ and the earlier the onset of use, the stronger the association.² The 2019 Monitoring the Future Survey found that 38% of 12th graders had used any illicit drug in the past year and 11.5% used an illicit drug that was not marijuana.¹⁸ While only 5-14% of these young people who have used illicit substances will develop a substance use disorder,¹ the sequelae stemming from these behaviors are vast and have severe future implications.^{3,19} Because the adolescent brain is more prone to the impacts of illicit drug use, individuals are at an increased risk of negative outcomes including cognitive impairment, mental health problems, traffic accidents, and other injuries.³ Adolescent SUD has also been associated with long term effects such as lower socioeconomic status and early morbidity/mortality.¹⁹ So, while only a small fraction of the adolescents who experiment with drugs will develop an SUD,¹ the majority of adults with an SUD started use in adolescence,⁵ representing a key period for early intervention. The shift from experimentation to dependence and disorder is marked by compulsive and habitual substance use that continues despite negative consequences due to cravings and a loss of control over consumption.² Research has found that up to 60% of adult SUD could have been avoided by early intervention in youth.²⁰

In the past, research has typically focused on urban metropolitan areas when describing adolescent substance use. However, in recent years substance use among adolescents living in rural areas has equaled or surpassed that of those in urban areas,

although the research has produced varied outcomes.¹¹ These outcomes are thought to be due to the heterogeneity of rural areas across the country with some shouldering the majority of the burden, while others remain protected.¹³ The Center on Addiction and Substance Abuse reported lower levels of substance use in rural adolescents until 1989 when equal or higher levels in rural areas began to be reported.¹¹ Rural youth have different access and norms towards illicit drugs than urban youth and have been found to be more likely to use marijuana, cocaine, methamphetamines, and inhalants.⁹ Not only do they use substances more frequently, but they also begin misusing them at younger ages.⁸ Rural adolescents are also more likely to engage in dangerous behaviors such as binge drinking and driving under the influence.⁹

Rural life is often idealized as being immune from the problems of urban communities. However, during the past 30 years changes in the structure of society, including the transformation of the American agricultural industry, has led to economic decline.¹² The result has been increased levels of poverty, infrastructural decay, and substance use in many areas, issues formerly thought of as predominantly isolated to urban populations.¹³ Historically high rates of opioid prescribing, expanded drug trafficking networks, and availability on the Internet have only exacerbated the problem by increasing access to illicit drugs.⁸ This new climate has led to increased research into possible explanations between the disparities in substance use by adolescents in rural and urban areas.

There are several risk and protective factors that have been associated with the initiation of adolescent substance use and subsequent development of SUD. Risk factors

make it more likely that an individual will begin using, while protective factors buffer this effect. Many factors have the potential to be either risk inducing or protective depending on the individual situation.⁴ While all adolescents are at risk of experiencing negative consequences from drug use, some have a higher risk than others due to mental health disorders, trauma, genetics, family dynamics, and environmental factors.⁴ Self-medication with drugs or alcohol is a maladaptive coping mechanism for mental health disorders, most strongly associated with depression, anxiety, behavior disorders, and ADHD.⁴ However, it is often difficult to identify whether a mental health disorder was preexisting or is co-existing with an SUD.²¹ It has also been proposed that substance use could potentially affect the developing brain in a manner that increases the risk of developing a mental health disorder.² Regardless of the etiology, 67% of adolescents with SUD have at least one current or prior mental health disorder.^{21,22}

Parental substance use is of particular concern as a risk factor for initiating substance use. This is due to the high degree of heritability of substance use disorders as well as parenting practices from users which may demonstrate more permissive attitudes towards adolescent substance use and lower monitoring of their children.⁴ However, parent and family structures also have the ability to act as protective factors if they provide structure, limits, rules, monitoring, and predictability for their children.⁴ These supportive relationships, which express a clear expectation for behavior and values among adolescents, make it less likely that they will start to use illicit substances.⁴

The effect of peer influences stemming from school and community norms, is one of the most commonly cited risk/protective factors for initiating substance use in

adolescence.^{4,23,24} The plasticity of the adolescent brain makes it particularly susceptible to social influences.²⁴ Youth's attitudes towards substance use including the presumed risk and level of acceptability are shaped by the behaviors of their peers.²³ While adolescents are easily influenced by their peers, they are not able to accurately perceive the attitudes of others.²⁴ This misperception, called the false consensus effect, commonly leads youth to believe that, because they are engaging in a behavior, the behaviors of others are similar, leading them to overestimate the risky behaviors of their peers.²⁴ While social influence has the potential to reinforce and encourage risky behaviors, such as substance use, it can have the opposite effect of promoting positive social norms such as school engagement, cooperating with peers, and volunteering.²⁴ The more one's patterns of differential association, comprised of the frequency, duration, priority, and intensity of social interactions, lean towards exposure to prosocial, positive behavior and attitudes, the more likely that one will emulate these behaviors.²⁴

As a highly specialized population, rural adolescents face risk and protective factors for developing substance use disorders that are resultant from their environment, as well as many of the same as their urban counterparts. One study found that rural adolescents have net 35% greater odds of past year prescription opioid use than urban adolescents.⁸ In this analysis they found that criminal behavior, lower perceived risk from drug use, and past year emergency department (ED) treatment were all higher in rural than large urban adolescents and were among the most robust predictors of substance use.⁸ Paradoxically, they found that less peer use and less access to illicit drugs were protective factors for rural adolescents, even though the prevalence of drug use was

higher in the rural population than the large urban population.⁸ This finding was partially explained by the manner in which rural adolescents obtain prescription opioids, which was more likely to be through legitimate means from a physician, likely due to their higher utilization of the ED.⁸

Despite differences in risk between urban and rural adolescent populations, substance use treatment strategies have comparable efficacies in both groups.¹² The primary methods of treatment for adolescents are evidence-based psychosocial interventions,²⁵ such as contingency management (CM), motivational enhancement therapy (MET), family therapy, and cognitive behavioral therapy (CBT).²⁶ A meta-analysis comparing the effectiveness of various adolescent outpatient treatment modalities found that family therapy was most effective at reducing substance use, although every form of treatment was found to produce a reduction in substance use over no treatment at all or generic practice.²⁷ This study highlights the importance of ensuring that specialized substance use treatment is readily available to adolescents. Because all methods were shown to be effective to some level, additional factors besides effectiveness, such as cost effectiveness, ease of implementation, and transportability to different settings, should also be considered when selecting treatment models in order to increase utilization by patients.²⁷

Although interventions have been found to be effective to some level, it is common to observe a relapsing and remitting course throughout treatment, often with a low retention rate.⁵ It is not unusual to see only modest reductions in substance use following treatment.⁵ Pairing adolescents with personalized treatment plans increases the

likelihood of successful engagement.⁵ The minimum standard of treatment recommended by the Center for Substance Abuse Treatment is a segregated track for adolescents in a center that admits all age groups.²⁸ Due to their incomplete neurological development, adolescents have unique treatment requirements that need to address family functioning and stressful physical and psychosocial transitions.²⁹ These additional features of adolescent treatment that deviate from traditional adult treatment demonstrate the need for adolescent specific care.

While underutilized, medication therapy has been increasingly recommended and successfully implemented as an adjuvant treatment option for adolescents. Current treatment guidelines maintain a focus on psychosocial interventions, however, medication is available for severe substance use or with the treatment of opioid, tobacco, and alcohol use.²⁵ The American Academy of Pediatrics also currently recommends medication assisted therapy (MAT) specifically for severe OUD.²⁵ Several medication options including buprenorphine, naloxone, and methadone have been used in adult patients for opioid use.²⁵ However, the options for adolescents are more limited. The only currently available medication is buprenorphine, which is only approved by the FDA for use in those over the age of sixteen.²⁵ Buprenorphine is a partial opioid agonist that is effective in reducing acute withdrawal symptoms during the detoxification process and reducing craving symptoms as a part of maintenance treatment.²⁵

While a variety of treatments have been found to be effective, a significant disparity exists between the number of adolescents who could potentially benefit and the number who actually enroll in treatment.^{5,6} It has been estimated that only 10% of

adolescents in need of treatment are able to succeed in receiving it in any form and this statistic has not changed in the past 20 years.⁶ Numerous barriers exist to the utilization of treatment services by adolescents, allowing deviant behaviors and their consequences initiated in an individual's teenage years to continue to plague them into their adult lives. The bulk of research on adolescent populations has studied a lack of available treatment programs, lack of treatment options including medication treatment, lack of perceived need or motivation for treatment, social stigma, socioeconomic status (SES), familial relationships, and referral services as potential barriers in access to substance use treatment. Barriers have been studied in general adolescent, general adult, and rural adult populations, however, there is a lack of current knowledge of the utilization barriers faced by rural adolescents, which is of particular importance in the ever-changing landscape of substance abuse patterns across the country. This dearth of updated data results in a lack of insight into how the problem of adolescent substance use can be mitigated in rural areas of high need.

