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Impact of Brief Interventions on Admissions to Speciality Substance Abuse Treatment

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Impact of Brief Interventions on Admissions to Specialty Substance Abuse Treatment

Sabrina Trocchi, PhD
University of Connecticut, 2018

Abstract

Substance abuse is a major public health burden, accounting for significant social, physical, and health problems and resulting in considerable health care costs. Screening, Brief Intervention, and Referral to Treatment (SBIRT) is a public health approach that provides early intervention for individuals with risky alcohol and drug use and timely referral to specialty substance abuse treatment for individuals with substance use disorders. This observational study utilized a single group pre-post test design to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement as determined by the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). A secondary aim was to assess differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants who received a BI or BI/RT.

Significant effect was found for study participants who screened at high-risk on the ASSIST for alcohol and/or other substances *and* who were offered a BI/RT *and* who had a pre-SBIRT admission to specialty treatment. The odds of the BI/RT study participants (OR= 4.751; 95% CI 2.634, 8.571) with prior substance abuse treatment having a post-SBIRT admission to specialty treatment was 4.751 times greater than the odds of study participants who did not have prior substance abuse treatment admission. The role of BI and the substantially significant role of BI/RT, as components of SBIRT, are confirmed as a promising approach for early intervention for substance use disorders.

Impact of Brief Interventions on Admissions to Specialty Substance Abuse Treatment

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Doctor of Philosophy

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University of Connecticut

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APPROVAL PAGE

Doctor of Philosophy Dissertation

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DEDICATION

I dedicate this dissertation to my husband, Rick, and three children—Emily, Tessa, and Jacob, for their enduring love and support throughout this long yet rewarding journey.

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CHAPTER 1: INTRODUCTION

Substance abuse is a major public health burden, accounting for significant social, physical, and health problems and resulting in considerable health care costs. In 2014, an estimated 136.9 million Americans, aged 12 and older, were identified as current alcohol users, with 22.9% classified as binge drinkers, defined as drinking five or more drinks for males and drinking four or more drinks for females on the same occasion on at least one day in the past 30 days, and 6.3% as heavy drinkers, defined as binge drinking on five or more days in the past 30 days based on the thresholds described above for males and females (Substance Abuse and Mental Health Services Administration (SAMHSA), 2014). Additionally, an estimated 24.6 million Americans, aged 12 or older, were identified as current illicit drug users, meaning they had used an illicit drug during the month prior to the survey interview (SAMHSA, 2014). Treatment need was identified by classifying survey respondents as having a substance use disorder in the past 12 months based on broad criteria specified in the most recent Diagnostic and Statistical Manual of Mental Disorders edition (DSM). Diagnosis criteria included symptoms such as withdrawal, tolerance, use in dangerous situations, trouble with the law, and interference with major obligations at work, school, or home during the past 12 months (SAMHSA, 2014). In 2013, an estimated 22.7 million individuals or 8.6 percent of the population, aged 12 or older, needed treatment for alcohol or an illicit drug problem. Of the estimated 22.7 million Americans who were classified as needing treatment, only about 2.5 million people 10 percent received treatment in a specialty substance abuse treatment facility, of which 859,000 received treatment for alcohol use, 899,000 received treatment for illicit

drug use only, and 633,000 received treatment for both alcohol and illicit drug use (SAMHSA, 2014). It is worthy to mention that treatment need was based on a very broad definition of substance use disorder, which included a significant number of individuals who are at low levels of dependence.

A large body of scientific evidence demonstrates that substance abuse treatment is generally associated with positive outcomes for individuals with substance use disorders, including reduced future medical costs and arrests and higher likelihood of employment (McLellan et al., 1994; Campbell et al., 2007; Luchansky et al., 2006; Wickizer, et al., 2000; Wickizer et al., 2006). Research shows that the earlier substance-dependent individuals engage in treatment, the faster and better the outcomes (Timko et al. 1999; Moos & Moos 2003), further highlighting the significance of identifying substance use/abuse issues early (universal screening) and intervening with clinically indicated interventions (motivationally based brief interventions and/or referral to specialty treatment). While scientific data suggests that specialty treatment increases the likelihood of recovery among individuals with diagnosable dependence (Dawson et al., 2006), a number of barriers prevent individuals from seeking, entering, and remaining in treatment. Screening, Brief Intervention, and Referral to Treatment (SBIRT) is a public health approach that provides early intervention for individuals with risky alcohol and drug use and timely referral to specialty substance abuse treatment for individuals with substance use disorders. Although SBIRT programs vary, key SBIRT components generally include universal screening, motivationally based brief interventions (BIs), and referral to specialty substance abuse treatment services (RT) for individuals presenting at

higher risk for alcohol and/or other substance use. SBIRT is largely delivered in primary healthcare settings, such as community health centers, hospital emergency departments, and dental clinics. While there is substantial evidence of the short-term benefits of BI for alcohol problems, tobacco use and other health risk behaviors in primary care settings (Babor et al., 2007), less is known on the extent to which BIs are associated with admissions to specialty substance abuse treatment services. Therefore, this dissertation was designed to examine factors associated with patient engagement in specialty substance use treatment for those receiving SBIRT services within a primary care visit at one of nine (9) Federally Qualified Health Centers across Connecticut.

SBIRT services include use of validated, universal screening tools to identify all psychoactive substances with determination of level of risk. Patients screening negative or low-risk for substances are provided education and feedback about those substances. The Connecticut SBIRT Program utilized the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) to obtain risk level (no risk, low-risk, moderate-risk or high-risk) for alcohol and/or substance misuse. The ASSIST was developed by the World Health Organization (WHO) specifically for use in primary healthcare settings where harmful substance use among patients may go undetected. Validity of the ASSIST for identifying substance use in individuals who use a number of substances and have varying degrees of substance use has been demonstrated in a number of multi-site international studies (Humenuik et al., 2007).

It was demonstrated that the ASSIST can discriminate between low-, moderate-, and high-risk substance use across multiple substances, including alcohol, cannabis, opioid, and cocaine use (Humenuik et al., 2007). Patients scoring in the moderate risk range are offered a BI to encourage

lower risk use, while those scoring in the high risk range are offered a BI and a referral to treatment (RT) to motivate them to engage in specialty treatment. BIs are widely researched methods shown to provide risk reduction to patients at lower or moderate levels of risk and are also used to encourage high-risk individuals to accept more intensive treatment. BIs encompass several broad frameworks and theories on behavioral change and motivation, including Stages of Change, FRAMES (Feedback, Responsibility, Advice to Change, Menu of Options, Empathy, and Self-Efficacy), and Motivational Interviewing (MI) theories, all of which are considered to account for the observed changes in substance use, although there is little evidence that these components are necessary or sufficient conditions for behavior change.

Based on the growing literature on BIs (Krupski, et al., 2010; Babor et al., 2007; SAMHSA, 2011), including reported effects of BIs, as a component of SBIRT, in treatment engagement, this study was designed to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT interventions. The study hypothesis was based on the assumption that study participants who screened at high-risk on the ASSIST for substance use and were offered a BI/RT would be more likely to engage in specialty substance abuse treatment within a year post-SBIRT intervention compared to those who screened at moderate-risk on the ASSIST and received a BI only. Study participants who screened at high-risk and who were offered BI/RT, which facilitates engagement into specialty substance abuse treatment, would present to specialty substance abuse treatment at higher rates than study participants who screened at moderate-risk on the ASSIST. A secondary exploratory aim was to assess differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and

pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT.

The following analyses were conducted to test the study hypothesis and exploratory secondary aim:

- 1) The first analysis tested the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT as part of health center SBIRT services within the previous year.
- 2) The second (exploratory) analysis investigated demographic, including age, gender, race/ethnicity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment and ASSIST severity correlates of treatment engagement among study participants based on the receipt of a BI or BI/RT.

This was an observational study which utilized a single study group pre-post test design to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT interventions. Specialty substance abuse treatment was defined as an admission to a licensed substance abuse treatment program within 365 days (one year) post-SBIRT intervention as captured by the Connecticut Department of Mental Health and Addiction Services (DMHAS) client database. Specialty substance abuse treatment included the following levels of care: residential detoxification, long-term rehabilitation, intensive and

intermediate residential, medication assisted treatment, including methadone maintenance, outpatient, and partial hospitalization. This study relied on existing administrative data from a number of sources, including the Connecticut Department of Mental Health and Addiction Services (DMHAS) administrative database and the Connecticut SBIRT Program database.

The study population included adults, ages 18 and over, who presented at one of the nine community health centers implementing the CT SBIRT Program between March 1, 2011 and March 31, 2013 *and* who screened at moderate-risk or at high-risk on the ASSIST for alcohol and/or other substances *and* who were offered a BI or BI/RT. Individuals who screened at low-risk on the ASSIST were provided feedback by the Health Educators (HEs) on their ASSIST score and what it represents, in addition to being provided a positive educational message and encouragement to continue their healthy behaviors. No further action was taken with individuals who screened at low-risk. Individuals who screened at moderate-risk or at high-risk on the ASSIST were asked permission to discuss their substance use, and, if the participant was willing, moved into a BI. Participants in the high-risk group, in addition to receiving a BI, were also referred to specialty substance abuse treatment (RT) for additional assessment and possible placement in an appropriate level of care. Admission to specialty substance abuse treatment was determined by matching study participant identifiers to the Connecticut Department of Mental Health and Addiction Services (DMHAS) administrative database of specialty substance abuse treatment.

As hypothesized, the odds of the BI/RT study population having a post-SBIRT admission to specialty treatment was 2.78 times greater than the odds of study participants who screened at moderate-risk and who were offered a BI only [OR= 2.78; 95% CI 2.27, 3.40]. When factoring

age, gender (male), race/ethnicity, prior history of mental health treatment, prior history of substance abuse treatment, and ASSIST severity scores, the odds of the BI/RT study participants having a post-SBIRT admission to specialty treatment was between 2.88 and 1.67 times higher than for the BI only study participants. These findings indicate that BI/RT, as a component of the SBIRT model, could potentially impact admissions to specialty substance abuse treatment post-SBIRT intervention more significantly than BI alone. It is also important to note that BI alone also had a positive impact on admissions to specialty substance abuse treatment. Significant effect was found for study participants who screened at high-risk on the ASSIST for alcohol and/or other substances *and* who were offered a BI/RT *and* who had a pre-SBIRT admission to specialty treatment. The odds of the BI/RT study participants with prior substance abuse treatment having a post-SBIRT admission to specialty treatment was 4.751 times greater than the odds of study participants who did not have prior substance abuse treatment admission [OR= 4.75; 95% CI 2.63, 8.57]. No significant effects were predicted for BI or BI/RT and age, gender, race/ethnicity or prior mental health treatment, where each characteristic was examined one-by-one to measure the independent effects on post-SBIRT admission to specialty substance abuse treatment.

The potential for BIs, as a component of SBIRT, to identify, intervene, and motivate individuals at-risk for alcohol and/or other substances to access specialty treatment could have a significant impact on healthcare given continued trends of alcohol and/or other substance abuse in the United States. The findings of this dissertation study have the potential to affirm a significant role for BIs, as a component of SBIRT, in motivating and facilitating individuals' admission to specialty treatment.

SBIRT provides early identification and intervention with individuals who are at risk for substance abuse. The role of BI and substantially significant role of BI/RT, as components of SBIRT, in increasing access to specialty substance abuse treatment is promising. Wider dissemination of BI and BI/RT, as components of SBIRT, can have a significant impact on healthcare and societal costs associated with substance abuse. The potential for BIs, as a component of SBIRT, to identify, intervene, and motivate individuals at-risk for alcohol and/or other substances to access specialty treatment could have a significant impact on healthcare given continued trends of alcohol and/or other substance abuse in the United States.

CHAPTER 2: LITERATURE REVIEW

This chapter reviews the literature for the key domains that support the study aims and hypotheses tested. Domains include: 1) Public Health Effects of Alcohol and Illicit Drug Use; 2) Prevalence Rates of Alcohol and Illicit Drug Use; 3) Benefits of Substance Abuse Treatment; 4) Barriers to

Treatment; 5) Screening, Brief Intervention and Referral to Treatment (SBIRT): A Public Health Approach; 6) Brief Intervention (BI) Theory; 7) Effectiveness of Brief Interventions (BIs) with Alcohol and Other Drugs; and 8) Role of Brief Interventions (BI) in Specialty Treatment Admission. This chapter concludes with a conceptual framework and rationale for this dissertation study, including scientific gaps and a description of the study aims and hypotheses.

2.1. Public Health Effects of Alcohol and Illicit Drug Use

Substance abuse is a major public health burden, accounting for significant social, physical, and health problems and resulting in considerable health care costs. Substance abuse often results in poor health outcomes and substantial costs related to illnesses, hospitalizations, motor vehicle injuries, and premature deaths. Deaths resulting from alcohol and illicit drugs use, most of which are preventable, include unintentional overdose, suicide, HIV and AIDS acquired through the sharing of contaminated drug paraphernalia, and trauma, such as, motor vehicle accidents caused by driving under the influence (United Nations Office of Drugs and Crime (UNODC), 2014). In the United States, the total costs of abuse and addiction due to use of alcohol and illicit drugs are estimated at \$740 billion a year in health care, productivity loss, crime, and incarceration and drug enforcement (National Institute on Drug Abuse (NIDA), 2013). Alcohol accounts for 5.9% of the world's annual disease burden and contributes to 3.3 million deaths annually (WHO, 2014). Globally, it is estimated that in 2010 between 153 million and 300 million people aged 15-64; or 3.4-6.6 percent of the world's population in that age group, had used an illicit substance at least once in the previous year. Illicit drugs contribute to an additional 250,000 deaths annually (WHO, 2012), with drug-related deaths accounting for 0.5 and 1.3 percent of all-cause mortality among those aged 15-64 (UNODC, 2014).

2.2. Prevalence Rates of Alcohol and Illicit Drug Use

The National Survey on Drug Use and Health (NSDUH) is the primary source of statistical information on the use of alcohol and illicit drugs by the U.S. civilian, non-institutionalized population aged 12 or older (SAMHSA, 2014). The survey is sponsored by SAMHSA, U.S. Department of Health and Human Services, and is planned and managed by SAMHSA's Center for Behavioral Health Statistics and Quality (CBHSQ). According to the 2013 NSDUH, an estimated 136.9 million Americans aged 12 and older were current alcohol users, with 22.9% classified as binge drinkers and 6.3% as heavy drinkers. Binge drinking is defined as drinking five or more drinks for males and drinking four or more drinks for females on the same occasion on at least one day in the past 30 days. Heavy drinking is defined as having five or more drinks on the same occasion on at least five days in the past 30 days (SAMHSA, 2014). Additionally, an estimated 24.6 million Americans aged 12 or older were current illicit drug users, meaning they had used an illicit drug during the month prior to the survey interview. This estimate represents 9.4 percent of the population aged 12 or older (SAMHSA, 2014). Illicit drugs include marijuana/hashish, cocaine, heroin, hallucinogens, inhalants, or prescription-type psychotherapeutics (pain relievers, tranquilizers, stimulants, and sedatives) used for non-medical purposes. The data indicates that marijuana use has continued to increase, where 19.8 million persons reported current (past-month) use (7.5 percent); 6.5 million reported nonmedical users of prescription-type drugs (2.5 percent); 1.5 million reported cocaine use (.6 percent); and an estimated 289,000 current heroin users (.1 percent) of the population. After alcohol, marijuana has the highest rate of dependence or abuse among all drugs, with 4.3 million Americans meeting clinical criteria for dependence or abuse of marijuana in 2012. More than half (52.1 percent) of

Americans aged 12 or older reported being current drinkers of alcohol, translating to an estimated 135.5 million current drinkers in 2012 (SAMHSA, 2012). An estimated 21.6 million persons aged 12 or older (8.2%) in 2013 were classified with substance dependence or abuse in the past year based on criteria specified in the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (DSM-IV).

Analysis of the National Household Survey on Addictions (SAMHSA, 2014) shows that Connecticut has: 1) a higher rate of alcohol use, binge drinking, and illicit drug use than the national average. Connecticut's rate of substance abuse or dependence (10.1%) is higher than the nation as a whole (9.2%); 2) an estimated 268,000 adults have a current need for treatment for substance abuse or dependence; 3) a higher rate of past month use of alcohol than the national average (60.8% vs. 51.4%); 4) a higher rate of binge drinking than the national average (25.1% vs. 22.9%); and 5) a higher rate of illicit drug use (9.2%) in the past month than the national average (8.2%). The Connecticut DMHAS Annual Statistical Report provides information about the services provided and the individuals served during state fiscal year 2015 (CT DMHAS, 2016). During State Fiscal Year 2015 (July 1, 2014 through June 30, 2015), 59,203 individuals were treated in specialty substance abuse treatment programs. The most common primary drug at admission was heroin/other opiates at 52.6%, followed by alcohol at 29.1%, marijuana at 9.2%, and cocaine at 5.4% (CT DMHAS, 2016). More than twice as many male patients (68%) presented to specialty substance abuse treatment than female patients (31%). Of patients served, 64% were White/Caucasian, 16% Black/African American, and 14% of Hispanic ethnicity. The average age of patients receiving specialty substance abuse treatment services was 38.3 years. Admissions to specialty substance abuse treatment levels of care were as follows: 9% Residential/Inpatient, 64%

Outpatient, and 27% Medication Assisted Treatment, including Methadone Maintenance. The Connecticut substance abuse treatment system includes approximately 51 licensed substance abuse treatment organizations with over 300 programs.

The Affordable Care Act (ACA) created changes in the delivery and funding of specialty substance abuse treatment services, including increasing the number of individuals that are eligible to receive these services. In Connecticut, the Medicaid Expansion in 2012 resulted in an increased number of individuals eligible for Medicaid. In FY 13, the number of uninsured was approximately 13.2% of the state's population and this was reduced to approximately 4% in 2015 (CT DMHAS, 2016).

2.3. Benefits of Treatment

The goal of specialty substance abuse treatment, in addition to stopping or decreasing the frequency of substance use, is to return individuals to productive functioning in the family, workplace, and community. Participation with substance abuse treatment is generally associated with positive outcomes for individuals with substance use disorders (McLellan, et al., 1994), with a large body of scientific evidence demonstrating that substance abuse treatment is associated with reduced future medical costs and arrests, higher likelihood of employment, and improved social and psychological functioning (Campbell et al., 2007; Luchansky et al., 2006; Wickizer, et al., 2000; Wickizer et al., 2006). According to the National Institute on Drug Abuse (NIDA), specialty substance abuse treatment reduces drug use by 40 to 60 percent and arrest rates for violent and nonviolent criminal acts by 40 percent during and after treatment (NIDA, 2016). Furthermore, research shows that specialty substance abuse treatment reduces the risk of HIV infection and can improve the prospects for employment, with gains of up to 40 percent after treatment (NIDA,

2016). Effective treatment includes medication and behavioral therapy, often in combination, to ease withdrawal symptoms and increase skills to handle cues that may trigger substance abuse and prevent relapse. Research shows that the earlier substance-dependent individuals engage in treatment, the faster and better the outcomes (Timko et al. 1999; Moos & Moos 2003), further highlighting the significance of delivering SBIRT services in primary health care settings to identify substance use/abuse issues early (universal screening) and intervene with clinically indicated interventions, i.e., motivationally based brief interventions and/or referral to specialty treatment.

2.4. Barriers to Treatment

In 2013, an estimated 22.7 million individuals, or 8.6 percent of the population, aged 12 or older, needed treatment for alcohol or an illicit drug problem (SAMHSA, 2014). It is worthwhile to mention that treatment need was based on a very broad definition of substance use disorder, which included a significant number of individuals who are at low levels of dependence. Of the estimated 22.7 million Americans who were classified as needing treatment, only about 2.5 million people (10 percent) received treatment at a specialty substance abuse treatment facility, of which 859,000 received treatment for alcohol use, 899,000 received treatment for illicit drug use only, and 633,000 received treatment for both alcohol and illicit drug use (SAMHSA, 2014). Among the 20.2 million individuals who did not receive treatment at a specialty facility, 908,000 or 4.5 percent reported that they perceived a need for treatment. Of the 908,000, 316,000 individuals or 34.8 percent reported they made an effort to get treatment and 592,000 or 65.2 percent reported making no effort to get treatment (SAMHSA, 2014). Commonly reported reasons for not receiving treatment include: 1) no health coverage/could not afford treatment cost (37.3 percent); 2) not

ready to stop using (24.5 percent); 3) did not know where to access treatment (9.0 percent); 4) had health coverage but it did not cover treatment cost (8.2 percent); and 5) no transportation or treatment facility offered inconvenient hours for services (8.0 percent) (SAMHSA, 2014).

While scientific data suggests that treatment increases the chance of recovery among individuals with diagnosable dependence (Dawson et al., 2006), there are a number of barriers that prevent individuals seeking, entering, and remaining in treatment. Internal barriers include guilt, stigma, shame, feelings of powerlessness and hopelessness, access to treatment services, and lack of confidence that treatment will work (Grant, 1997; George & Tucker, 1996). External barriers include lack of knowledge regarding treatment availability and fear of the behavioral health treatment and legal systems (Coletti, 1998), in addition to fragmentation of services (Finkelstein, 1993). Literature on the process for referring individuals to assessment and specialty substance abuse treatment suggests that brief interventions (BIs) may be critical for the following reasons: 1) many individuals with alcohol and/or drug dependence do not seek treatment on their own until reaching a state of extreme severity; 2) most individuals do not follow up on a recommendation to seek treatment and BIs have been shown to increase the number who enter specialized substance abuse treatment; and 3) motivationally based BIs for individuals with substance use disorders not only facilitate their entry into treatment but also increase their treatment participation, attendance, and retention (Babor et al., 2007).

2.5. SBIRT: A Public Health Approach

As described on the federal Center for Substance Abuse Treatment (CSAT) website, “SBIRT is a public health approach to the delivery of early intervention and treatment services for people with

substance use disorders and those at risk of developing these disorders. Many different types of community settings provide opportunities for early intervention with at-risk substance users before more severe consequences occur” (SAMHSA, accessed May 14, 2014). Since 2003, SAMHSA has awarded cooperative agreements to twenty-nine states, one territory, and two tribal councils to establish SBIRT services. The SAMHSA-funded SBIRT Programs are designed to expand States’ continuum of care to include services for at-risk substance users to reduce alcohol and drug consumption and its negative health impact, reduce costly health care utilization, and promote sustainability. The World Health Organization (WHO), in response to the growing global crisis resulting from alcohol and illicit drugs use, strongly recommends that screening for harmful alcohol and illicit drug use be conducted using a validated instrument that can easily be incorporated into routine primary care practice and that individuals with harmful alcohol and/or drug use be provided brief interventions (BIs) (WHO, 2013). The U.S. Preventive Services Task Force (USPSTF), an independent panel of experts in prevention and evidence-based medicine, has recommended that primary care clinicians provide BIs to reduce alcohol misuse among adults ages 18 and older (USPSTF, 2004). SBIRT, which is identified as a promising practice for addressing unhealthy alcohol and/or illicit substance use in patient populations, was also a key component of the 2011 and 2012 National Drug Control Strategy (Office of National Drug Control and Policy (ONDCP), 2011, 2012a).

Although SBIRT programs vary, key SBIRT components generally include universal screening, motivationally based brief interventions, and referral to specialty substance abuse treatment services, as defined below. SBIRT is largely delivered in primary healthcare settings, such as community health centers, hospital emergency departments, and medical and dental clinics.

- I. Universal Screening: Screening is the process of identifying individuals with potential substance misuse or abuse problems and determining the appropriate interventions or next steps for these individuals. Screening is conducted using a validated brief instrument to classify an individual's pattern of alcohol or drug use (SAMHSA, 2013). Several examples of validated instruments include the Alcohol Use Disorders Identification Test (AUDIT) (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), the Drug Abuse Screening Test (DAST) (Skinner, 1982), the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) (Humeniuk, Henry-Edwards, Ali, Poznyak, & Monteiro, 2010). Screening offers the opportunity to initiate discussions with individuals about their alcohol and drug use and to provide interventions as recommended. Individuals who have a low screening score may not need an intervention, but may still benefit from health education and prevention activities to further support maintenance of low-risk use behaviors. Individuals who have a moderate screening score may be provided a motivationally based BI to raise individuals' awareness of their substance use and its consequences and motivate them towards positive change. Individuals who score high may receive a BI and/or be referred to specialty substance abuse treatment (RT) for further diagnostic assessment.

- II. Brief Interventions (BIs): BIs are evidence-based procedures that provide immediate attention to individuals who screen at moderate-risk and high-risk for alcohol and/or other substance use behaviors. As defined in the SAMHSA Treatment Improvement Protocol (TIP), BIs are time-limited, structured, and directed interventions, which aim to raise individuals' awareness of substance use and its consequences and motivate them towards positive change (SAMHSA,

1999). The intensity and focus of the BI is driven by the individual's presenting risk level and the patient's degree of readiness for behavior changes. In general, BIs in primary healthcare settings can range from 3 to 30 minutes of brief feedback, counseling, and advice (WHO, 2010). Key to the success of BIs is the ability to identify a measurable behavioral change that allows individuals to experience a small, incremental success. These small successes generally motivate individuals to return for more successes (SAMHSA, 1999). In *low-risk users*, the goal of BI is to educate them on the guidelines for low-risk use and potential problems of increased use. For example, an individual screening low-risk for alcohol use, should be encouraged to stay within empirically established guidelines—no more than 14 drinks per week or 4 per occasion for men and no more than 7 drinks per week or 3 per occasion for women (NIAAA, website 2015). In *moderate-risk users*, defined as individuals who are above the recommended guidelines for alcohol use or whose substance use places them at risk, the goal of BI is to address the level of use, to encourage decreased use or no use, and to educate the individual about the consequences of risky behavior and continued increased use. In *high-risk users*, defined as individuals with a likely substance use disorder per the most recent Diagnostic and Statistical Manual of Mental Disorders (DSM), the goal of BI is to prevent an increase in substance use, to educate on the consequences of risky behavior, and to encourage the individual to consider assessment or specialty substance abuse treatment. Furthermore, for these individuals BIs facilitate referrals to specialty treatment services and have the potential to move individuals towards seeking treatment (Bien et al., 1993). While BIs are not a substitute for individuals who screen high enough to be classified as being at high-risk for substance use, they may be used to engage patients into specialized substance abuse treatment services. Furthermore, BIs are seen as complementary to the continuum of substance abuse

treatment options, particularly valuable when an individual is resistant to needed specialty substance abuse treatment. BIs can also improve individual's compliance with specialty treatment by focusing on attainable goals.

III. Referral to Treatment (RT): Effective BI approaches incorporate comprehensive, proactive strategies to refer high-risk individuals to specialty substance abuse treatment (Babor et al., 2007). The goal of the referral component is to identify appropriate specialty substance abuse treatment providers and to facilitate engagement of individuals in treatment. The SBIRT Health Educator provides a quick hand-off of individuals to specialty substance abuse treatment providers. To facilitate individual engagement, SBIRT providers use motivational enhancement techniques to encourage individuals with ambivalence towards treatment (SAMHSA, 2013). Research findings suggest that motivational-based BIs can increase individual participation and retention in specialty substance abuse treatment (Dunn & Ries, 1997).