Existing Research

The majority of investigations into the barriers to access of treatment have been performed in young adult populations, age 18-25, who display higher rates of substance use and misuse than adolescents.¹ However, a preliminary review of the literature yields several studies conducted to investigate why few adolescents receive treatment for both substance use and substance use disorders, despite displaying behaviors that have been directly correlated with continued and worsening use in adulthood. A few main themes have been identified from this body of research, which add to the understanding of the

factors involved in the underutilization of treatment by adolescents. These themes have been categorized into individual, interpersonal, institutional, and policy level barriers in accordance with the social ecological model.³⁰ According to the social ecological perspective, all levels are intrinsically linked and interventions must breach multiple levels in order to be successful in increasing access to treatment.³⁰ While progress has been made on studies of general adolescent populations, even fewer studies focus attention specifically on rural adolescents and the unique barriers to treatment they face by virtue of their isolated geography and represent an area for future research focus.

Individual

One identified barrier for adolescents is the **lack of perceived need and motivation** for treatment. Wu et. al. 2011 found that of the 5141 self-reported lifetime opioid users, 789 (16%) endorsed patterns of use consistent with DSM-IV criteria for abuse or dependence, while another 999 (20%) endorsed subthreshold use.³¹ Despite these reported usage patterns, only 89 (4.9%) expressed perceiving a need for treatment.³¹ The dependence group was the most likely to perceive need followed by the abuse and then subthreshold groups (SU< A,D; p= 0.001).³¹ Haughwout et. al. 2016 also found that treatment utilization was more prevalent among adolescents with SUD than those with subthreshold use (11.4% vs. 1.4%).³² These results indicate that adolescents may not realize that they could benefit from some form of treatment until their substance use has reached the level at which they have become dependent on using.

The Wu et. al. study also suggests that even if treatment is available, adolescents may not see a need for it or ever attempt to obtain it. Even among the small proportion of

those who did express a need for treatment, only 13% actually received it.³¹ The reasons for not seeking treatment related to perception of need included: “wasn’t ready to stop using” (34%), “could handle the problem without treatment” (21%), “didn’t need treatment” (18%), “didn’t think treatment would help (8%).³¹ These reasons given did not differ among those with dependence, abuse, or subthreshold use.³¹ Additionally, Wisdom et. al. reported lack of motivation as a barrier to seeking care reported by 14% of staff, 13% of parents, and 21% of adolescents interviewed.³³ Haughwort et. al. reported that 26% of adolescents with SUD perceived a need for treatment. The Wisdom et. al. and Haughwort et. al. studies do not report perception of need as a barrier as prominently seen in the Wu et. al. study, although it still appears to be a common barrier across multiple studies.

Socioeconomic status is another potential barrier that has been investigated in relation to the low utilization of substance use treatment by adolescents. Lui et. al. 2017 investigated SES, measured by parent education and income, and examined its relationship to the adolescents who were receiving treatment as well as their long term outcomes, measured by abstinence and 12 step attendance over five years after the end of treatment.¹⁹ No association was found between parent SES and treatment initiation or treatment retention.¹⁹ There was also no difference was found in alcohol or drug abstinence by parent education or income.¹⁹ However, those with parents of a higher education were more likely to participate in 12 step groups at three and five year follow ups ($p < 0.05$).¹⁹ This finding suggests that there may be a disparity in continuing care after the completion of a treatment program.¹⁹ Wu et. al. 2011 also investigated family

income as an enabling variable and similarly found no association with entering treatment.³¹ However, Ilgen et. al. found that higher parental education was positively associated with receipt of substance abuse treatment (OR 1.22, 95% CI: 1.03-1.45).⁶

Interpersonal

Family structure has also been examined in relation to treatment utilization by adolescents. Zhang et. al. 2020 researched the association between adolescent drug use, drug use disorders, and treatment service utilization across two-parent, one-parent, and no-parent families.³ They found that youth in non-parent and single parent families were more likely to report lifetime illicit drug use (Single-parent OR: 1.34, 95% CI: 1.25,1.44; Non-parent OR: 1.61, 95% CI: 1.38,1.89) with a substantially higher likelihood of using marijuana (Single-parent OR: 1.59, 95% CI: 1.47,1.71, Non-parent OR: 2, 95% CI:1.69,2.37) and a mildly higher likelihood of using non-marijuana illicit drugs particularly cocaine, heroin, and methamphetamine (Single-parent OR: 1.63, 95% CI: 1.21,2.2; Non-parent OR: 1.78 95% CI: 1.18,2.71) and hallucinogens (Single-parent OR: 1.45, 95% CI: 1.22,1.73; Non-parent OR: 1.83 95% CI: 1.38,2.44).³ The proportion of use was greatest in non-parent families and followed by one-parent families.³ However, there was no difference for risk of developing a disorder following use based on family structure.³ It was hypothesized that once an adolescent starts using illicit substances, they may be similarly likely to develop a disorder regardless of the potential protective or risk inducing influence of family.³ There was also no significant difference in treatment utilization among the three family structures.³ However, in both the bivariate and multivariate analysis, treatment utilization was highest among one-parent families,

followed by non-parent, and lowest in two-parent families.³ Other studies have investigated the relationships between adolescents and their parents or guardians. Multiple studies have found that adolescents who did not talk to parents/guardians about substance use utilized treatment less than those who did (Haughwort et. al. With SUD OR: 1.54 95% CI: 1.32 to 1.79; Wu et. al. OR: 1.56 95% CI: 1.08-2.25).^{31,32} Haughwort et. al only found this association to be significant among adolescents with SUD as opposed to subthreshold users.³²

While perceived **social stigma** as a barrier to accessing substance use treatment has been addressed in the adolescent literature, few studies have analyzed its effects in depth and few definitive conclusions have been drawn from the outcomes of these studies. In the adolescent literature, Wu et. al. 2011 found that reasons associated with facing stigma commonly given for not seeking treatment included: “Didn’t want others to find out” (22%) and “treatment might cause neighbors to have negative opinions” (22%).³¹ Of the staff, parents, and adolescents interviewed by Wisdom et. al., 24% of staff, 0% of parents, and 4% of adolescents indicated that stigma was a barrier to seeking treatment.³³ However unlike the previously mentioned studies, Earnshaw et. al. 2018 specifically investigated the impact of stigma on adolescents in a small qualitative analysis.³⁴ From thematic analyses of interviews, this study found that youth may worry about their classmates finding out our their SUD and that this fear may dissuade them from seeking treatment in order to hide their SUD.³⁴ As has been reported in adults with SUDs, adolescents reported feeling hurt by family members who stigmatized them, sometimes leading to an increase in substance use to cope with this perceived

maltreatment.³⁴ Caregivers to adolescents with SUD were reported to face the double stigma of worrying that others will blame them for their child's substance use and worrying about their child facing stigma.³⁴ Caregivers may be socially rejected by the caregivers of their child's peers due to this stigma.³⁴ Due to its extensively researched effect on adults and the importance of peer and community influences on adolescents, the impact of stigma is a topic that warrants future focused study using both quantitative and longitudinal studies in this population.

Institutional

One major barrier identified was the **lack of treatment programs** available to adolescents. A study by Paino et. al. 2015 found that less than half of treatment programs admitted adolescents or offered an adolescent only track.²⁹ Of the 49.5% of treatment centers that admitted adolescents, 79.6% of them offered a track specialized for this age group.²⁹ This means that 41.8% of total centers surveyed offered an adolescent only track.²⁹ There were only 3.8% of centers to go beyond the Center for Substance Abuse Treatment's recommendation for minimum standards that an adolescent only track exist in a center that admits age groups and admit solely adolescents.²⁹ While it is a positive finding that a majority of the centers that admit youth offered specialized tracks, adolescent only treatment centers may offer a higher quality of care, highlighting the necessity of programs with the capabilities to best serve this especially vulnerable population.²⁹ Interestingly, they also found that treatment centers in urban areas were less likely to admit adolescents (OR: 0.371, $p < 0.01$) and to offer adolescent only tracks (OR:

0.446, $p < 0.01$) than those in suburban or rural areas.²⁹ The details of these findings should be investigated in future studies.