2.6. Brief Intervention (BI) Theory and Frameworks

This dissertation was designed to establish an association between BI and admission to specialty substance abuse treatment. BIs encompass several broad frameworks and theories on behavioral change and motivation, including Stages of Change, FRAMES (Feedback, Responsibility, Advice to Change, Menu of Options, Empathy, and Self-Efficacy), and Motivational Interviewing (MI) theories, which are considered to account for the observed changes in substance use, although there is little evidence that these components are necessary or sufficient conditions for behavior change.

- I. The Stages of Change model, which helps tailor interventions to individuals' needs (Prochaska and DiClemente, 1984), provides a useful framework for understanding the process by which people change their behavior and for considering how ready they are to change their substance use behaviors. This model is the work of Prochaska and DiClemente who examined several theories concerning behavior change and how it applies to substance abuse behavior modification. Their Stages of Change model, comprised of five stages—Pre-contemplation, Contemplation, Preparation, Action and Maintenance—represents the process individuals go through when thinking about, beginning and trying to maintain new behavior (WHO, 2010). With regard to BIs, Stages of Change model is useful in tailoring interventions to individual's current level of readiness for change (Hodgson and Rollnick, 1992; Mudd et al., 1995). Individuals are offered motivational supports appropriate to their Stage of Change. For each level of Stages of Change, a different stage of action is recommended. *Pre-contemplation Stage:* The majority of individuals screened through SBIRT are likely to be in this stage. Individuals at this stage are not thinking about changing their substance use, are focused on the positive aspects of their substance use, and are unlikely to have concerns about their substance use (SAMHSA, 1999). For individuals at the pre-contemplation stage, the role of the BI is to raise their awareness of substance use/abuse. *Contemplation Stage:* Individuals in the contemplation stage are thinking about reducing or stopping substance use and are likely to have some awareness of the problems associated with substance use. A proportion of people in the contemplation stage may be willing to make a change but they may not know how to make a change (SAMHSA, 1999). For individuals at contemplation stage, the role of BI is to help these individuals choose positive change over their current behaviors, help in identifying and choosing change strategies, and

help to carry out and comply with the change strategies (SAMHSA, 1999). *Preparation / Determination Stage*: Individuals in this stage are intending to act, may make small changes in their substance use behaviors, and are considering the options available, including specialty treatment. *Action Stage*: It is anticipated that a smaller portion of individuals are in this stage. Individuals in this stage have made the decision to change substance use behavior and are actively taking steps to do so. *Maintenance Stage*: Individuals in the maintenance stage are attempting to maintain gains made in substance use behavior and are working towards preventing relapse. With comprehension of the five stages within the Stages of Change model, SBIRT staff are able to accept the individual's current stage, avoid "getting too far ahead" of where the individual is, and, most important, apply the most appropriate BI strategy for each stage of readiness (SAMHSA, 1999).

- II. BIs also employ the FRAMES (Feedback, Responsibility, Advice to Change, Menu of Options, Empathy, and Self-Efficacy) model. The components of FRAMES include: (1) *Feedback*. Individuals are shown their alcohol and/or drug screening scores using a feedback card and are provided an explanation of what these scores mean. (2) *Responsibility*. A key principle with substance users is that they acknowledge and accept that they alone are responsible for their own behavior (SAMHSA, 1999). The BI emphasizes the individual's responsibility and choice for reducing use. (3) *Advice*. A central component of effective BIs is the provision of clear advice, delivered in a non-judgmental manner, on how to reduce the harms associated with continued use. Individuals may be unaware that their current pattern of substance use could lead to health or other problems or make existing problems worse. Advice to change, i.e., information on safe drinking guidelines, is provided in a manner that

involves the individual in setting their individual goals. (4) *Menu of options*. Individuals are offered a variety of change options from which they may choose. These may include setting specific limits, learning to avoid high-risk situations or developing skills to avoid use. (5) *Empathy*. A core training component for SBIRT staff is focused on maintaining empathy and avoiding confrontation. Delivery of BIs utilizes a non-confrontational, reflective style which is more effective than an aggressive, confrontational style. (6) *Self Efficacy*. BIs include motivation-enhancement techniques to encourage individuals to develop, implement and commit to plans to stop and or reduce risky substance use (SAMHSA, 1999).

- III. BIs utilize a motivational interviewing (MI) (Miller & Rollnick, 2002) approach to help individuals evaluate the pros and cons of their substance use and level of concern. This includes immediate feedback on substance abuse scores, risks associated with pattern of use/abuse, advice on self-directed options for change, and motivation to change one's behavior. Feedback about the use of the primary substance identified through the highest score is given and behavioral change strategies are offered.

2.7. Effectiveness of Brief Interventions for Alcohol and Other Drugs

BIs are based on over 30 years of research supporting their efficacy for alcohol use reduction, risk reduction, and cost reduction. The efficacy of BI in primary care settings has been supported by randomized controlled trials in both Europe and the United States (Wilk et al., 1997; Wallace et al., 1998; Fleming et al., 1997, 2002; Whitlock et al., 2004; Bertholet et al., 2005). BI approaches have been successfully implemented in large-scale health systems (Gelber & Renaldo, 2000), and have been demonstrated to be effective across racial and ethnic groups (Latinos,

Whites, African Americans), age groups (young adults, older adults), substance use disorders (alcohol, tobacco, and other drugs) and settings (e.g., community health centers, hospitals). BIs have also proven to be cost-effective, resulting in a reduction of about \$4 in health care expenditures for every dollar spent (Fleming, et al., 2000; 2002). The Washington State SBIRT program demonstrated a reduction in total Medicaid costs, ranging from \$185-\$192 per month, for individuals who received a BI (Estee et al., 2006). A study by Gentitello et al., (2005) showed that every \$1.00 spent on providing screening and BIs resulted in approximately \$3.81 in savings.

BIs for alcohol use have shown effectiveness in reducing hazardous drinking (Kaner et al., 2007), as well as in reducing medical costs (Estee et al., 2010; Fleming et al., 2000). In a Cochrane Review of the effectiveness of BIs for alcohol consumption in primary care populations, Kaner and colleagues (2009) analyzed 22 randomized clinical trials enrolling 7,619 participants and showed that participants receiving BIs had lower alcohol consumption than the control group after follow-up of one year. Moreover, BIs have been shown to be effective in reducing alcohol misuse. Bien et al. (1993) evaluated 32 controlled studies involving over 6,000 patients, finding that BIs with problem drinkers were often as effective as more extensive treatments. Twelve randomized controlled trials were reviewed by Wilk et al. (1997), who found that drinkers receiving a BI were twice as likely to reduce their alcohol use over 6 to 12 months as those who received no intervention. Fleming et al., (1997) in a clinical trial conducted in community-based primary care practices to test the efficacy of brief physician advice in reducing alcohol use by problem drinkers, found that both treatment and control group participants reduced their number of drinks in the past seven days and reduced their number of binge drinks in the past 30 days. Additionally, the

percentage of people who drank excessively in the past seven days was lowered for both treatment and control groups.

Literature on the effectiveness of BIs for risky drug use (Madras et al., 2008; Saitz et al., 2010) continues to grow, with a number of randomized studies finding statistically significant effects, with several exceptions as noted below. A randomized controlled trial of BI for illicit drugs linked to the ASSIST administered to patients in primary health care settings (Humeniuk et al., 2011) indicated that ASSIST screening linked to BI has potential to reduce substance use and substance use disorders in a wide variety of primary health care settings. Another randomized controlled trial indicated that BIs were associated with reductions in cocaine and heroin use (Bernstein et al., 2005) and BIs have been linked with reductions in marijuana, cocaine, and heroin use (Madras et al., 2008). BIs were associated with a reduction in illicit drug and alcohol abuse after 6-months in a random sample of patients (Madras et al., 2009). SAMHSA funded SBIRT projects have also reported significant reductions in drug use and other problems from baseline to follow-up (Gryczynski et al., 2011; InSight 2009; Woodruff et al., 2013). However a recent study by Roy-Byrne et al. (2014) to determine whether BI improves drug use outcomes compared with care as usual found that a one-time BI had no effect on drug use in patients. A similar study by Saitz et al. (2014) which tested the efficacy of BIs for unhealthy drug use compared with no BI, also did not find efficacy in use of BI for decreasing unhealthy drug use in primary care patients. A systematic review by Young et al. (2014), which assessed the effectiveness of BIs in reducing nonmedical use of psychoactive substances, found insufficient evidence to support whether BIs, as part of SBIRT, are effective or ineffective for reducing use of nonmedical psychoactive substances when administered to a non-treatment seeking population.

While several studies have attempted to identify factors that result in different responses to BI by client characteristics, most studies of BIs to date are limited by their lack of sufficient subject assessments post-BI intervention. Findings from the available research suggest that client characteristics are not good predictors of a person's response to a BI and that BIs may be relevant to individuals from a wide range of cultures and backgrounds (SAMHSA, 1999).

In summary, BIs for alcohol and/or substance misuse are critical to the prevention of and/or early intervention in addiction. For individuals at-risk of developing a serious problem with drinking or drugs, the identification of early warning signs can be enough to change risky drinking or drug use habits. For others, BIs may be important first steps toward treatment of and recovery from addiction. There is substantial evidence of the benefits of BIs for alcohol problems and other health risk behaviors in primary care settings (Babor et al., 2007). There is also promising evidence suggesting that BIs could be effective for drug abuse (Babor et al., 2007; Madras et al., 2009; Gryczynski et. al., 2011; InSight, 2009; Woodruff et al., 2013). Given the large population who engages in risky substance use, BIs could have significant public health implications and positively impact a broad population with risky substance use.

2.8. Role of Brief Interventions on Treatment Admissions

The reported effects of BIs on treatment engagement vary widely. In individual studies, BIs have increased the percent of individuals who show up for their first clinic appointment from 5% among controls to 50 to 65% among those receiving BIs, with as many as 50% of individuals reporting that they continue to be involved in some kind of substance abuse treatment or 12-step meetings

on follow-up (Bernstein et al., 1997; D'Onofrio et al., 1998; Dunn and Ries, 1997). Bien and colleagues examined 12 controlled studies of strategies to improve individuals' acceptance of referrals for additional specialist treatment or return to the clinic for additional treatment following an initial visit. They concluded that relatively simple strategies and specific aspects of counselors' styles can increase rates of follow through on referrals as well as improve initial engagement and participation in treatment (Bien et al., 1993). Bien and colleagues concluded from an analysis of three other studies that BIs enhanced the motivation of treatment-seeking problem drinkers to enter and remain in outpatient or residential alcohol treatment compared with individuals not receiving such attention (Bien et al., 1993). In addition to being helpful in providing individuals encouragement and information about substance abuse and substance abuse treatment, BIs serve as a means of motivating individuals to seek specialty treatment.

Literature on the process for referring individuals to specialty substance abuse treatment suggests that BIs may be critical in linking individuals to specialty substance abuse treatment services for the following reasons: 1) screening in high volume primary care settings offers greater opportunity to engage individuals who are in need of intervention (Agerwala et al, 2012); 2) many individuals with alcohol and/or drug dependence do not seek treatment on their own; and 3) motivationally based BIs for individuals with substance use disorders not only facilitate their entry into treatment but also increase their treatment participation, attendance, and retention (Babor et al., 2007). For those at risk of developing a serious problem with drinking or drugs, the identification of early warning signs can be enough to change negative drinking or drug use. For others, BIs are important first steps toward treatment of and recovery from addiction. In summary, there is evidence that BIs

are effective with at-risk and hazardous substance users, and emerging evidence suggests that BIs can be used to motivate individuals to seek specialized substance abuse treatment.

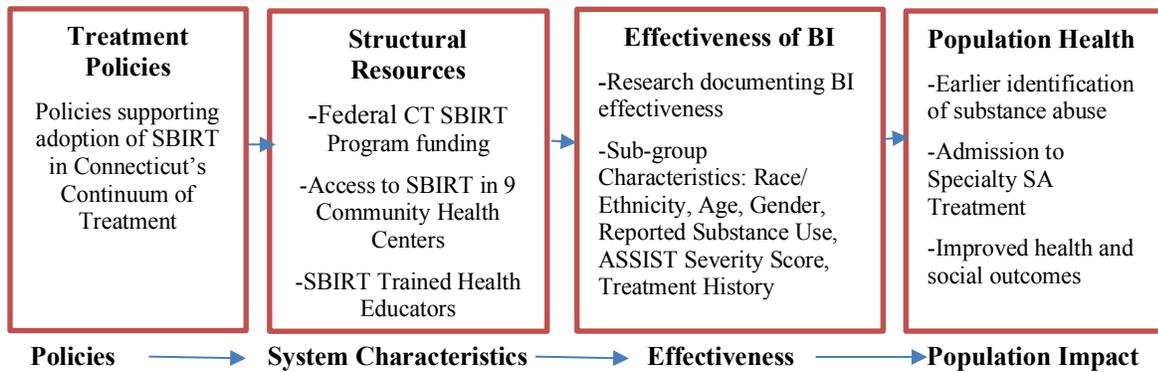
Clinical evidence also suggests that BIs can be used in specialized treatment programs to address specific targeted issues. A study by Longabaugh et al., 2010 found that a booster session, following BI or BI/RT, enhanced the effect of the BI. A booster session was defined as a ten-minute follow-up call approximately one week after the initial intervention and included motivational interviewing to follow-up on patient ambivalence to commit to the intervention.

2.9. Conceptual Framework

Review of existing literature illustrates the limited research on BI and its impact on admissions to specialty substance abuse treatment. A systematic review in 2010 of randomized controlled trials of BI found no studies that examined linkage to specialty treatment as a study outcome (Saitz, 2010). Several other systematic reviews that evaluated the effect of BIs on subsequent health utilization did not specifically examine utilization of specialty treatment (Bray et al., 2011; Mdege et al., 2013). Existing reviews of BI have not provided adequate evidence to inform whether or not BIs increase subsequent specialty treatment utilization. Building upon the significant knowledge base acquired in the studies of BIs in primary care settings and a growing literature that focuses on the public health outcomes of BIs, this study is guided by the treatment systems framework, adapted from the work of Babor et al. (2008), which was based on the public health approach to specialty treatment systems. This framework takes into consideration how other services and supports interact with and complement specialized treatment. The framework begins with system policies which are the higher level decisions made by policymakers that influence the

continuum of services/interventions adopted in the treatment system. In this instance, the State of Connecticut adopted the implementation of SBIRT. The system characteristics include the availability of and access to SBIRT services. The federal funding garnered by DMHAS to support the CT SBIRT Program provided the resources needed to train a workforce and implement SBIRT across the nine targeted community health centers in Connecticut. Treatment policies, system characteristics, and effectiveness of SBIRT services were expected to contribute to increased admissions to specialty substance abuse treatment. The treatment systems framework suggests that BIs would motivate individuals found to be at-risk for substance use to present to a specialty substance abuse treatment provider and potentially have a positive impact on population health, such as earlier identification of substance use/abuse risk, increased admissions to specialty substance abuse treatment, and improved social and health outcomes. Figure 1 illustrates the guiding framework for the study.

Figure 1 Guiding Framework for Study



2.10. Study Hypothesis and Secondary Exploratory Aim

Based on the growing literature on BIs (Krupski et al., 2010; Babor et al., 2007; SAMHSA, 2011), including reported effects of BIs as a component of SBIRT in treatment engagement, the primary aim of this study was to test the odds of admission to specialty substance abuse treatment taking into account severity of substance involvement and the receipt of BI or BI/RT interventions. The study hypothesis was based on the assumption that study participants who screened at high-risk on the ASSIST for substance use and were offered a BI/RT would be more likely to engage in specialty substance abuse treatment within a year post-SBIRT intervention compared to those who screened at moderate-risk on the ASSIST and received a BI only. Study participants who screened at high-risk and who were offered BI/RT, which facilitates engagement into specialty substance abuse treatment, would present to specialty substance abuse treatment at higher rates than study participants who screened at moderate-risk on the ASSIST. A secondary exploratory aim was to assess differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT.

The following analyses were conducted to test the study hypothesis and exploratory secondary aim:

- 1) The first analysis tested the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT as part of health center SBIRT services within the previous year.

- 2) The second analysis investigated the effects of demographic characteristics, including age, gender, race/ethnicity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment and ASSIST severity correlates of treatment engagement among study participants based on the receipt of a BI or BI/RT.

This study has the potential to inform clinical practice and health care policy, particularly with a focus on increasing efforts to implement SBIRT in various health care settings. The contention that BIs, as a component of SBIRT, may motivate individuals screening at-risk for alcohol and/or other substances to seek specialty treatment underscores the importance of further examining the role of BIs in increasing admissions to specialty treatment.

CHAPTER 3: METHODS

This study was an observational study which utilized a single study group pre-post test design to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT interventions. A secondary aim was to assess differential effects on admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT. This study relied on existing administrative data from a number of sources, including the CT DMHAS administrative database of specialty substance abuse treatment and the CT SBIRT Program database (described below). This chapter describes: 1) the CT SBIRT Program; 2) study design; 3) study locations; 4) participant sample and eligibility; 5) BI procedures; 6) data sources; 7) preliminary data on study participant sample; 8) eligible study participants; 9) data analysis 10) power analysis; and 11) Human Subjects Protections.

3.1. Overview of the Connecticut SBIRT Program

In 2011, the State of Connecticut DMHAS was awarded a five-year grant in the amount of \$8.3 million from the federal SAMHSA, Center for Substance Abuse Treatment (CSAT), to establish a statewide SBIRT program. The purpose of the Connecticut SBIRT Program, in response to the SAMHSA initiative goals, was to: 1) expand the state's continuum of care to include SBIRT services in general medical and other community settings; 2) support clinically appropriate BIs for individuals screening at moderate- or high-risk for alcohol and/or other substances; 3) improve linkages between community agencies performing SBIRT and specialty substance abuse treatment agencies; and 4) identify systems and policy changes to increase access to treatment in generalist and specialist settings. A program evaluation, conducted by the University of Connecticut Health Center (UCHC), focused on monitoring the implementation of the SBIRT program to reduce alcohol and drug consumption and its negative health impact among patients presenting for primary health care and examining service implementation models for sustainability purposes. In addition to conducting the evaluation activities, UCHC, through the establishment of an SBIRT Training Institute, provided training and supervision to the Connecticut SBIRT Program staff, comprised primarily of health educators, in addition to technical assistance to staff at the participating community health centers.

The Connecticut SBIRT Program employed the following components: 1) universal screening to identify level of risk; 2) motivational-based BI driven by level of risk; and 3) referral to treatment as indicated. Between October 1, 2011 and August 31, 2016, the Connecticut SBIRT Program screened a total of 69,521 patients across the nine targeted community health center sites.

Summary of risk-levels of screened patients is presented in Table 1 below. Of the 69,521 patients screened, 61,397 (88.3%) screened at low-risk, 7,120 (10.2%) screened at moderate-risk, and 1,004 (1.4%) screened at high-risk. All patients who screened at moderate-risk were offered a BI. Patients screening at high-risk were offered a BI in addition to being offered a brief treatment and/or referral to a specialty substance abuse treatment (RT).

Table 1 CT SBIRT Program Patient Screening Data

October 1, 2011—August 31, 2016	Total Number	Percent
Patients who <i>Screened at Low-Risk</i> for Alcohol/Drug Use	61,397	88.3%
Patients who <i>Screened at Moderate-Risk</i> for Alcohol/Drug Use	7,120	10.2%
Patients who <i>Screened at High-Risk</i> for Alcohol/Drug Use	1,004	1.4%
	69,521	100%

*CT DMHAS/SBIRT Website (Retrieved 10/4/2017)

3.2. Overview of Study Design

This study utilized a single study group pre-post test designed to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT interventions. A secondary aim was to assess differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT. The study took advantage of a naturalistic situation where the CT SBIRT Program was being implemented in nine community health center sites across the state. Admission to specialty substance abuse treatment was determined by matching study participant identifiers to the CT DMHAS administrative database of specialty substance abuse treatment.

3.3. Study Locations

The study locations included nine community health centers (CHCs) across Connecticut who opted to participate with the Connecticut SBIRT Program, including: 1) Community Health Services in Hartford; 2) Cornell Scott-Hill Health Center in New Haven; 3) Fair Haven Community Health Center in New Haven; 4) First Choice Health Center in East Hartford; 5) Greater Danbury Community Health Center in Danbury; 6) Optimus Health Care in Bridgeport and Stamford; 7) Southwest Community Health Center in Bridgeport; 8) StayWell Health Center in Waterbury; and 9) United Community Family Services in Norwich. CHCs provide accessible, comprehensive, and quality health care, including medical, dental, behavioral health, and related services, primarily serving uninsured, low-income families, and ethnically/racially diverse populations. Prevalence rates for many health behavior risk factors, including substance use, are highest among uninsured and Medicaid-eligible populations. The prevalence of substance use disorders among Connecticut’s current Medicaid-eligible populations in Connecticut is 21.6% compared to a prevalence rate of 23.2% for uninsured income-eligible individuals (SAMHSA, 2012). Both of the above rates are substantially higher than the SAMHSA prevalence rate of 8.3% for substance use disorders among general populations (SAMHSA, 2014). CHCs offer unique opportunities to identify and intervene early with low income, high-risk individuals whose substance use is hazardous or harmful. Table 2 provides a summary of patient demographic information for community health centers participating with CT SBIRT.

Table 2 Patient Demographics for Community Health Centers FY 2012

Community Center	Unduplicated Adults 18+ Served	% White	% Black	% Latino/a	Payer Mix
Community Health Services-Hartford	14,064	30%	52%	34%	Uninsured: 23% Medicaid: 59%

					Medicare: 5% Private Insurance: 12%
Cornell-Scott Hill Health Center-New Haven	28,193	35%	31%	34%	Uninsured: 18% Medicaid: 63% Medicare: 8% Private Insurance: 11%
CT Institute for Communities-Danbury	3,726	63%	6%	27%	Uninsured: 16% Medicaid: 35% Medicare: 12% Private Insurance: 37%
Fair Haven Community Health Center-New Haven	9,903	12%	12%	60%	Uninsured: 28% Medicaid: 54% Medicare: 7% Private Insurance: 11%
Generations Family Health Center-Willimantic	15,817	68%	7%	22%	Uninsured: 23% Medicaid: 54% Medicare: 10% Private Insurance: 12%
Optimus Health Center-Bridgeport & Stamford	31,393	69%	26%	57%	Uninsured: 27% Medicaid: 55% Medicare: 6% Private Insurance: 12%
Staywell Health Center-Waterbury	13,624	58%	20%	50%	Uninsured: 19% Medicaid: 69% Medicare: 7% Private Insurance: 4%
Southwest Community Health Center-Bridgeport	13,662	17%	37%	41%	Uninsured: 27% Medicaid: 57% Medicare: 5% Private Insurance: 11%
United Community & Family Services-Norwich	8,780	62%	11%	10%	Uninsured: 14% Medicaid: 58% Medicare: 7% Private Insurance: 18%
TOTALS	138,352	48%	25%	41%	Uninsured: 23% Medicaid: 58% Medicare: 7% Private: 12%

*Retrieved from U.S. HRSA website (<https://bphc.hrsa.gov>) based on 2012 UDS Data.

3.4. Participant Sample and Eligibility

The study population includes adults, ages 18 and over, who presented at one of the nine community health centers implementing the CT SBIRT Program between March 1, 2011 and March 31, 2013 *and* who screened at moderate-risk or at high-risk on the ASSIST for alcohol and/or other substances *and* who were offered a BI or BI/RT. Individuals who screened at low-

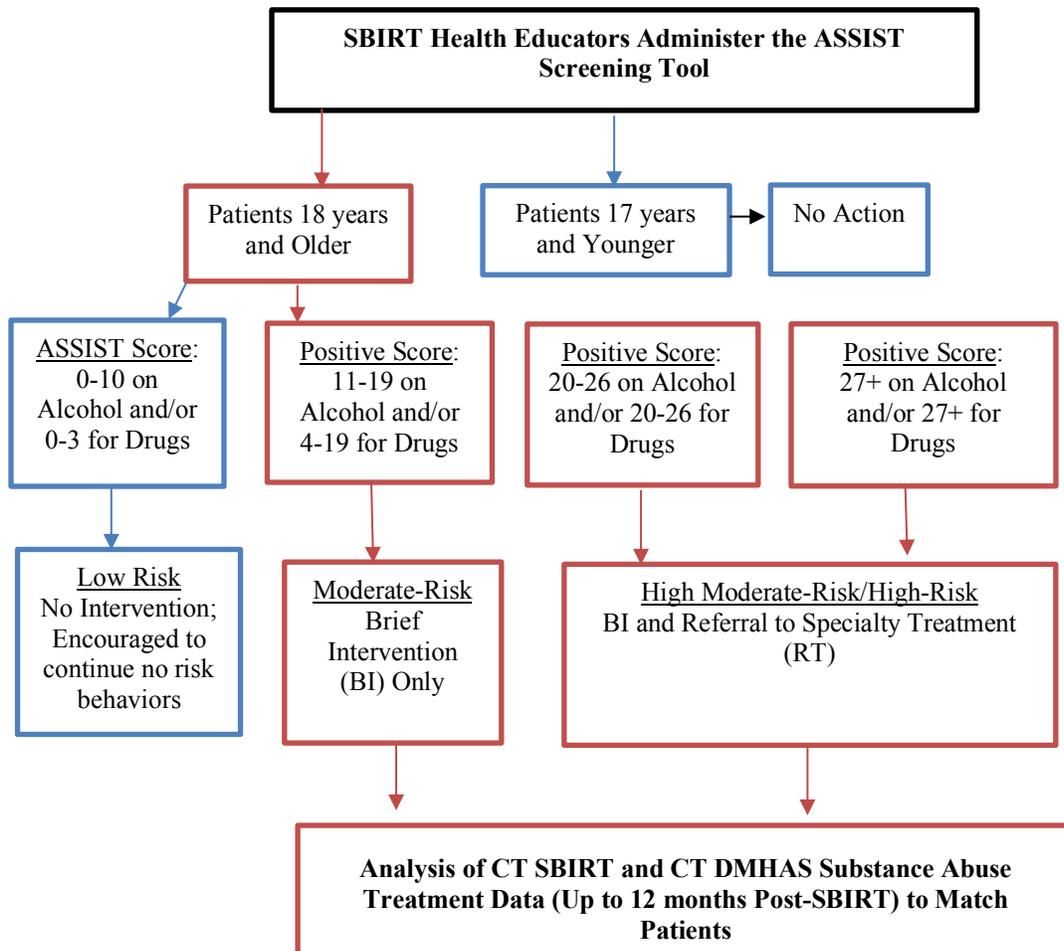
risk on the ASSIST were provided feedback by the Health Educators (HEs) on their ASSIST score and what it represents, in addition to being provided a positive educational message and encouragement to continue their healthy behaviors. No further action was taken with individuals who screened at low-risk. Individuals who screened at moderate-risk or at high-risk on the ASSIST were asked permission to discuss their substance use, and, if the participant was willing, moved into a BI. Participants in the high-risk group, in addition to receiving a BI, were also referred to specialty substance abuse treatment (RT) for additional assessment and possible placement in an appropriate level of care. Admission to specialty substance abuse treatment was determined by matching study participant identifiers to the CT DMHAS administrative database of specialty substance abuse treatment.