A larger and more recent study by Alinsky et. al. 2020 of 13,585 treatment centers using data from the 2017 National Survey of Substance Abuse Treatment Services differed from the findings of Paino et. al. 2015.³⁵ They found that only 26% of centers offered adolescent specific treatment.³⁵ This suggests that the number of treatment centers offering specialized adolescent treatment may have declined in the years since the Paino et. al. study from 2015. The adolescent serving facilities were significantly associated with being owned by a nonprofit (OR: 1.28, 95% CI: 1.18, 1.39) or state/local/tribal government (OR: 1.59, 95% CI: 1.38, 1.82), accepting insurance or offering free and reduced services (Private insurance OR: 1.57, 95% CI: 1.52, 1.83; Medicaid OR: 1.94, 95% CI: 1.78, 2.12; Other public insurance OR: 1.72, 95% CI: 1.58, 1.87; Free or reduced fees OR: 1.75, 95% CI: 1.60, 1.92), and with receiving government grants (OR: 1.42, 95% CI: 1.31, 1.54) in comparison to adult facilities.³⁵ Only 3.6% of these facilities offered inpatient services, making the likelihood that one requiring a higher level of care based on the American Society of Addiction Medicine criteria would have access.³⁵ This finding further emphasizes the need for programs with the capabilities to best serve vulnerable adolescent populations.

In addition to a lack of programs, there is a lack of diversity of treatment options within these programs. Treatment programs have been found to be the most effective when they are tailored to the individual needs of each patient.^{5,32} For patients who are interested in or who clinically could benefit from **medication treatment**, it is often not

available.^{29,35} In addition to investigating the availability of treatment centers for youth, Paino et. al. 2015 and Alinsky et. al. 2020 also looked at which centers offer medication treatment. Both studies found that the availability of MAT treatment was lower in adolescent-serving facilities than in adult-serving facilities.^{29,35} Alinsky et. al. found that 23.1% of the adolescent serving facilities, or 6% of the total facilities offered any medication for adolescents with opioid use disorders.³⁵ This is compared to 35.9% of adult focused facilities who offer this treatment (OR: 0.53, 95% CI: 0.49,0.58).³⁵

Qualities that were associated with offering medication treatment were nonprofit status (OR: 1.37, 95% CI: 1.14,1.63), hospital affiliation (OR: 3.55, 95% CI: 2.72,4.65), accepting any form of insurance (Private OR: 5.92, 95% CI: 4.34,8.07; Medicaid OR: 2.06, 95% CI: 1.67,2.54; Other public insurance OR: 2.26, 95% CI: 1.85,2.78), being certified, licensed, or accredited by a state/hospital or national authority (By state/hospital authority OR: 1.95, 95% CI: 1.44,2.63; By national authority OR: 1.73, 95% CI:1.47,2.02), offering inpatient services (OR: 3.59, 95% CI: 2.52,5.12), and Northeast location (Northeast: Ref; Midwest: OR: 1.23, 95% CI: (1.09, 1.39); South: OR: 1.14, 95% CI: (1.02, 1.29); West: OR: 1.50, 95% CI: (1.33, 1.68)).³⁵

Paino et. al. investigated how frequently medications for alcohol use disorder and opioid use disorder were offered.²⁹ They found that as the percentage of adolescents in the treatment center increased, the extent to which it used MAT therapy decreased.²⁹ This association was found most significantly in the use of disulfiram for alcohol use disorder, and buprenorphine for opioid use disorder ($p < 0.10$).³⁵ Privately funded centers (OR: 2.359, $p < 0.01$), accredited centers (OR: 2.138, $p < 0.05$), centers with more employees

(OR: 2.067, $p < 0.001$), and centers with a greater percentage of counselors with advanced education (OR: 1.017, $p < 0.001$) were all positively associated with providing medication therapy.²⁹

Availability of different treatment settings and offerings is also important for accommodating individuals with different severities of illness. In the past, treatment services were designed for those with severe addiction for ongoing treatment, however, programs now exist to provide brief interventions for those with more mild use.¹⁶ Wu et. al. 2011 explored treatment utilization by lifetime and past year opioid users separated into those meeting the criteria for dependence, abuse, and subthreshold level use.³¹ They found that 12.4% of symptomatic opioid users received any form of treatment in the past year.³¹ Similar levels of utilization were found between the abuse group (16.1%) and the dependence group (17.4%), which were higher than the subthreshold group (8.9%) (Any medical setting $SU < \text{abuse (A), dependence (D)}$; $p = 0.001$; Any non-medical setting $SU < \text{A,D}$; $p = 0.002$).³¹ The type of treatment received differed based on the severity of opioid use with those meeting the criteria for dependence and abuse utilizing self-help groups ($SU < \text{A,D}$; $p = 0.003$) and inpatient hospitals ($SU < \text{A,D}$; $p < 0.001$) more than the subthreshold users.³¹ Analyzed separately, the dependence group also used more outpatient ($SU < \text{D}$; 0.014) and emergency room treatment ($SU < \text{D}$; $p = 0.007$) than the subthreshold users and the abuse group used more inpatient rehabilitation ($SU < \text{A}$; $p = 0.008$).³¹ These disparities suggest that there are differing treatment needs among groups of adolescents who use illicit substances and that those with subthreshold use are less likely to receive support despite still using opioids an average of 43.9 days a year.³¹

Referral to treatment from either mental health services or juvenile justice services has been found to increase entry into treatment. Multiple studies found that criminal justice system involvement was associated with a greater use of treatment (Haughwort et. al. With SUD: OR: 4.23 95% CI: 3.74 to 4.79 Without SUD: OR: 6.49 95% CI: 5.21 to 8.09; Wu et. al. OR: 2.58 95% CI: 1.66-4.02).^{31,32} Haughwout et. al. found that 24.7% of the adolescents sampled with an SUD reported criminal justice involvement.³² The National Center on Addiction and Substance Abuse has reported that 48.2% of treatment referrals occur through the criminal justice system.³² Ilgen et. al. found that treatment utilization was more common in adolescents who had already been seen in the mental health system.⁶ The adjusted odds of treatment increased by more than 3 times (OR 3.09, 95% CI: 2.55-3.75) for adolescents who reported past 12 month mental health treatment compared to those who did not.⁶ Mental health providers may be especially well positioned and trained to facilitate appropriate follow through on referrals to substance abuse treatment.⁶ The findings of these studies illustrate that lack of efficient entry points into the substance abuse treatment system may be a barrier for adolescents to receive treatment.

Policy

Studies have also found discrepancies between the types of **insurance** associated with treatment access.^{32,35} Haughwort et. al. found having private compared to public insurance decreased odds of receiving any type of treatment, although not to a significant level (Public aOR 1.00, Private: aOR 0.90 (95% CI 0.73 to 1.12)).³² This suggests that some private insurance may be less willing to cover SUD treatment for adolescents

compared to public insurance. In recent years, private plans have limited benefits and decreased funding for substance use treatment, while public plans have increased their funding.³² Alternatively, Alinsky et. al. found that those with private insurance had an increased odds of receiving maintenance medication treatment (Private OR: 5.92, 95% CI: 4.34,8.07; Medicaid OR: 2.06, 95% CI: 1.67,2.54; Other public insurance OR: 2.26, 95% CI: 1.85,2.78).³⁵ This may be explained by Medicaid restrictions seen in many states that require either prior authorization or the failure of other therapies before covering medication treatment.³⁵ Studies have found that facilities in states with the most strict Medicaid restrictions are least likely to accept it.³⁵ Treatment facilities may see these restrictions as too great a barrier with too little pay off and decline to offer medication treatment.³⁵

Common Limitations of the Literature

Six of the eight studies analyzed utilized nationwide survey data in cross sectional studies of either adolescent populations or substance use treatment facilities.^{3,6,29,31,32,35} The cross-sectional design makes it difficult to draw definitive conclusions because researchers are only able to look at data from a single point in time. Four of these cross-sectional studies, used surveys filled out directly by adolescents.^{3,6,31,32} These studies possess both a recall bias and a social desirability bias based on this design. In this case, survey respondents were often asked about lifetime and past year drug use, which may not have been represented accurately due to recall bias. The social desirability bias is commonly seen in the reporting of controversial or taboo subjects, such as sexual

behavior, mental health, and illicit drug use. In the adolescent population where stigma and social influence are especially strong, the data may have been influenced by bias.

A major limitation of the preceding investigation was the lack of a defined search strategy in the selection of relevant studies. The studies included in this preliminary review were identified using various untracked searches in Google Scholar and PubMed without clear inclusion or exclusion criteria. In the future, a systematic review will need to be conducted in order capture the maximum number of relevant studies. Stronger conclusions regarding barriers in the access of treatment for adolescent substance use disorder will able to be drawn using this design.

METHODS

Study Design

A systematic literature review is proposed to further investigate the barriers in access to treatment for adolescents with substance use disorders. The aim of the review will be to answer the question, “What are the barriers to adolescents receiving treatment for substance use disorders?” and will examine these barriers in the context of rural populations. This project will be the first of its kind conducted for the adolescent population and will be able to offer a more conclusive overview than individual studies alone. It will be conducted in accordance with the 2020 PRISMA statement and checklist.

Search Strategy

Relevant articles were identified by conducting literature searches in PubMed, Embase, and PsycInfo. A search strategy was developed for PubMed using MeshTerms and later adapted for the subsequent databases by translating each original search term into index terms specific to each database (Table 2). PubMed was searched on May 13, 2021, followed by Embase on May 24, 2021 and PsycInfo on June 2, 2021. The searches were conducted following the framework of the Panchansky and Thomas (1981) paper, which defined “healthcare access” according to five parameters: acceptability, affordability, accessibility, availability, and accommodation.³⁶ The Mesh database was searched to determine the MeshTerm most closely related to each of the five parameters. For the purposes of the PubMed search, accessibility and availability were combined, due to the term “accessibility to health services” included under the MeshTerm “availability of health services”. Searches were conducted by combining each of the identified mesh

terms from Criteria A with the additional qualifiers from Criteria B (Table 1), to create 4 unique searches. A fifth search using “stigma” was added due to the presence of this barrier to substance use treatment access noted from the preliminary literature searches. The mesh terms from Criteria B were linked and included in each search using the Boolean term “AND”. The mesh term “adolescent” was further modified using “NOT adult”, as it was found to be more effective at reducing results for adult populations in PubMed. The search was kept intentionally broad with regards to urban-rural location in order to yield the highest number of relevant studies. The searches were filtered to include studies published from 1990-present, in order to encompass all papers published after the presumed start of the opioid epidemic when illicit drug use first began to significantly increase in adolescents.³⁷

Table 1. Criteria A and B terms used to conduct literature searches in the primary databases.

Criteria A	“Patient acceptance of healthcare”
	“Health care costs”
	“Health services accessibility”
	“Delivery of health care”
Criteria B	“United States”
	“Substance related disorders”
	“Substance abuse treatment centers”
	“Adolescent” NOT “adult”

Study Population

This review examined adolescents age 10-19 in the United States, in accordance with the WHO definition of “adolescent”, with the diagnosis of at least one substance use disorder.³⁸ Subspecialty populations including those involved in the juvenile justice system and those with co-occurring mental health disorders were included in the study population.

Inclusion/Exclusion Criteria

This review included IRB approved studies published in English. Papers examining any type of substance use disorder including illicit drug, marijuana, alcohol, tobacco, and polysubstance use were included. Studies examining adolescents directly or indirectly through other stakeholders, including parents of adolescents or adolescent providers, were included. All study types were used, however, manuscripts and other background informational papers were excluded. “Barriers in access to treatment” was defined as any factor which makes it less likely that an individual or group will initiate formal treatment for substance use. Consequently, studies examining factors which make it more likely to receive treatment were included and the “barrier” was considered as the opposite factor. Included studies had factors involved in treatment initiation as a primary or secondary outcome measure. Papers conducted on general behavioral or mental health disorders were excluded.

Screening and Identification of Studies

All 670 papers resulting from the PubMed, Embase, and PsycInfo searches were uploaded into Rayyan, a free web based tool created to facilitate the screening process for

systematic reviews. The papers were screened first by title and abstract then by full text. The remaining studies identified in the preceding preliminary literature review which met the inclusion criteria and were not discovered by either of these search methods, were added to the included studies. Papers were screened by the first author to determine study eligibility. Rayyan was used to document the selections and the reasons for paper exclusion, as well as remove duplicates identified from multiple searches.

Timeline and Resources

The systematic literature review was conducted and the final analysis will be completed in the future. This project will occur over the 8 month period from May 2021-December 2021.

Table 2. Timeline for project completion.

May 2021	Identify research question, define inclusion/exclusion criteria, identify search strategy and search of databases
June 2021	Identification of studies for inclusion
June 2021- August 2021	Analysis of literature using included studies
September 2021- October 2021	Selection of journal in which to submit to, project write up
October 2021- December 2021	Editing and revisions based on criteria and layout of the peer reviewed journal selected for submission
December 2021	Submission for publication in a peer reviewed journal

It was conducted by the primary author. A research librarian was utilized to optimize search strategies and an expert in the field of adolescent substance use served as an advisor to oversee the completion of the project.

Institutional Review Board

The systematic review does not involve human subjects and does not require IRB approval. Only IRB approved studies were included for analysis.

Results

The proposed search strategy was conducted and 24 papers fitting the inclusion/exclusion criteria were identified (Appendix B). Seventeen of the identified studies were cross sectional in design, using either data from nationally administered surveys, such as the Monitoring the Future Survey and National Household Survey on Drug Abuse, or from independently collected data. All studies were published between 2002 and 2020. The majority of studies directly examined barriers from the adolescents perspective. However, studies examined additional stakeholder perspectives as well: two examined parents of adolescents with SUD, four examined clinical staff including providers and therapists, and two examined facility directors including juvenile correctional facility directors and child welfare agency directors. There were no studies that directly investigated barriers to substance use treatment in rural areas, although one study was conducted with Native American adolescents in the Southern United States, which may be presumed to be a rural area.

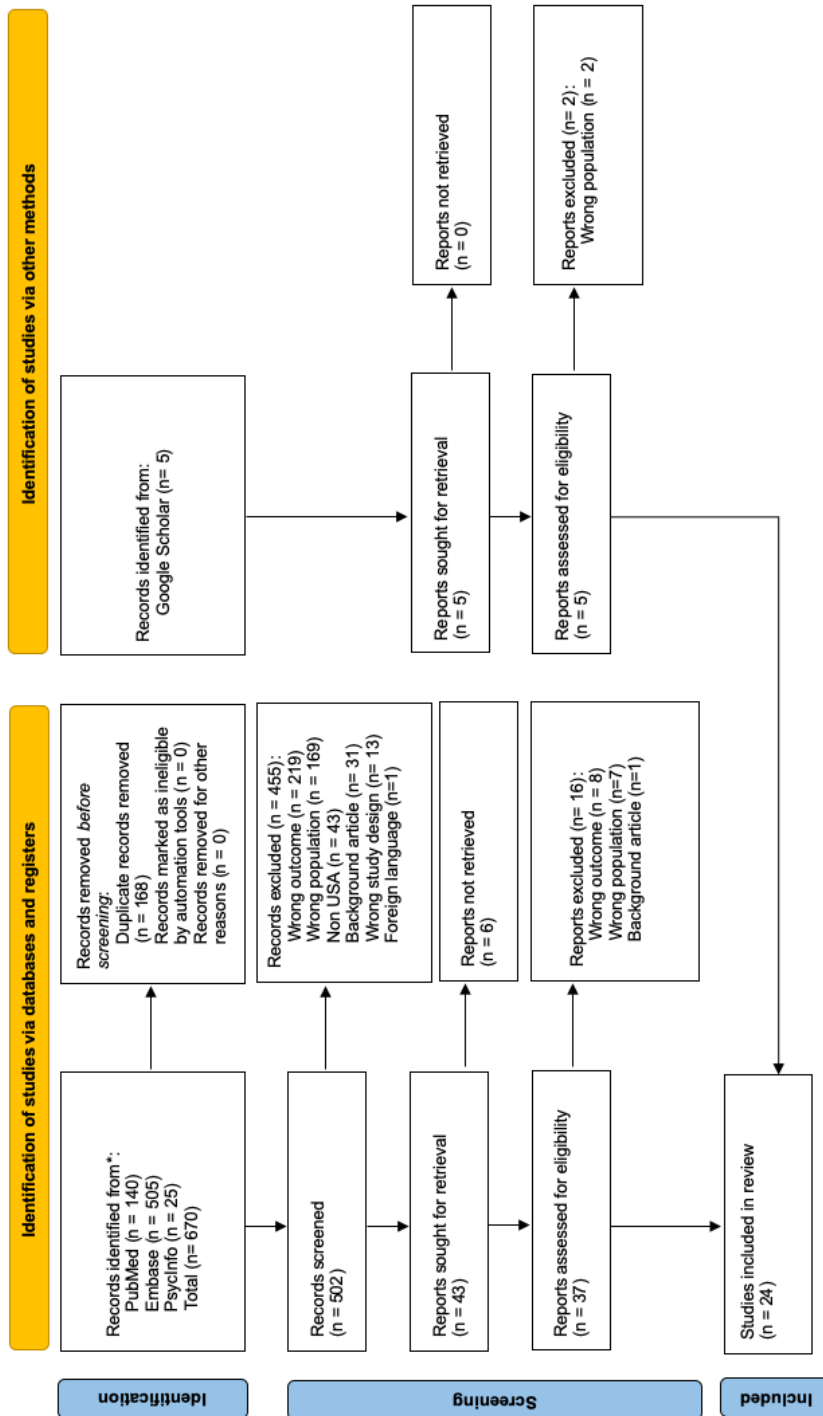


Figure 2. PRISMA 2020 flow diagram for included papers. Adapted from: Page et. al. 2020.³⁹