3.5. Screening, Brief Intervention, and Referral to Treatment (SBIRT) Procedures

Screening Procedure and Assessment. Patients presenting for primary healthcare services at one of nine participating CHCs in Connecticut received SBIRT services as part of their routine clinical care from trained Health Educators (HEs). The HEs, introduced by the medical staff or self-introduced as members of the health treatment team, began the patient interaction by discussing how lifestyle factors such as alcohol and/or other drug use might impact health. Once rapport was established, the HE collected general demographic information and screened patients for alcohol and other substance use utilizing the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) to obtain a risk level of substance use (no risk, low-risk, moderate-risk or high-risk). The ASSIST was developed by the World Health Organization specifically for use in primary healthcare settings where harmful substance use among patients may go undetected. Validity of the ASSIST for identifying substance use in individuals who use a number of substances and have varying degrees of substance use has been demonstrated in a number of multi-site international

studies (Humeniuk et al., 2007). It was demonstrated that the ASSIST can discriminate between low-, moderate-, and high-risk substance use across multiple substances, including alcohol, cannabis, opioid, and cocaine use (Humeniuk et al., 2007). Figure 2 shows the Connecticut SBIRT Program patient flow based on ASSIST scores.

Figure 2 CT SBIRT Program Study Design—Patient Flow



The ASSIST assesses severity or risk level from past 3-month use of alcohol and illicit drugs. For each substance endorsed, questions are asked regarding frequency of use in the previous three (3) months. Following the administration of the ASSIST, which typically takes 5-10 minutes, separate risk scores are calculated for alcohol and substance reported, with scores falling in the low-, moderate-, or high-risk range. For the alcohol-related questions, participants were asked: 1) How often do you have a drink containing alcohol?; 2) How many drinks containing alcohol do you have on a typical day when you are drinking?; and 3) How often do you have five (if male)/four (if female) or more drinks on one occasion? For the other drug-related questions, participants were asked: 1) In your life, which of the following substances have you ever used (Table 3 below includes listing of substances included in the tool)?; 2) In the past three months, how often have you used the substances you mentioned?; 3) In the past 3 months, how often have you had a strong desire or urge to use?; 4) During the past 3 months, how often has your use led to health, social, legal, or financial problems? Response choices include Never, Once or Twice, Monthly, Weekly, or Daily or Almost Every Day; 5) During the past 3 months, how often have you failed to do what was normally expected of you because of your use? Response choices include Never, Once or Twice, Monthly, Weekly, or Daily or Almost Every Day; 6) Has a friend or relative or anyone else ever expressed concern about your use? Response choices include Never, Yes—in the past 3 months, or Yes, but not in the past 3 months; and 7) Have you ever tried and failed to control, cut

down or stop using? Response choices include Never, Yes—in the past 3 months, or Yes, but not in the past 3 months. Listing of substances captured on the ASSIST Tool is provided in Table 3.

Table 3 ASSIST Tool Substances List

a. Tobacco products such as cigarettes, chewing tobacco, cigars, etc.
b. Alcoholic beverages such as beer, wine, hard liquor, etc.
c. Marijuana , pot, grass, reefer, weed, ganja, hash, chronic, gangster, joints, blunts, Mary Jane, etc.
d. Cocaine or Crack , coke, blow, snow, flake, toot, rock, etc.
e. Prescription stimulants such as Ritalin, Concerta, Adderall, Dexedrine, diet pills, etc.
f. Methamphetamine , uppers, speed, crystal meth, ice, chalk, glass, fire, crank, etc.
g. Inhalants or anything you might huff, like glue, correction fluid, gasoline, butane, paint thinner, lighter fluid, spray paint, poppers, snappers, Rush, Nitrous Oxide, laughing gas, whippets, etc.
h. Sedatives or sleeping pills such as Diazepam (Valium), Lorazepam (Ativan), Alprazolam (Xanax), Triazolam, Halcion, Librium, Restoril, Estazolam (ProSom), Rohypnol (roofies, roche, cope), Serepax, Seconal, pentobarbital sodium (Nembutal), Phenobarbital, mephobarbital (Mebacut), GHB (Grievous Bodily Harm, Georgia Home Boy, Liquid X, Liquid Ecstasy), Ketamine (Special K, Vitamin K), downers, tranquilizers, sedatives, hypnotics, etc.
i. Hallucinogens/psychedelics , LSD (acid, Boomers, Yellow Sunshine), mushrooms, mescaline, PCP (Angel Dust, Ozone, Wack, Rocket Fuel), MDMA (Ecstasy, XTC, Adam, X), wet, illy, etc.
j. Prescription pain medication such as fentanyl, oxycodone, OxyContin, Percocet, hydrocodone, Vicodin, methadone, buprenorphine, codeine, Darvon, Dilaudid, Demerol, Lortab, Talwin-Nx, Tylenol-2, -3, -4, morphine, non-prescription methadone, etc.
k. Heroin , opium, Smack, H, Junk , Skag
l. Other drug: Something not listed here? Please specify: _____

Scores obtained on the ASSIST determine the type of intervention provided: (1) no intervention, (2) BI only, and (3) BI plus referral to specialty substance abuse treatment (RT). Individuals scoring positive on the ASSIST were offered the appropriate level of intervention and/or referral to specialty substance abuse treatment prior to or immediately following their medical appointment. Individuals who scored at *no-risk* on the ASSIST were informed by the Health Educator (HE) of their screening score, its meaning and were encouraged to continue healthy behaviors. For individuals who scored at *moderate-risk* on the ASSIST, HEs provided feedback

on the screening score and offered an opportunity to receive a BI to encourage cessation of use. If accepted by the individual, the BI would generally take 10-15 minutes and included assessment of Stage of Change, establishment of goals with the individual, and a review of strategies for change, in addition to providing the patient literature on the effects of alcohol and drug use. If requested by the individual or indicated by risk level, the HE also provided referral to brief treatment and/or a referral to specialty substance abuse treatment. For individuals who scored at *high-risk* on the ASSIST, the HE provided feedback on the screening score, offered an opportunity to receive a BI, and offered referral to brief treatment and/or to a specialty substance abuse treatment provider. The BI primarily focus was on increasing insight and awareness regarding substance use and motivation towards behavioral change. Individuals scoring positive had the choice not to participate with the offered BI or, in some instances, external barriers may have interfered with providing the BI, e.g., HE was engaged with another client, medical appointment interfered with BI session. Table 4 below shows the risk-level scores for alcohol and drugs and the indicated interventions for each risk level, as specified in the WHO BI Manual (WHO, 2002).

Table 4 ASSIST Screening Risk Scores and Indicated Intervention

Risk Score	Risk Level	Indicated Intervention
ASSIST Alcohol Score 0-11 and/or ASSIST Drug Score 0-3	Low-Risk	-Feedback on ASSIST -No Intervention
ASSIST Alcohol Score 11-19 and/or ASSIST Drug Score 4-19	Moderate-Risk	-Feedback on ASSIST Score -Brief Intervention
ASSIST Alcohol Score 20-26 and/or ASSIST Drug Score 20-26 (Moderate High-Risk)	Moderate High-Risk/ High-Risk	-Feedback on ASSIST Score -Brief Intervention -Referral to Specialty Treatment
ASSIST Alcohol Score 27+ and/or ASSIST Drug Score 27+ (High-Risk)		

Health Educators Training. Health Educators (HEs), employed through the CT SBIRT Program, were trained and provided supervision through the UCHC SBIRT Training Institute. The UCHC SBIRT Training Institute evaluated HEs' application of SBIRT, self-efficacy in providing SBIRT services, knowledge essential to conducting SBIRT, and other components known to affect implementation of SBIRT. Ten full time equivalent HE staff were trained and certified in SBIRT approaches and received ongoing coaching and regular evaluation of their proficiency in motivational interviewing. HEs underwent extensive training at UCHC's Training Institute prior to implementing SBIRT services in the field. Depending on HE experience and background, training may last as long as a month or be completed within 7-8 days. Once training was completed, HEs were expected to have a complete understanding of the overall structure and the need for the services provided by CT SBIRT including: 1) the roles and duties of all members and member organizations that are part of the CT SBIRT team; 2) the continuum of CT SBIRT services as they relate to the continuum of substance use; 3) the conditions likely to be encountered in the health center settings and associated challenges; 4) motivational interviewing theory, key methods and practiced motivational techniques; 5) the CT SBIRT Program protocols for screening, BI, and making referrals to specialty substance abuse treatment; 6) the importance of patient confidentiality and ways in which confidentiality might become an issue in delivering services; 7) HIPAA regulations and necessary steps for compliance with those regulations; 8) elements of cultural proficiency and working with ethnically diverse patients; 9) ensuring patient and GPRA information is processed appropriately; 10) relevant GPRA requirements and the importance of meeting those requirements; and 11) Relevant ethical requirements and the importance of meeting the requirements (CT SBIRT Program, 2011). Although the CT SBIRT Program, through the UCHC SBIRT Training Institute, provided standardized training and technical assistance supports

to the nine participating CHCs and employed Health Educators, variation in implementation of SBIRT services across community health centers and Health Educators was possible.

3.6. Data Sources

Administrative data offers a rich resource for understanding individuals with substance use disorders (Sears, 2010). This study draws on existing administrative datasets from a number of sources, including: 1) the Connecticut DMHAS DDaP database, which includes a rich set of socio-demographic, diagnostic, and substance abuse treatment utilization data for individuals admitted to a licensed substance abuse treatment facility in Connecticut, and 2) the Connecticut SBIRT Program data, which includes the federal Government Performance and Results Act (GPRA) Core Client Outcome domains in addition to the ASSIST screening scores and SBIRT services provided to patients. Data collected through GPRA are used to report on the National Outcome Measures (NOMs) and include the following domains: (1) abstinence from drug use and alcohol abuse, or decreased mental illness symptomatology; (2) increased or retained employment and school enrollment; (3) decreased involvement with the criminal justice system; (4) increased stability in family and living conditions; (5) increased access to services; (6) increased retention in services for substance abuse treatment or decreased utilization of psychiatric inpatient beds for mental health treatment; and (7) increased social connectedness to family, friends, co-workers and classmates (SAMHSA, 1993). The GPRA survey instrument must be collected and reported by all SAMHSA-funded grant programs. For the SBIRT program, GPRA data is collected and reported to SAMHSA at intake, and for 10% of the evaluation cohort, at 6-month follow-up. The Connecticut SBIRT Program data set also includes screening interview responses, and record of

BIs or BIs/RTs provided for individuals who received SBIRT services at any Connecticut SBIRT Program intervention site. Summary of data sources is provided in Table 5.

Table 5 Administrative Data Sources

Data Source	Data Held	Description of Data	Derived Measures
DDaP	CT DMHAS	Admission and Treatment Data for all Individuals who were admitted to a CT-licensed Substance Abuse Treatment Program.	<ul style="list-style-type: none"> • Demographics (Age, Gender, Race /Ethnicity) • Admission Date to Specialty Substance Abuse Treatment • Discharge Date from Specialty Substance Abuse Treatment • Admission Lifetime to Specialty Substance Abuse Treatment • Substance Abuse Diagnosis
CT SBIRT Program: GPRA Data	UHC	Demographic and GPRA data for all Individuals Provided a CT SBIRT Program service.	<ul style="list-style-type: none"> • Reported alcohol or drug use in the past 30 days • Demographics (Age, Gender, Race/Ethnicity) • Improvements in domains of abstinence, alcohol/illicit drug related consequences, housing, and employment.
CT SBIRT Program: ASSIST Data	UHC	ASSIST Scores and Services Provided through the CT SBIRT Program.	<ul style="list-style-type: none"> • ASSIST screening scores • Services Offered: (1) no intervention, (2) brief intervention (BI) only, or (3) BI plus referral to specialty treatment (RT).

3.7. Data on Screened Sample

Over the targeted study period, March 1, 2011 through March 31, 2013, 28,637 unduplicated patients were screened utilizing the ASSIST screening instrument at the community health centers participating with the Connecticut SBIRT Program. Table 6 shows the demographic characteristics of the screened, unduplicated sample population. Sixty-three percent (63.2%) of the sample population were female. The age range of the study population was dispersed by the following age groups: 9.3% aged 18-24; 19.5% aged 24-35; 19.7% aged 35-44; 23.4% aged 45-54; and 28.1% aged 55 years and older. The study sample was comprised of 44.7% non-Hispanic Whites, 46.3% Hispanics, and 26.1% Blacks. Based on the ASSIST scores, 1,442 (5%) of the population scored at-risk for alcohol; 2,110 (7.4%) for cannabis; 713 (2.5%) for heroin; 985 (3.3%) for cocaine; and 289 (1%) for prescription opiates.