CONCLUSION

Discussion

This thesis proposes a protocol for the completion of a systematic review to identify barriers in access to substance use treatment for adolescents and to examine these barriers in the context of rurality. Healthcare decisions should be informed by the best available research evidence. A systematic literature review is a cost effective initial step towards both expanding the current base of research in the relatively newly emerging field of adolescent substance use. A systematic review can be conducted in a short period of time using minimal resources. A small team of 2-3 researchers and the funds necessary for journal submission and publication is sufficient for project completion. The 24 papers identified from the proposed systematic search strategy may be further analyzed in the future and the resulting conclusions used to further evidence-based practice, which integrates individual clinical expertise with the best available systematic research findings. The identified barriers may be further analyzed in the context of the social ecological model to understand how individual, interpersonal, institutional, and policy level barriers interact. This will help to tailor interventions, screening and referral methods, financing, policy, and organization and delivery of services to have the most significant impact possible on increasing service utilization.

While this project will further inform the field of adolescent substance use disorder, it has several limitations that need to be addressed. First, the papers were screened by only one author due to lack of additional personnel resources. In the future at least one additional author should conduct the screening process to reduce bias. Ideally, a

third author would be available to serve as a tiebreaker in the event of disagreement between the first two authors. Second, papers were only included which used treatment initiation as an outcome measure. While treatment retention and treatment completion are also measures of those who were able to access care, one's ability to stay in treatment or complete treatment is likely effected by differing factors than the barriers one must overcome to make an initial contact with the treatment system. Therefore treatment initiation was determined to be a more accurate indicator of the problem of treatment access. However, future studies may choose to broaden the inclusion criteria to include retention and completion as outcome measures. Third, studies conducted on both adolescents and young adults over age 18 combined were excluded from the study to keep focus on the target population, although conclusions drawn from these studies are likely applicable to the younger adolescent age group. The WHO definition of "adolescent" as those age 10-19 was used in order to capture the majority of papers which include those age 13-18. This definition does not capture those who are 20 years old who might be of interest when considering adolescent alcohol use disorder because the US drinking age is 21. For the purposes of this review 20 year old were not considered adolescents, although they may face barriers to receiving treatment due to their underage use similar to those of adolescents. No papers were excluded due to the inclusion of 20 year old's in the adolescent population. Finally, rurality was not directly examined in any of the included studies, so conclusions drawn about the impact of barriers on a rural environment will need to be largely postulated based on research done in adult populations.

Summary

This systematic literature review will be the first to examine barriers in access to care for the treatment of adolescent SUD. Studies have investigated treatment barriers for adult populations and for rural populations, however, investigations into treatment barriers for adolescents, especially those in rural areas, has remained lacking. The preliminary literature review found lack of perceived need and motivation, family structure, parental education, stigma, lack of available treatment programs, lack of MAT options, lack of availability of different treatment settings, referral policies, and insurance type to be barriers to access for the general adolescent population. The systematic review will be able to further characterize these barriers in the context of all available literature.

Public Health Significance

The identification of barriers in access to substance use treatment for adolescents determined from this systematic review will help to target future interventions to increase access to care. The current system in the US for adolescent SUD treatment is not sufficient to serve the needs of the adolescent population. Even as adolescent SUD has evolved and grown in recent years since the onset of the opioid epidemic in the 1990s, treatment utilization rates have remained low at 10%. Addressing and identifying substance use early would be effective harm reduction for those continuing to use into adulthood and may reduce the number of adults who use substances. A relapsing and remitting course is commonly seen in substance use disorder, so it is unlikely that adolescents who receive treatment will remain substance free throughout their lifetimes. However, treatment has been shown to be beneficial at reducing substance use for many

and provides a starting point for behavior alteration. Change in substance use treatment utilization will require the cooperation of multiple systems at the individual, interpersonal, institutional, and policy level in order to be implemented successfully.

APPENDIX A

PubMed Search Algorithm

1. Acceptability:

("Patient Acceptance of Health Care"[MeSh Terms] OR "Health Care Utilization" OR "Utilization, Health Care" OR "Patient Acceptance of Healthcare" OR "Healthcare Patient Acceptance" OR "Healthcare Patient Acceptances" OR "Nonacceptors of Health Care" OR "Care Nonacceptor, Health" OR "Care Nonacceptors, Health" OR "Health Care Nonacceptor" OR "Health Care Nonacceptors" OR "Health Care Seeking Behavior" OR "Acceptors of Health Care" OR "Care Acceptor, Health" OR "Care Acceptors, Health" OR "Health Care Acceptor" OR "Health Care Acceptors" OR "Health Care Acceptability" OR "Acceptability of Healthcare" OR "Healthcare Acceptabilities" OR "Healthcare Acceptability")

2. Affordability:

("Health Care Costs"[MeSh Terms] OR "Cost, Health Care" OR "Costs, Health Care" OR "Health Care Cost" OR "Health Costs" OR "Cost, Health" OR "Costs, Health" OR "Health Cost" OR "Healthcare Costs" OR "Cost, Healthcare" OR "Costs, Healthcare" OR "Healthcare Cost" OR "Medical Care Costs" OR "Costs, Medical Care" OR "Cost, Medical Care" OR "Medical Care Cost" OR "Treatment Costs" OR "Cost, Treatment" OR "Costs, Treatment" OR "Treatment Cost")

3. Accessibility:

("Health Services Accessibility"[Mesh] OR "Availability of Health Services" OR "Health Services Availability" OR "Accessibility of Health Services" OR "Accessibility, Health

Services" OR "Access to Health Services" OR "Access to Therapy" OR "Access to Therapies" OR "Therapy, Access to" OR "Access to Treatment" OR "Access to Treatments" OR "Treatment, Access to" OR "Health Services Geographic Accessibility" OR "Program Accessibility" OR "Accessibility, Program" OR "Access To Medicines" OR "Access To Medicine" OR "Access to Medications" OR "Access to Medication" OR "Medication, Access to" OR "Medication Access" OR "Access, Medication" OR "Medication Accesses")

4. Accommodation:

("Delivery of Health Care"[Mesh] OR "Delivery of Healthcare" OR "Healthcare Deliveries" OR "Healthcare Delivery" OR "Deliveries, Healthcare" OR "Delivery, Healthcare" OR "Health Care Delivery" OR "Delivery, Health Care" OR "Health Care" OR "Care, Health" OR "Healthcare" OR "Health Care Systems" OR "Health Care System" OR "System, Health Care" OR "Systems, Health Care" OR "Healthcare Systems" OR "Healthcare System" OR "System, Healthcare" OR "Systems, Healthcare" OR "Nonclinical Distribution" OR "Distributions, Nonclinical" OR "Nonclinical Distributions" OR "Distribution, Nonclinical" OR "Distribution, Non-Clinical" OR "Distribution, Non Clinical" OR "Distributions, Non-Clinical" OR "Non-Clinical Distributions" OR "Non-Clinical Distribution" OR "Non Clinical Distribution" OR "Community-Based Distribution" OR "Community Based Distribution" OR "Community-Based Distributions" OR "Distribution, Community-Based" OR "Distributions, Community-Based" OR "Distributional Activities" OR "Activities, Distributional" OR "Activity, Distributional" OR "Distributional Activity")

5. Stigma:

("Social Stigma"[MeSh Terms] OR "Social Stigmas" OR "Stigmas, Social" OR "Stigma, Social")

Additional qualifiers:

AND ("united states"[MeSH Terms] OR "united states"[All Fields] OR "USA"[All Fields] OR "America"[All Fields]) AND ("Substance-Related Disorders"[Mesh] OR "Substance Use" OR "Substance Uses" OR "Use, Substance" OR "Drug Abuse" OR "Abuse, Drug" OR "Drug Dependence" OR "Dependence, Drug" OR "Drug Addiction" OR "Addiction, Drug" OR "Substance Use Disorders" OR "Disorder, Substance Use" OR "Drug Use Disorders" OR "Disorder, Drug Use" OR "Drug Use Disorder" OR "Organic Mental Disorders, Substance-Induced" OR "Organic Mental Disorders, Substance Induced" OR "Substance Abuse" OR "Abuse, Substance" OR "Substance Abuses" OR "Substance Dependence" OR "Dependence, Substance" OR "Substance Addiction" OR "Addiction, Substance" OR "Chemical Dependence" OR "Chemical Dependences" OR "Dependence, Chemical" OR "Dependences, Chemical" OR "Prescription Drug Abuse" OR "Abuse, Prescription Drug" OR "Drug Abuse, Prescription" OR "Drug Habituation" OR "Habituation, Drug") AND ("Substance Abuse Treatment Centers"[Mesh] OR "Treatment Centers, Substance Abuse" OR "Drug Rehabilitation Center" OR "Center, Drug Rehabilitation" OR "Centers, Drug Rehabilitation" OR "Drug Rehabilitation Centers" OR "Treatment Centers, Drug Abuse" OR "Rehabilitation Center, Drug" OR "Rehabilitation Centers, Drug" OR "Treatment Centers, Drug" OR "Drug Abuse Treatment Centers" OR "Drug Treatment Centers" OR "Center, Drug Treatment" OR

"Centers, Drug Treatment" OR "Drug Treatment Center" OR "Treatment Center, Drug")AND ("Adolescent"[MeSH Terms]) NOT ("Adult"[MeSH Terms])

Final Search 1: 34 results

("Patient Acceptance of Health Care"[MeSH Terms] OR "Health Care Utilization" OR "Utilization, Health Care" OR "Patient Acceptance of Healthcare" OR "Healthcare Patient Acceptance" OR "Healthcare Patient Acceptances" OR "Nonacceptors of Health Care" OR "Care Nonacceptor, Health" OR "Care Nonacceptors, Health" OR "Health Care Nonacceptor" OR "Health Care Nonacceptors" OR "Health Care Seeking Behavior" OR "Acceptors of Health Care" OR "Care Acceptor, Health" OR "Care Acceptors, Health" OR "Health Care Acceptor" OR "Health Care Acceptors" OR "Health Care Acceptability" OR "Acceptability of Healthcare" OR "Healthcare Acceptabilities" OR "Healthcare Acceptability") AND ("united states"[MeSH Terms] OR "united states"[All Fields] OR "USA"[All Fields] OR "America"[All Fields]) AND ("Substance-Related Disorders"[Mesh] OR "Substance Use" OR "Substance Uses" OR "Use, Substance" OR "Drug Abuse" OR "Abuse, Drug" OR "Drug Dependence" OR "Dependence, Drug" OR "Drug Addiction" OR "Addiction, Drug" OR "Substance Use Disorders" OR "Disorder, Substance Use" OR "Drug Use Disorders" OR "Disorder, Drug Use" OR "Drug Use Disorder" OR "Organic Mental Disorders, Substance-Induced" OR "Organic Mental Disorders, Substance Induced" OR "Substance Abuse" OR "Abuse, Substance" OR "Substance Abuses" OR "Substance Dependence" OR "Dependence, Substance" OR "Substance Addiction" OR "Addiction, Substance" OR "Chemical Dependence" OR "Chemical Dependences" OR "Dependence, Chemical" OR "Dependences, Chemical")

OR "Prescription Drug Abuse" OR "Abuse, Prescription Drug" OR "Drug Abuse, Prescription" OR "Drug Habituation" OR "Habituation, Drug") AND ("Substance Abuse Treatment Centers"[Mesh] OR "Treatment Centers, Substance Abuse" OR "Drug Rehabilitation Center" OR "Center, Drug Rehabilitation" OR "Centers, Drug Rehabilitation" OR "Drug Rehabilitation Centers" OR "Treatment Centers, Drug Abuse" OR "Rehabilitation Center, Drug" OR "Rehabilitation Centers, Drug" OR "Treatment Centers, Drug" OR "Drug Abuse Treatment Centers" OR "Drug Treatment Centers" OR "Center, Drug Treatment" OR "Centers, Drug Treatment" OR "Drug Treatment Center" OR "Treatment Center, Drug")AND ("Adolescent"[MeSH Terms]) NOT ("Adult"[MeSH Terms])

Final search 2: 6 results

("Health Care Costs"[MeSH Terms] OR "Cost, Health Care" OR "Costs, Health Care" OR "Health Care Cost" OR "Health Costs" OR "Cost, Health" OR "Costs, Health" OR "Health Cost" OR "Healthcare Costs" OR "Cost, Healthcare" OR "Costs, Healthcare" OR "Healthcare Cost" OR "Medical Care Costs" OR "Costs, Medical Care" OR "Cost, Medical Care" OR "Medical Care Cost" OR "Treatment Costs" OR "Cost, Treatment" OR "Costs, Treatment" OR "Treatment Cost") AND ("united states"[MeSH Terms] OR "united states"[All Fields] OR "USA"[All Fields] OR "America"[All Fields]) AND ("Substance-Related Disorders"[Mesh] OR "Substance Use" OR "Substance Uses" OR "Use, Substance" OR "Drug Abuse" OR "Abuse, Drug" OR "Drug Dependence" OR "Dependence, Drug" OR "Drug Addiction" OR "Addiction, Drug" OR "Substance Use Disorders" OR "Disorder, Substance Use" OR "Drug Use Disorders" OR "Disorder, Drug

Use" OR "Drug Use Disorder" OR "Organic Mental Disorders, Substance-Induced" OR "Organic Mental Disorders, Substance Induced" OR "Substance Abuse" OR "Abuse, Substance" OR "Substance Abuses" OR "Substance Dependence" OR "Dependence, Substance" OR "Substance Addiction" OR "Addiction, Substance" OR "Chemical Dependence" OR "Chemical Dependences" OR "Dependence, Chemical" OR "Dependences, Chemical" OR "Prescription Drug Abuse" OR "Abuse, Prescription Drug" OR "Drug Abuse, Prescription" OR "Drug Habituation" OR "Habituation, Drug") AND ("Substance Abuse Treatment Centers"[Mesh] OR "Treatment Centers, Substance Abuse" OR "Drug Rehabilitation Center" OR "Center, Drug Rehabilitation" OR "Centers, Drug Rehabilitation" OR "Drug Rehabilitation Centers" OR "Treatment Centers, Drug Abuse" OR "Rehabilitation Center, Drug" OR "Rehabilitation Centers, Drug" OR "Treatment Centers, Drug" OR "Drug Abuse Treatment Centers" OR "Drug Treatment Centers" OR "Center, Drug Treatment" OR "Centers, Drug Treatment" OR "Drug Treatment Center" OR "Treatment Center, Drug")AND ("Adolescent"[MeSH Terms]) NOT ("Adult"[MeSH Terms])

Final search 3: 11 results

("Health Services Accessibility"[Mesh] OR "Availability of Health Services" OR "Health Services Availability" OR "Accessibility of Health Services" OR "Accessibility, Health Services" OR "Access to Health Services" OR "Access to Therapy" OR "Access to Therapies" OR "Therapy, Access to" OR "Access to Treatment" OR "Access to Treatments" OR "Treatment, Access to" OR "Health Services Geographic Accessibility" OR "Program Accessibility" OR "Accessibility, Program" OR "Access To Medicines"