Table 6 Characteristics of Unduplicated Screened Sample

N=28,637			
Demographic Variables		Frequency	Percentage
GENDER	Male	10,518	36.7%
	Female	18,102	63.2%
	Transgender	13	00.0%
AGE	18-24	2,650	9.3%
	25-34	5,592	19.5%
	35-44	5,639	19.7%
	45-54	6,692	23.4%
	55+	8,058	28.1%
ETHNICITY—HISPANIC/LATINO			
	Yes	13,266	46.3%
	No	15,106	52.7%
	Missing/Refused	265	.9%
RACE	Black	7,707	26.9%
	White	12,801	44.7%
	Asian	709	2.5%
	American Indian	91	.3%
	Missing/Refused	3,836	13.4%
SUBSTANCE USE SEVERITY MEASURES			
ASSIST Alcohol Scores		Frequency	Percentage
	0-10	27,554	96.7%

11-19	586	.02%
20+	553	.03%
<i>Based on the ASSIST Score, 1,442 or 5% of Sample Population was at-risk for Alcohol</i>		
ASSIST Cannabis Scores	Frequency	Percentage
0-3	26,423	92.6%
4-19	1,894	6.7%
20+	216	.6%
<i>Based on the ASSIST Score, 2,110 or 7.3% of the Sample Population was at-risk for Cannabis</i>		
ASSIST Heroin Scores	Frequency	Percentage
0-3	27,829	97.5%
4-19	613	2.1%
20+	100	.4%
<i>Based on the ASSIST Score, 713 or 2.5% of Sample Population was at-risk for Heroin</i>		
ASSIST Cocaine Scores	Frequency	Percentage
0-3	27,584	96.6%
4-19	848	.3%
20+	110	.00%
<i>Based on the ASSIST Score, 985 or 3.3% of Sample Population was at-risk for Cocaine</i>		
ASSIST RX Opiates Scores	Frequency	Percentage
0-3	28,253	99%
4-19	259	.9%
20+	30	.00%
<i>Based on the ASSIST Score, 289 or 1% of Sample Population was at-risk for RX Opiates</i>		

3.8. Eligible Study Participants

Eligible study participants were defined as adults (18 years and older) who screened at moderate-risk or at high-risk for alcohol and/or other substances utilizing the ASSIST screening instrument at one of the CHCs participating with the Connecticut SBIRT Program between March 1, 2011 and March 31, 2013. CT SBIRT Program participants were then matched to the State of Connecticut DMHAS specialty substance abuse treatment database to determine whether they entered treatment after their SBIRT encounter up to one-year post-SBIRT intervention. The Connecticut DMHAS database includes admission and discharge data for all licensed substance

abuse treatment programs, including substance abuse residential detoxification, long-term rehabilitation, intensive and intermediate residential, medication assisted treatment, including methadone maintenance, outpatient, and partial hospitalization. Of the 28,637 screened study sample, 24,600 participants screened at low risk on the ASSIST and were excluded. Three-thousand nine-hundred and forty-eight (3,948) participants screened at moderate- to high-risk on the ASSIST. Of the 3,948 participants, 3,931 were deemed eligible study participants, with 17 participants being excluded from the analyses due to missing data. The final eligible study sample included 3,931 participants of which 3,235 screened at moderate-risk and were offered a BI and 696 screened at high-risk and were offered a BI/RT. Approximately sixty-one percent (61%) of the eligible study participants were male. The eligible study sample was comprised of 31% non-Hispanic Whites, 36% Hispanics, and 29% Blacks. The minimum age of the study population was 18 years and the maximum age was 79 years, with study population having a mean age of 41. Approximately 14% (n=541) of eligible study sample has received specialty substance abuse treatment up to one-year post-SBIRT intervention.

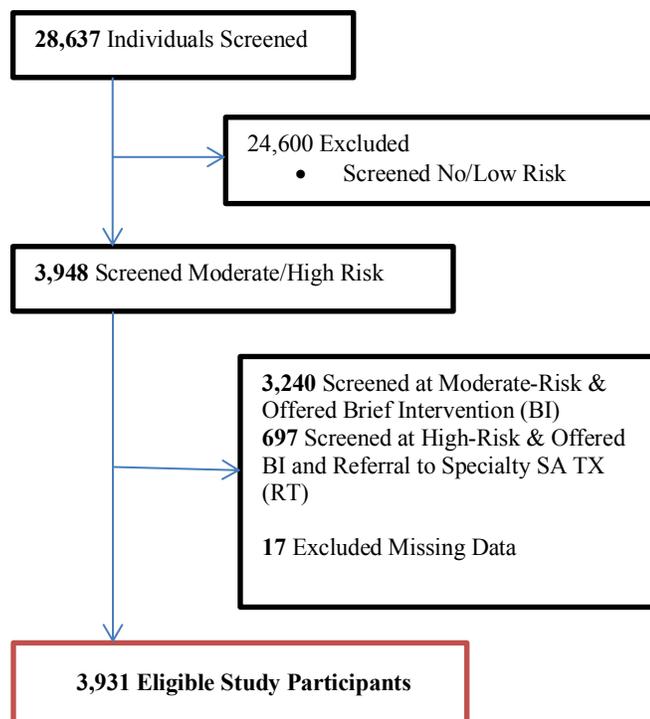
Table 7 Characteristics of Unduplicated, Eligible Study Sample (N=3,931)

Demographic Variables	Frequency	Percentage
GENDER		
Male	2,407	61%
Female	1,524	39%
RACE		
Black	1,213	31%
White	1,161	29%
Other	132	.03%
ETHNICITY		
Yes Hispanic	1,425	36%
POST-SBIRT SPECIALITY TX		
Yes	541	14%
No	3,396	86%

AGE	Minimum Age: 18.09 Maximum Age: 78.56 Mean Age: 41.38
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Figure 3, below, provides a flow diagram for the eligible study participants.

Figure 3 Flow Diagram for Study Participants



3.9. Data Analyses

This study was designed to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT interventions. A secondary exploratory aim was to assess differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT. Admission to specialty substance abuse treatment was the measured dependent variable. The independent variables, extracted from the Connecticut DMHAS, the Connecticut SBIRT GPRA data, and the Connecticut SBIRT Program, including ASSIST severity scores, demographic data, specifically age, gender, race/ethnicity, previous admission to specialty substance abuse treatment, and reported substance used. Outcome measures were drawn from the CT SBIRT Program database, including GPRA and ASSIST data, and from the DMHAS DDaP administrative service records. Matched substance abuse treatment data from the DMHAS DDaP data repository was used to determine association between SBIRT and admissions to specialty substance abuse treatment. DMHAS, through a patient matching algorithm based on name, age, residence, gender, and race/ethnicity, used the CT SBIRT Program data to match individuals who entered specialty substance abuse treatment pre-SBIRT within 365 days post-SBIRT service as captured in the CT SBIRT Program database. Admission to specialty substance abuse treatment was defined as admission to treatment, (1=yes, 0=no), and included admission data to any licensed specialty substance abuse treatment modality, i.e., residential detoxification, long-term rehabilitation, intensive and intermediate residential, medication assisted treatment including methadone maintenance, outpatient, and partial hospitalization treatment.

DMHAS provided a de-identified data set of matched records which were used to conduct the analyses identified below.

3.10. Statistical Analysis

Chi-square tests were used to explore differences of the screening sample, overall sample characteristics, and to investigate post-SBIRT service admissions to specialty substance abuse treatment and demographics and characteristics of patients, including ASSIST severity data, demographic data, specifically age, gender, race/ethnicity, previous mental health treatment, previous admission to specialty substance abuse treatment, and reported substance used. Cross-tabulations were used to describe rates across demographic subgroups. Multilevel logistic regression analyses were conducted to compare the odds of post-SBIRT admission to specialty substance abuse treatment for study participants who received a BI or BI/RT and examine interactions with a number of patient characteristics, including age, gender, race/ethnicity, prior lifetime history of specialty substance abuse treatment, prior history of mental health treatment, and ASSIST severity score. The multilevel logistic regression analyses allowed for a “stepped” approach in which each of the above patient characteristics were added one-by-one to examine the effect of independent measures on post-SBIRT admission to specialty substance abuse treatment. Type 1 error rate was set at $\alpha=.05$ for hypothesized effects. Interpretation of findings factored in clinical relevance, in addition to statistical significance. Output and data analyses for this study were generated utilizing SPSS[®] Statistics software, Version 22.0 (IBM SPSS Statistics, 2013).

3.11. Human Subjects

This study was approved by both UCHC and the Connecticut DMHAS Institutional Review Boards (IRBs). IRB approval for data analysis and reporting was in effect while study participants were enrolled in the study for the March 2011-March 2013 period.

CHAPTER 4: RESULTS

4.1. Overview

Chapter 4 presents the findings based on the analyses methods and procedures described in Chapter 3.

4.2. Study Hypothesis

The study hypothesis was based on the assumption that study participants who screened at high-risk on the ASSIST for substance use and were offered a BI/RT would be more likely to engage in specialty substance abuse treatment within a year post-SBIRT intervention compared to those who screened at moderate-risk on the ASSIST and received a BI only. Study participants who screened at high-risk and who were offered BI/RT, which facilitates engagement into specialty substance abuse treatment, would present to specialty substance abuse treatment at higher rates than study participants who screened at moderate-risk on the ASSIST.

Multilevel logistic regression analyses were conducted to examine the odds of admissions to specialty substance abuse treatment based on study participants' receipt of a BI or BI/RT as part of health center SBIRT services within the previous year. Of the 3,937 study participants included in the analyses, or 12.4% of the total CT SBIRT Program population, 3,240 study participants scored at moderate-risk on the ASSIST for alcohol and/or other substances and were offered a BI. The remaining 697 study participants scored at high-risk on the ASSIST for alcohol and/or other substances and were offered a BI and referral to specialty treatment (RT). Of the total population offered a BI or BI/RT, 541 study participants had a post-SBIRT admission to specialty substance abuse treatment up to 1 year post-SBIRT. Of particular note is the significant effect found for study participants who screened at high-risk on the ASSIST for alcohol and/or other substances and who were offered a BI/RT and admission to post-SBIRT specialty treatment. The odds of the BI/RT study population having a post-SBIRT admission to specialty treatment was 2.78 times greater than the odds of study participants who screened at moderate-risk and who were offered a BI only [OR= 2.78; 95% CI 2.27, 3.40]. In the second model, which in addition to BI or BI/RT also included age, gender (male), and race/ethnicity, we found an increase in the odds of the BI/RT study population having a post-SBIRT admission to specialty treatment [OR= 2.82; 95% CI 2.30, 3.46]. In the second model, BI/RT study participants had 2.82 greater odds of having a post-SBIRT admission to specialty treatment than BI only study participants. In the third model, which in addition to BI or BI/RT included age, gender (male), race/ethnicity, prior history of mental health treatment, and prior history of substance abuse treatment, we found a decrease in odds of the BI/RT study population having post-SBIRT admission to specialty treatment [OR= 2.31; 95% CI 1.86, 2.88]. In the third model, BI/RT study participants had 2.31 greater odds of having an admission

to specialty treatment than study participants who were only offered a BI. The final model, in addition to BI or BI/RT, included age, gender (male), race/ethnicity, prior history of mental health treatment, prior history of substance abuse treatment, and ASSIST severity scores. For this model, the odds of the BI/RT study population having a post-SBIRT admission to specialty treatment reduced to 1.67; therefore BI/RT study participants had 1.67 greater odds of admissions to specialty treatment post-SBIRT than study participants who were only offered a BI [OR= 1.67; 95% CI 1.19, 2.34]. In summary, odds of post-SBIRT admission to specialty treatment were between 2.88 and 1.67 for the BI/RT study participants than for the BI only study participants.

Table 8 Predicting Odds of Admission to Specialty Treatment (n = 3,937)

	Model 1 (Unadjusted)	Model 2 (Adjusted)	Model 3 (Adjusted)	Model 4 (Adjusted)
	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI
Characteristics:				
BI/RT versus BI	2.78 (2.27, 3.40)	2.82 (2.30, 3.46)	2.31 (1.86, 2.88)	1.67 (1.19, 2.34)
Demographics:				
Age		1.00 (0.99, 1.00)	0.99 (0.98, 0.99)	0.98 (0.97, 0.99)
Gender (Male)		0.85 (0.70, 1.03)	0.92 (0.75, 1.14)	0.90 (0.72, 1.12)
Ethnicity-Hispanic		0.69 (0.42, 1.14)	1.00 (0.59, 1.73)	1.12 (0.64, 1.98)
Race-Black		0.51 (0.41, 0.64)	0.70 (0.55, 0.89)	0.70 (0.55, 0.90)
Race-White		0.56 (0.44, 0.70)	0.68 (0.53, 0.88)	0.77 (0.60, 1.00)
Prior Treatment History:				
Prior SA Treatment			0.12 (0.09, 0.15)	0.14 (0.10, 0.18)
Prior MH Treatment			0.55 (0.44, 0.67)	0.58 (0.47, 0.72)
ASSIST Severity Score:				
Alcohol Score				1.01 (0.99, 1.02)
Cannabis Score				0.97 (0.96, 0.99)
Cocaine Score				1.03 (1.02, 1.05)
Opiate Score				1.05 (1.03, 1.07)

4.3. Secondary Exploratory Aim

The secondary exploratory aim was to explore differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT. Multilevel logistic regression analyses were conducted to predict odds of post-SBIRT admissions to specialty substance abuse treatment. The multilevel regression allowed for a “stepped” regression by adding study participant characteristics one-by-one to examine the effects of independent measures on post-SBIRT admission to specialty substance abuse treatment. The stepped regression models were designed to identify characteristics that account for treatment engagement among study participants that present for specialty substance abuse treatment post-SBIRT. We tested a five level multilevel logistic regression model. Independent variables were sequentially added to BI and BI/RT in the following five models: Model 1: BI, BI/RT and Age, Model 2: BI, BI/RT and Gender, Model 3: BI, BI/RT and Race/Ethnicity, Model 4: BI, BI/RT and Prior Mental Health Treatment, and Model 5: BI, BI/RT and Prior Specialty Substance Abuse Treatment.