OR "Access To Medicine" OR "Access to Medications" OR "Access to Medication" OR
"Medication, Access to" OR "Medication Access" OR "Access, Medication" OR
"Medication Accesses") AND ("united states"[MeSH Terms] OR "united states"[All
Fields] OR "USA"[All Fields] OR "America"[All Fields]) AND ("Substance-Related
Disorders"[Mesh] OR "Substance Use" OR "Substance Uses" OR "Use, Substance" OR
"Drug Abuse" OR "Abuse, Drug" OR "Drug Dependence" OR "Dependence, Drug" OR
"Drug Addiction" OR "Addiction, Drug" OR "Substance Use Disorders" OR "Disorder,
Substance Use" OR "Drug Use Disorders" OR "Disorder, Drug Use" OR "Drug Use
Disorder" OR "Organic Mental Disorders, Substance-Induced" OR "Organic Mental
Disorders, Substance Induced" OR "Substance Abuse" OR "Abuse, Substance" OR
"Substance Abuses" OR "Substance Dependence" OR "Dependence, Substance" OR
"Substance Addiction" OR "Addiction, Substance" OR "Chemical Dependence" OR
"Chemical Dependences" OR "Dependence, Chemical" OR "Dependences, Chemical"
OR "Prescription Drug Abuse" OR "Abuse, Prescription Drug" OR "Drug Abuse,
Prescription" OR "Drug Habituation" OR "Habituation, Drug") AND ("Substance Abuse
Treatment Centers"[Mesh] OR "Treatment Centers, Substance Abuse" OR "Drug
Rehabilitation Center" OR "Center, Drug Rehabilitation" OR "Centers, Drug
Rehabilitation" OR "Drug Rehabilitation Centers" OR "Treatment Centers, Drug Abuse"
OR "Rehabilitation Center, Drug" OR "Rehabilitation Centers, Drug" OR "Treatment
Centers, Drug" OR "Drug Abuse Treatment Centers" OR "Drug Treatment Centers" OR
"Center, Drug Treatment" OR "Centers, Drug Treatment" OR "Drug Treatment Center"

OR "Treatment Center, Drug")AND ("Adolescent"[MeSH Terms]) NOT ("Adult"[MeSH Terms])

Final search 4: 87 results

("Delivery of Health Care"[Mesh] OR "Delivery of Healthcare" OR "Healthcare Deliveries" OR "Healthcare Delivery" OR "Deliveries, Healthcare" OR "Delivery, Healthcare" OR "Health Care Delivery" OR "Delivery, Health Care" OR "Nonclinical Distribution" OR "Distributions, Nonclinical" OR "Nonclinical Distributions" OR "Distribution, Nonclinical" OR "Distribution, Non-Clinical" OR "Distribution, Non Clinical" OR "Distributions, Non-Clinical" OR "Non-Clinical Distributions" OR "Non-Clinical Distribution" OR "Non Clinical Distribution" OR "Community-Based Distribution" OR "Community Based Distribution" OR "Community-Based Distributions" OR "Distribution, Community-Based" OR "Distributions, Community-Based" OR "Distributional Activities" OR "Activities, Distributional" OR "Activity, Distributional" OR "Distributional Activity") AND ("united states"[MeSH Terms] OR "united states"[All Fields] OR "USA"[All Fields] OR "America"[All Fields]) AND ("Substance-Related Disorders"[Mesh] OR "Substance Use" OR "Substance Uses" OR "Use, Substance" OR "Drug Abuse" OR "Abuse, Drug" OR "Drug Dependence" OR "Dependence, Drug" OR "Drug Addiction" OR "Addiction, Drug" OR "Substance Use Disorders" OR "Disorder, Substance Use" OR "Drug Use Disorders" OR "Disorder, Drug Use" OR "Drug Use Disorder" OR "Organic Mental Disorders, Substance-Induced" OR "Organic Mental Disorders, Substance Induced" OR "Substance Abuse" OR "Abuse, Substance" OR "Substance Abuses" OR "Substance Dependence" OR "Dependence,

Substance" OR "Substance Addiction" OR "Addiction, Substance" OR "Chemical
Dependence" OR "Chemical Dependences" OR "Dependence, Chemical" OR
"Dependences, Chemical" OR "Prescription Drug Abuse" OR "Abuse, Prescription
Drug" OR "Drug Abuse, Prescription" OR "Drug Habituation" OR "Habituation, Drug")
AND ("Substance Abuse Treatment Centers"[Mesh] OR "Treatment Centers, Substance
Abuse" OR "Drug Rehabilitation Center" OR "Center, Drug Rehabilitation" OR "Centers,
Drug Rehabilitation" OR "Drug Rehabilitation Centers" OR "Treatment Centers, Drug
Abuse" OR "Rehabilitation Center, Drug" OR "Rehabilitation Centers, Drug" OR
"Treatment Centers, Drug" OR "Drug Abuse Treatment Centers" OR "Drug Treatment
Centers" OR "Center, Drug Treatment" OR "Centers, Drug Treatment" OR "Drug
Treatment Center" OR "Treatment Center, Drug") AND ("Adolescent"[MeSH Terms])
NOT ("Adult"[MeSH Terms])

Final search 5: 2 results

("Social Stigma"[MeSH Terms] OR "Social Stigmas" OR "Stigmas, Social" OR "Stigma,
Social") AND ("united states"[MeSH Terms] OR "united states"[All Fields] OR
"USA"[All Fields] OR "America"[All Fields]) AND ("Substance-Related
Disorders"[Mesh] OR "Substance Use" OR "Substance Uses" OR "Use, Substance" OR
"Drug Abuse" OR "Abuse, Drug" OR "Drug Dependence" OR "Dependence, Drug" OR
"Drug Addiction" OR "Addiction, Drug" OR "Substance Use Disorders" OR "Disorder,
Substance Use" OR "Drug Use Disorders" OR "Disorder, Drug Use" OR "Drug Use
Disorder" OR "Organic Mental Disorders, Substance-Induced" OR "Organic Mental
Disorders, Substance Induced" OR "Substance Abuse" OR "Abuse, Substance" OR

"Substance Abuses" OR "Substance Dependence" OR "Dependence, Substance" OR
"Substance Addiction" OR "Addiction, Substance" OR "Chemical Dependence" OR
"Chemical Dependences" OR "Dependence, Chemical" OR "Dependences, Chemical"
OR "Prescription Drug Abuse" OR "Abuse, Prescription Drug" OR "Drug Abuse,
Prescription" OR "Drug Habituation" OR "Habituation, Drug") AND ("Substance Abuse
Treatment Centers"[Mesh] OR "Treatment Centers, Substance Abuse" OR "Drug
Rehabilitation Center" OR "Center, Drug Rehabilitation" OR "Centers, Drug
Rehabilitation" OR "Drug Rehabilitation Centers" OR "Treatment Centers, Drug Abuse"
OR "Rehabilitation Center, Drug" OR "Rehabilitation Centers, Drug" OR "Treatment
Centers, Drug" OR "Drug Abuse Treatment Centers" OR "Drug Treatment Centers" OR
"Center, Drug Treatment" OR "Centers, Drug Treatment" OR "Drug Treatment Center"
OR "Treatment Center, Drug")AND ("Adolescent"[MeSH Terms]) NOT ("Adult"[MeSH
Terms])

TOTAL RESULTS: 140

APPENDIX B

Title	Authors	Year of Publication	Population	Substance	Location	Study period	Design
Factors associated with adolescent utilization of alcohol treatment services ⁴⁰	Wu P; Hoven CW; Tiet Q; Kovalenko P; Wicks J	2002	Age 12-17 from the 1994 National Household Survey on Drug Abuse (n=4,698)	All	USA	1994	Cross sectional
Pathways to care: narratives of American Indian adolescents entering substance abuse treatment ⁴¹	Novins DK; Spicer P; Fickenscher A; Pescosolido B	2012	Adolescents at a residential substance abuse treatment program run by the Southern American Indian tribe (n=89)	All	Southern USA	October 1998 - May 2001	Retrospective cohort study
Adolescent treatment initiation and engagement in an evidence-based practice initiative ⁴²	Lee MT; Garnick DW; O'Brien PL; Panas L; Ritter GA; Acevedo A; Garner BR; Funk RR; Godley MD	2012	Age 12-18 at 28 outpatient substance abuse treatment sites (n=2,191)	All	USA	January 2007 - May 2010	Randomized control
Prevalence and characteristics of substance abuse treatment utilization by U.S. adolescents: national data from 1987 to 2008 ⁶	Ilgen MA; Schulenberg J; Kloska DD; Cazy E; Johnston L; O'Malley P	2011	12th grade students from the Monitoring the Future Survey (n=25,537)	All	USA	1987-2008	Cross sectional
Adolescents entering chemical dependency treatment in private managed care: ethnic differences in treatment initiation and retention ⁴³	Campbell CI; Weisman C; Sterling S	2006	Age 13-18 entering chemical dependency treatment in a private, managed care health plan (n=419)	All	Northern California	May 2000 - June 2002	Longitudinal cohort
Treatment use and barriers among adolescents with prescription opioid use disorders ³¹	Wu LT; Blazer DG; Li TK; Woody GE	2011	Age 12-17 from the National Surveys of Drug Use and Health (n=1788)	Prescription opioids	USA	2005-2008	Cross sectional
A national survey of substance abuse treatment for juvenile offenders ⁴⁴	Young DW; Dembo R; Henderson CE	2007	National survey of juvenile institutional and community corrections facilities directors (n=141)	All	USA	2003	Cross sectional
Effects of alcohol and drug use on inpatient and residential treatment among youth with severe emotional disturbance in Medicaid-funded behavioral health care plans ⁴⁵	Cook JA; Burke-Miller J; Fitzgibbon G; Grey DD; Heflinger CA; Paulson RI; Stein-Seroussi A; Kelleher KJ; Hoven CW; Mulken V	2004	Age 11-17 with co-occurring severe emotional disturbance and substance use (n=875)	All	5 sites: PA, NY, OR, TN, OH	May 1997 - May 1999	Cross sectional
Child welfare agency ties to providers and schools and substance abuse treatment use by adolescents ⁴⁶	Wells, R; Chuang, E.; Haynes, L.E.; Lee, L.-H.; Bai, Y.	2011	Age 11-16 from the NSCAW Child Protective Services cohort from 92 welfare agencies (n=901). Directors of child welfare agencies in the NSCAW sample (n=86/92)	All	USA	October 1999- December 2000	Cross sectional
Treatment staff referrals, participation expectations, and perceived benefits and barriers to adolescent involvement in Twelve-Step Groups ⁴⁷	Kelly, J.F.; Yeterian J.D.; Myers, M.G	2008	SUD clinical staff from 5 programs with patient contact (n= 114)	Alcohol and Narcotics	Northeastern US	Not reported	Cross sectional
Dynamic effects among patients' treatment needs, beliefs, and utilization: A prospective study of adolescents in drug treatment ⁴⁸	Schell, T.L.; Orlando, M.; Morral, A.R.	2005	First sample of youths age 13-19 receiving residential treatment (n=476), second sample of youths age 13-19 receiving outpatient treatment (n=519)	First sample: All, Second sample: marijuana	First sample: Western US, Second sample: Eastern US states	First sample: 1999-2001, Second sample: 1998-1999	Longitudinal cohort

Title	Authors	Year of Publication			Substance	Location	Study period	Design
		Publication	Population	FQHC for				
Adolescent SBIRT implementation: Generalist vs. Specialist models of service delivery in primary care ⁴⁹	Mitchell, S.G.; Gryczynski, J.; Schwartz, R.P.; Kirik, A.S.; Dusek, K.; Oros, M.; Hosler, C.; O'Grady, K.E.; Brown, B.S.	2020	27 Providers from a large FQHC for adolescents age 12-17 (n=9639)	All	Baltimore City, MD	May 1, 2013 - December 31, 2014	Cluster randomized trial	
Socioeconomic differences in adolescent substance abuse treatment participation and long-term outcomes ¹⁹	Lui, C.K.; Sterling, S.A.; Chi, F.W.; Lu, Y.; Campbell, C.J.	2017	Adolescents age 13-18 (n= 358)	All	Northern California	2000-2002	Longitudinal cohort	
Treatment need and utilization among youth entering the juvenile corrections system ⁵⁰	Johnson, T.P.; Cho, Y.I.; Fendrich, M.; Graf, I.; Kelly-Wilson, L.; Pickup, L.	2004	Youth age 13-18 entering the IDOC juvenile system for the first time	All	Illinois	May 12, 2000 - August 11, 2000	Cross sectional	
Adolescent substance abuse treatment clinicians' self-help meeting referral practices and adolescent attendance rates ⁵¹	Passetti, L.L.; Godley, S.H.	2008	Adolescents age 15-17 at 8 geographically varied substance use treatment programs (n= 1,889), Clinicians from these sites (n= 28)	All	USA	September 2002 - June 2006	Cross sectional	
The association of self-reported neighborhood disorganization and social capital with adolescent alcohol and drug use, dependence, and access to treatment ⁵²	Winstanley, E.L.; Steinwachs, D.M.; Ensminger, M.E.; Latkin, C.A.; Stitzer, M.L.; Olsen, Y.	2008	Adolescents age 12-17 from the NSDUH (n= 38,115)	All	USA	1999-2000	Cross sectional	
Adolescent and therapist perception of barriers to outpatient substance abuse treatment ⁵³	Mensingger, J.L.; Diamond, G.S.; Kaminer, Y.; Wintersteen, M.B.	2006	Adolescents age 13-18 in the Cannabis Youth Treatment project (n= 600), Therapists (n= 14)	Marijuana	USA	Not reported	Cross sectional	
Pathways to chemical dependency treatment for adolescents in an HMO ⁵⁴	Sterling, S.; Kohn, C.; Lu, Y.; Weisner, C.	2004	Adolescents age 13-18 and accompanying parent (n= 419)	All	Northern California	May 2000 - June 2002	Cross sectional	
Detection and outcomes of substance use disorders in adolescents seeking mental health treatment ⁵⁵	Kramer, T.L.; Robbins, J.M.; Phillips, S.D.; Miller, T.L.; Burns, B.J.	2003	Adolescents and their parents of caregiver (n= 237)	All	Arkansas and Texas	Not reported	Longitudinal cohort	
Race/ethnic disparity and correlates of substance abuse service utilization and juvenile justice involvement among adolescents with substance use disorders ⁵⁶	Aaron, G.A.; Brown, S.A.; Garland, A.F.; Hough, R.L.	2004	Adolescents age 13-18 (n= 420)	All	San Diego County, California	Not reported	Cross sectional	
Adolescent-serving addiction treatment facilities in the United States and the availability of medications for opioid use disorder ⁵⁵	Alinksky, R.H.; Hadland, S.E.; Mason, P.A.; Cerda, M.; Saloner, B.	2020	Drug and alcohol treatment facilities (n= 13,585)	All	USA	February 2017 - December 2017	Cross sectional	
Organizational Predictors and Use of Evidence Based Practices in Adolescent Substance Abuse Treatment ²⁹	Paino, Alettraris, Roman	2015	SUD treatment programs (n= 454)	All	USA	June 2009 - January 2012	Cross sectional	
Treatment utilization among adolescent substance users: Findings from the 2002 to 2013 National Survey on Drug Use and Health ⁵²	Haughwout et al.	2016	Adolescents age 12-17 with past year substance use (n= 79,885)	All	USA	2002-2013	Cross sectional	
Family Structure and youth illicit drug use, use disorder, and treatment services utilization ³	Zhang et al.	2020	Adolescents age 12-17 (n= 41,579)	All	USA	2015-2017	Cross sectional	

LIST OF JOURNAL ABBREVIATIONS

Addict Behav	Addictive Behaviors
Addict Res Theory	Addiction Research & Theory
Alcohol Clin Exp Res	Alcoholism: Clinical and Experimental Research
Am J Addict	The American Journal on Addictions
Am J Drug Alcohol Abuse	The American Journal of Drug and Alcohol Abuse
Am J Psychiatry	American Journal of Psychiatry
Arch Pediatr Adolesc Med	Archives of Pediatrics and Adolescent Medicine
BMJ	British Medical Journal
Child Youth Serv Rev	Children and Youth Services Review
Community Ment Health J	Community Mental Health Journal
Dev Cogn Neurosci	Developmental Cognitive Neuroscience
Drug Alcohol Depend	Drug and Alcohol Dependence
Health Serv Res	Health Services Research
Int J Drug Policy	International Journal of Drug Policy
Int J Ment Health Addict	International Journal of Mental Health and Addiction
J Adolesc Health	Journal of Adolescent Health

J Am Acad Child Adolesc Psychiatry	Journal of the American Academy of Child & Adolescent Psychiatry
J Child Adolesc Subst Abuse	Journal of Child & Adolescent Substance Abuse
J Psychoactive Drugs	Journal of Psychoactive Drugs
J Rural Health	The Journal of Rural Health
J Subst Abuse Treat	Journal of Substance Abuse Treatment
J Youth Adolesc	Journal of Youth and Adolescence
Soc Sci Med	Social Science & Medicine
Subst Abuse	Substance Abuse
Prison J	The Prison Journal

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CURRICULUM VITAE