Significant effect was found for study participants who screened at high-risk on the ASSIST for alcohol and/or other substances who were offered a BI/RT *and* who had a pre-SBIRT admission to specialty treatment. The odds of the BI/RT study participants with prior substance abuse treatment having a post-SBIRT admission to specialty treatment was 4.75 times greater than the odds of study participants who did not have prior substance abuse treatment admission [OR= 4.75;

95% CI 2.63, 8.57]. No significant effects were predicted for BI or BI/RT and age, gender, race/ethnicity or prior mental health treatment, where each characteristic was examined one-by-one to measure the independent effects on post-SBIRT admission to specialty substance abuse treatment.

Table 9 Predicting Differential Effects of Independent Variables on Admission to Specialty Treatment (n = 3,937)

Multilevel Logistic Regression Stepped Models	OR 95%CI
BI/RT, Age	1.01 (0.98, 1.03)
BI/RT, Gender (Male)	1.42 (0.87, 2.31)
BI/RT, Ethnicity-Hispanic	2.81 (0.83, 9.56)
BI/RT, Race-Black	1.14 (0.65, 2.00)
BI/RT, Race-White	0.84 (0.46, 1.53)
BI/RT, Prior MH Treatment	1.39 (0.88, 2.20)
BI/RT, Prior SA Treatment	4.75 (2.63, 8.57)

The cross-tabulation output, presented in Table 10, reflects that 11.3% (n=31) of study participants with no prior SBIRT admission to specialty substance abuse treatment that were offered BI/RT, therefore scored at high-risk for alcohol and/or other substances on the ASSIST, had an admission to specialty substance abuse treatment within one year of the SBIRT intervention. In comparison, 1.7% (n=30) of study participants with no prior SBIRT admission to specialty substance abuse treatment who scored at moderate-risk for alcohol and/or other substances on the ASSIST, had an

admission to specialty substance abuse treatment within one year of the SBIRT intervention. For study participants who were offered BI/RT and who had prior to SBIRT admission to specialty treatment, 35.2% (n=149) had an admission to specialty substance abuse treatment within one year of the SBIRT intervention. In comparison, 22.6% (n=331) of study participants that were offered a BI, therefore screened at moderate-risk on the ASSIST, had an admission to specialty substance abuse treatment within one year of the SBIRT intervention. As hypothesized, study participants who were offered a BI/RT presented to specialty substance abuse treatment post-SBIRT at a higher frequency than participants who we only offered a BI, with overall 25.8% (n=180) of the population that was offered BI/RT having an admission to specialty substance abuse treatment within one year of the SBIRT intervention in comparison to 11.1% (n=361) of study participants that were offered a BI having an admission to specialty substance abuse treatment within one year of the SBIRT intervention.

Table 10 Cross Tabulation of Pre- and Post-SBIRT Specialty Treatment for Study Participants Offered BI or BI/RT

Prior & Post-SBIRT Specialty TX			YES POST-SBIRT TX	NO POST-SBIRT TX	TOTAL
No Prior TX	BI/RT	N	31	243	274
		% within BI/RT Participants	11.3%	88.7%	100%
	BI	N	30	1744	1774
		% within BI Participants	1.7%	98.3%	100%
	TOTAL	N	61	1744	1774
	% within BI or BI/RT Participants	3.0%	97.0%	100%	
Yes Prior TX	BI/RT	N	149	274	423
		% within BI/RT Participants	35.2%	64.8%	100%
	BI	N	331	1135	1466
		% within BI Participants	22.6%	77.4%	100%
	TOTAL	N	480	1409	1889
	% within BI or BI/RT Participants	25.4%	74.6%	100%	

Total	BI/RT	N	180	517	697
		% within BI/RT Participants	25.8%	74.2%	100.0%
	BI	N	361	2879	3240
		% within BI Participants	11.1%	88.9%	100%
	TOTAL	N	541	3396	3937
		% within BI or BI/RT Participants	13.7%	86.3%	100%

Chi-square analysis was conducted to further examine the significance of the interactions of prior substance abuse treatment and post-SBIRT admission to specialty treatment for study participants who were offered a BI/RT. Results of the Chi-Square Test, Table 11 below, show statistically significant interactions for study participants offered BI/RT with no prior-SBIRT admission to specialty substance abuse treatment [Chi-Square=76.05, $p < 0.000$] and for study participants offered BI/RT with prior-SBIRT admission to specialty treatment [Chi-Square=27.70, $p < 0.000$].

Table 11 Specialty Treatment Pre-SBIRT vs. Post-SBIRT

	Value	df	Asymptotic Significance (2-sided)
No Prior-SBIRT Specialty TX	76.051	1	.000
Yes Prior-SBIRT Specialty TX	27.699	1	.000
Total	104.330	1	.000

In summary, a significant effect was found for study participants who screened at high-risk on the ASSIST for alcohol and/or other substances who were offered a BI/RT *and* who had a pre-SBIRT admission to specialty treatment. The odds ratio, presented in Table 12, shows that overall study

participants who were offered BI/RT were 2.78 times more likely to have a post-SBIRT admission to specialty treatment if they had a pre-SBIRT admission to specialty treatment.

Table 12 Specialty Treatment Pre-SBIRT vs. Post-SBIRT Odds Ratio

	Odds Ratio for	Value	95% Confidence Interval	
			Lower	Upper
NO Prior-SBIRT Specialty TX	Odds Ratio for BI/RT	7.416	4.411	12.469
	YES Post-SBIRT Specialty TX	6.690	4.117	10.872
	NO Post-SBIRT Specialty TX	.902	.864	.941
	N of Study Participants	2048		
YES Prior-SBIRT Specialty TX	Odds Ratio for BI/RT	1.865	1.476	2.356
	YES Post-SBIRT Specialty TX	1.560	1.329	1.831
	NO Post-SBIRT Specialty TX	.837	.776	.902
	N of Study Participants	1889		
TOTAL	Odds Ratio for BI/RT	2.777	2.269	3.398
	YES Post-SBIRT Specialty TX	2.318	1.977	2.717
	NO Post-SBIRT Specialty TX	.835	.798	.874
	No of Study Participants	3937		

Differentials in post-SBIRT admissions to specialty substance abuse treatment were explored by comparing community health centers with on-site availability of specialty substance abuse treatment to community health centers without on-site availability of specialty treatment (Table 13

below). The results indicated no statistically significant association between post-SBIRT admissions to specialty substance abuse treatment for community health centers with on-site availability of specialty substance abuse treatment in comparison to community health centers without on-site availability of specialty treatment. This is contrary to the original assumption that community health centers with on-site availability of specialty treatment would have greater success in engaging study participants in post-SBIRT specialty treatment.

Table 13 Community Health Centers with On-Site Specialty Treatment

		ASSIST SCREEN POS & NO TX OR PRE- SBIRT TX	ASSIST SCREEN POS & POST- SBIRT TX	TOTAL		
CHC with On-Site Specialty SA Treatment						
0	Count	2073	329	2402		
	% within On-Site Specialty TX	86.3%	13.7%	100.0%		
	% within FOR BI/RT, NOPOST V. POST	60.9%	59.3%	60.7%		
1	Count	1332	226	1558		
	% within On-Site Specialty TX	85.5%	14.5%	100.0%		
	% within FOR BI/RT, NOPOST V. POST	39.1%	40.7%	39.3%		
Total	Count	3405	555	3960		
	% within On-Site Specialty TX	86.0%	14.0%	100.0%		
	% within FOR BI/RT, NOPOST V. POST	100.0%	100.0%	100.0%		
Chi-Square Tests		Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Chi-Square		.513 ^a	1	.474		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 218.36.

CHAPTER 5: DISCUSSION

5.1. Overview

A discussion of the main findings for the study hypothesis, in addition to limitations and strengths of the dissertation study, is provided. This is followed by the implications that this dissertation study may have on the future of brief intervention (BI) programs, policies, and ongoing research. This dissertation study was designed to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT interventions. A secondary aim was to assess differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT.

5.2. Substance Abuse, SBIRT & Specialty Treatment

As noted in the Introduction, substance abuse is a major public health burden, accounting for significant social, physical, and health problems and resulting in considerable health care costs. Research shows that early engagement of substance-dependent individuals in treatment results in better outcomes (Timko et al. 1999; Moos & Moos 2003), highlighting the significance of identifying substance use/abuse issues early via universal screening and intervening with clinically indicated interventions (e.g., motivationally based brief interventions and/or referral to specialty treatment). BIs, as a component of SBIRT, are evidence-based procedures that provide immediate attention to individuals who screen at moderate-risk and high-risk for alcohol and/or other substance use behaviors. BIs raise individuals' awareness of substance use and its consequences and motivate them towards positive behavior change. For individuals at-risk of developing a serious problem with alcohol and/or substance misuse, the identification of early warning signs can be enough to change risky drinking or other substance use habits. For others, BIs may be important first steps toward treatment of and recovery from addiction. Given the vast population who experience risky alcohol and/or substance use, BIs could have significant public health implications and positively impact a broad population.

The primary aim of this study was to test the odds of admission to specialty substance abuse treatment based on severity of substance involvement and the receipt of BI or BI/RT interventions. The study hypothesis was based on the assumption that study participants who screened at high-risk on the ASSIST for substance use and were offered a BI/RT would be more likely to engage in specialty substance abuse treatment within a year post-SBIRT intervention

compared to those who screened at moderate-risk on the ASSIST and received a BI only. Study participants who screened at high-risk and who were offered BI/RT, which facilitates engagement into specialty substance abuse treatment, would present to specialty substance abuse treatment at higher rates than study participants who screened at moderate-risk on the ASSIST. The secondary exploratory aim was to explore differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT. Specialty substance abuse treatment was defined as admission to a licensed substance abuse treatment program within 365 days (one year) post-SBIRT intervention as captured by the Connecticut DMHAS administrative substance abuse treatment database.

5.3. Study Hypothesis

The study hypothesis was based on the assumption that study participants who screened at high-risk on the ASSIST for substance use and were offered a BI/RT would be more likely to engage in specialty substance abuse treatment within a year post-SBIRT intervention compared to those who screened at moderate-risk on the ASSIST and received a BI only. There is evidence that BIs are effective with at-risk and hazardous substance users, and emerging evidence suggests that BIs can be used to motivate individuals to seek specialized substance abuse treatment (Bien et al., 1993). To meet this purpose the following study question was posed:

- 1) Did study participants who screened at high-risk on the ASSIST for alcohol and/or other substances *and* who were offered a BI/RT, have an increased probability of admission to

specialty substance abuse treatment within the following year (post-SBIRT) compared to study participants who screened at moderate-risk and who were offered BI only?

The effects of BI or BI/RT may be confounded by addiction severity as captured by the ASSIST. Therefore we cannot imply that BI/RT was responsible for increased admission to specialty treatment when only study participants who screened at high-risk on the ASSIST were offered BI/RT. The severity of substance use was used to assign BI (at moderate-risk) or BI/RT (at high-risk), which may account for the possible effect of BI vs. BI/RT on specialty treatment admission. This study attempted to reduce the impact of this effect by using multilevel logistic regression analyses, which allowed for a “stepped” approach in which each patient characteristic was added one-by-one to examine the effect of independent measures on post-SBIRT admission to specialty substance abuse treatment. This study also analyzed the Global ASSIST severity score, which took into account all symptoms across all reported alcohol and other substances. The odds ratio remained significant, suggesting that the type of intervention (BI or BI/RT) may have contributed to specialty treatment admission beyond the ASSIST severity score alone. Furthermore, analyses were also conducted where the BI and BI/RT variables were added last, after the other demographic variables were added. After controlling for demographics, prior mental health and substance abuse treatment, and Global ASSIST severity, the BI/RT still made an independent, significant contribution.

Thus, as hypothesized, study participants offered BI/RT were more likely to engage in specialty treatment than study participants who were offered BI, after controlling for severity of substance involvement. The odds of the BI/RT study having a post-SBIRT admission to specialty treatment

was 2.78 times greater than the odds of study participants who screened at moderate-risk and who were offered a BI only population [OR= 2.78; 95% CI 2.27, 3.40]. When factoring age, gender (male), race/ethnicity, prior history of mental health treatment, prior history of substance abuse treatment, and ASSIST severity scores, the odds of the BI/RT study participants having a post-SBIRT admission to specialty treatment was between 1.67 and 2.88 times higher than for the BI only study participants. These findings indicate that BI/RT, as a component of the SBIRT model, could potentially impact admissions to specialty substance abuse treatment post-SBIRT intervention more significantly than BI alone. It is also important to note that BI alone also had a positive impact on admissions to specialty substance abuse treatment. Study participants that screened at high-risk on the ASSIST for alcohol and/or other substances had a higher rate (29%) of post-SBIRT admissions to specialty treatment as compared to study participants (11.4%) who screened at moderate-risk on the ASSIST for alcohol and/or other substances. It seems logical that study participants screening high-risk on the ASSIST would be an important moderator for admission to specialty treatment.

In other studies, BIs have been found to increase the percent of individuals who show up for their first specialty treatment appointment to range from 5% among controls to 50 to 65% among those receiving BIs, with as many as 50% of individuals reporting that they continue to be involved in some kind of substance abuse treatment (Bernstein et al., 1997; D'Onofrio et al., 1998; Dunn and Ries, 1997). Analysis conducted by Bien et al., (1993) concluded that BIs enhanced the motivation of treatment-seeking problem drinkers to enter and remain in outpatient or residential alcohol treatment compared with individuals not receiving such attention. Results from the Krupski et al., (2010) study also indicated that patients who received a BI were significantly more likely to enter

specialized treatment in the subsequent year compared to similar patients who did not receive a BI. Patients who were provided a referral to treatment in addition to the BI also were associated with a substantially higher likelihood of subsequent specialty treatment. However, a meta-analysis conducted by Glass et al., (2015) found no evidence that BIs for alcohol were effective in increasing the utilization of specialty alcohol treatment, suggesting that the BI and referral to treatment component of SBIRT may not adequately link patients who need specialty treatment to those services. The Glass et al. study included only alcohol-related interventions and settings of the randomized controlled trials varied, including two that were delivered in medical inpatient units, three in general healthcare settings, eight in emergency departments, and the remaining studies were conducted outside of the United States. A study by Longabaugh et al., (2010) found that a booster session, defined as a ten-minute follow-up call approximately one week after the initial intervention following BI or BI/RT, enhanced the effect of the BI and patient engagement in specialty treatment. Dissertation study findings indicate that BI/RT within the SBIRT model more significantly impacts admissions to specialty substance abuse treatment post-SBIRT intervention than BI alone. It is also important to note that BI alone impacted admissions to specialty substance abuse treatment.

5.4. Secondary Exploratory Aim

The secondary aim was to explore differential effects in admission to specialty treatment based on age, gender, race/ethnicity, ASSIST severity, alcohol and/or other substance reported, pre-SBIRT mental health treatment, and pre-SBIRT specialty substance abuse treatment among study participants based on the receipt of a BI or BI/RT. Multilevel logistic regression analyses were conducted to compare the odds of post-SBIRT admission to specialty substance abuse treatment

for study participants who received a BI or BI/RT and examine interactions with a number of patient characteristics, including age, gender, race/ethnicity, prior lifetime history of specialty substance abuse treatment, prior history of mental health treatment, and ASSIST severity score. The multilevel logistic regression analyses used a “stepped” approach in which each of the above patient characteristics were added one-by-one to examine the effect of independent measures on post-SBIRT admission to specialty substance abuse treatment.

Multilevel logistic regression analyses were conducted to predict the effects of multiple variables on admission to specialty substance abuse treatment post-SBIRT. The multilevel regression allowed for a “stepped” regression by adding patient characteristics one-by-one to examine the effects of independent measures on post-SBIRT admission to specialty substance abuse treatment. No statistically significant relationship was found with age, gender, race or ethnicity or prior mental health treatment. A statistically significant association was found with study participants who had pre-SBIRT admission to specialty treatment. Study participants who screened at high-risk on the ASSIST and were offered BI/RT and who had pre-SBIRT admissions to specialty treatment were 2.78 times more likely to have a post-SBIRT admission to specialty treatment than study participants with moderate risk who were offered a BI only. Results indicate that study participants who were offered a BI/RT were significantly more likely to enter into specialty substance abuse treatment in the subsequent year compared to study participants who were only offered a BI. The strongest association between study participants who were offered a BI/RT and post-SBIRT admission to specialty treatment was prior SBIRT admission to specialty treatment. This may suggest that participants with prior treatment who receive BI/RT may be more willing to re-engage with specialty treatment because of their prior history of addiction/dependence or

their familiarity with accessing specialty treatment. Although a history of prior SBIRT admission to specialty substance abuse treatment was associated with higher likelihood of post-SBIRT admission to specialty substance abuse treatment, BI/RT also had an impact for those with no prior specialty substance abuse treatment. Therefore providing BI/RT was associated with higher likelihood of post-SBIRT admission to specialty treatment.

5.5. Strengths and Limitations of Dissertation Study

This dissertation study included several strengths and weaknesses. Strengths include: 1) Real-World Implementation: The dissertation study took advantage of the implementation of the Connecticut SBIRT Program, where SBIRT was implemented across nine community health centers across the state; and 2) Analysis of Administrative Specialty Treatment Dataset: The study had the ability to match the SBIRT screened sample to the Connecticut DMHAS administrative specialty substance abuse treatment dataset, including matching study participants pre-SBIRT (historical data up to 7 years pre-SBIRT) or up to one year post-SBIRT. The administrative specialty treatment dataset provided rich patient level information, including socio-economic characteristics, confirmation of substance abuse diagnosis, and utilization of specialty treatment, that were matched with the ASSIST and CT SBIRT Program data. Linkage of the SBIRT dataset with the DMHAS dataset provided the first population level evaluation of the relationship between SBIRT screening in primary care and subsequent admission to treatment, as documented in the records of a statewide primary care screening program and in the admission records to a statewide treatment service monitoring system.

There are important study limitations that should be noted, including: 1) Non-Randomized Study Participants: Study participants were not randomized for this study. Thus, study participants may have been subject to selection bias, although controls for various possible confounders were included in the statistical analyses. 2) Generalization: Study participants were from community health centers across Connecticut which serve primarily low-income populations with significant health issues and greater likelihood of untreated substance use disorders. These individuals are primarily publically insured (i.e., Medicaid, Medicare), uninsured, and/or underserved from Connecticut's urban hubs often with higher rates of substance misuse. It is unclear whether study results would generalize to other populations or healthcare settings. 3) Non-Research Data: There are concerns associated with the use of service/administrative data which may not include all measurements of interest. 4) Variations across Community Health Center Sites: Although all SBIRT staff were trained and received supervision on the SBIRT model from the University of Connecticut Health Center SBIRT Training Institute, there may have been differences in implementation procedures across the various health center study sites. 5) SBIRT Intervention Fidelity: Although all SBIRT staff were trained and received supervision on the SBIRT model from the University of Connecticut Health Center SBIRT Training Institute, variations of on-site supervision for SBIRT services varied per community health center location. Furthermore, the quality of health educators may have also varied by location, which may have resulted in varying quality of BI provided and referrals to treatment directly impacting who presented to specialty treatment and who did not. 5. Self-Report: The self-report ASSIST data is also a limitation to the study dissertation findings. While the ability to match the SBIRT screened sample to the Connecticut DMHAS administrative specialty substance abuse treatment data set was helpful, this study still depends on individual responses to the ASSIST screening questions to determine

substance use severity and intervention protocol. Individuals who underreported alcohol and/or substance usage, as well as their substance use and severity symptoms may have been misclassified.

5.6. Public Health Implications

Data from the NSDUH reflects that approximately 20.2 million Americans who were classified as needing treatment did not receive treatment at a specialty facility (SAMHSA, 2014). There are a number of internal and external barriers that prevent individuals from seeking, entering, and remaining in specialty treatment, including guilt, stigma, shame, lack of access to treatment services, and lack of knowledge regarding treatment availability. BIs potentially offer opportunities to address some barriers to specialty treatment by engaging non-treatment seeking individuals through motivationally based interventions that facilitate entry to specialty treatment. Further exploration of BI's potential to engage non-treatment seeking individuals to specialty treatment is warranted, including further exploration of potential increased significance of BIs/RTs. Of study participants who screened at moderate-risk on the ASSIST for alcohol and/or other substances and who were offered a BI, 80.4% had no post-SBIRT admission to specialty treatment. Of study participants who screened at high-risk on the ASSIST for alcohol and/or other substances and who were offered BI/RT, 59.9% had no post-SBIRT admission to specialty treatment. While 40% of study participants who screened at high-risk were admitted to specialty treatment within one year of being screened, this does offer opportunities to increase engagement and referral to treatment targeting the 60% who did not present to treatment. This exceeds the significant gap in treatment seen nationally, where of the estimated 22.7 million Americans who were classified as needing treatment, only about 2.5 million people (10 percent) received treatment

at a specialty substance abuse treatment facility (SAMHSA, 2014). The potential for BIs, as a component of SBIRT, to identify, intervene, and motivate individuals at-risk for alcohol and/or other substances to access specialty treatment could have a significant impact on healthcare given current trends of alcohol and/or other substance abuse in the United States. The findings of this study affirm a significant role for BIs, as a component of SBIRT, in motivating and facilitating individuals' admission to specialty treatment.

5.7. Future Research

Future research should investigate the extent to which BIs and BIs/RTs, as components of SBIRT, facilitate admission to specialty substance abuse treatment and improve outcomes related to specialty treatment and health. Further analyses on association between admission to specialty treatment and clinical outcomes are warranted. Future research is needed to better understand how to incorporate referrals to specialty treatment within BIs for individuals screening at low- to moderate-risk, in addition to individuals screening at high-risk. Future research should utilize longer-term follow-up periods (beyond one-year post-SBIRT services) to analyze impacts of BI and BI/RT on admission to specialty substance abuse treatment, length of stay and outcomes of specialty substance abuse treatment, and other health outcomes. Future analysis should also look at cost-effectiveness of BI and BI/RT and its impact on utilization of other services, including hospital/emergency department. Additional research on the ASSIST and scoring associated with substance abuse level of risk would be useful. Research on how to best deliver BI and BI/RTs to further increase post-SBIRT admissions to specialty treatment is warranted. Finally, future research should consider use of a randomized controlled study design to further investigate BI and BI/RT role.

5.8. Conclusion

In conclusion, SBIRT provides early identification and intervention with individuals who are at risk for substance abuse. The role of BI and the substantially significant role of BI/RT, as components of SBIRT, is confirmed as a promising approach for early intervention for substance use disorders, in addition for recovery management for individuals with pre-SBIRT specialty treatment history. Wider dissemination of BI and BI/RT, as components of SBIRT, can have a significant impact on healthcare and societal costs associated with substance abuse.

APPENDICES

APPENDIX 1: WHO ASSIST

WHO ASSIST

The questions I'm going to ask you relate to your experiences with alcohol, cigarettes, and other drugs. Some of the substances we'll talk about can be prescribed by a doctor or dentist (like pain medications). But I am only concerned with those if you have taken them for reasons other than prescribed, or in different doses than prescribed. This information is an important part of your medical history and will help us in our mission to give you the most appropriate and comprehensive care.

I am interested in knowing about the substances you have used in your lifetime as well as those you have used in the past 3 months.

1. In your life, which of the following substances have you ever used? Please report Nonmedical use only: (Do not record medications that are used as prescribed by a doctor).	No	Yes
m. Tobacco products such as cigarettes, chewing tobacco, cigars, etc.	0	3
n. Alcoholic beverages such as beer, wine, hard liquor, etc.	0	3
o. Marijuana, pot, grass, reefer, weed, ganja, hash, chronic, gangster, joints, blunts, Mary Jane, etc.	0	3
p. Cocaine or Crack, coke, blow, snow, flake, toot, rock, etc.	0	3

q. Prescription stimulants such as Ritalin, Concerta, Adderall, Dexedrine, diet pills, etc.	0	3
r. Methamphetamine , uppers, speed, crystal meth, ice, chalk, glass, fire, crank, etc.	0	3
s. Inhalants or anything you might huff, like glue, correction fluid, gasoline, butane, paint thinner, lighter fluid, spray paint, poppers, snappers, Rush, Nitrous Oxide, laughing gas, whippets, etc.	0	3
t. Sedatives or sleeping pills such as Diazepam (Valium), Lorazepam (Ativan), Alprazolam (Xanax), Triazolam, Halcion, Librium, Restoril, Estazolam (ProSom), Rohypnol (roofies, roche, cope), Serepax, Seconal, pentobarbital sodium (Nembutal), Phenobarbital, mephobarbital (Mebacut), GHB (Grievous Bodily Harm, Georgia Home Boy, Liquid X, Liquid Ecstasy), Ketamine (Special K, Vitamin K), downers, tranquilizers, sedatives, hypnotics, etc.	0	3
u. Hallucinogens/psychedelics , LSD (acid, Boomers, Yellow Sunshine), mushrooms, mescaline, PCP (Angel Dust, Ozone, Wack, Rocket Fuel), MDMA (Ecstasy, XTC, Adam, X), wet, illy, etc.	0	3
v. Prescription pain medication such as fentanyl, oxycodone, OxyContin, Percocet, hydrocodone, Vicodin, methadone, buprenorphine, codeine, Darvon, Dilaudid, Demerol, Lortab, Talwin-Nx, Tylenol-2, -3, -4, morphine, non-prescription methadone, etc.	0	3
w. Heroin , opium, Smack, H, Junk, Skag	0	3
x. Other drug: Something not listed here? Please specify: _____	0	3

- If the patient says “No” for all items in Question 1, reinforce abstinence. **Screening is complete.**
- If the patient says “Yes” to any of the substances, ask Question 2 for those substances ever used.

2. <u>In the past three months</u> , how often have you used the substances you mentioned (first drug, second drug, etc)?	Never	Once or Twice	Monthly	Weekly	Daily or Almost
a. Tobacco products or cigarettes	0	2	3	4	6
b. Alcoholic beverages	0	2	3	4	6
c. Marijuana	0	2	3	4	6
d. Cocaine or Crack	0	2	3	4	6
e. Prescription stimulants	0	2	3	4	6
f. Methamphetamine	0	2	3	4	6
g. Inhalants	0	2	3	4	6
h. Sedatives or sleeping pills	0	2	3	4	6
i. Hallucinogens	0	2	3	4	6
j. Prescription pain medication	0	2	3	4	6
k. Heroin	0	2	3	4	6
l. Other – specify:	0	2	3	4	6

For patients who report “Never” having used any substance in the past 3 months: **Go to Question 6.**

- If any substances in Question 2 were used in the previous three months, **ask Question 3** for each substance used.

3. <u>In the past 3 months</u> , how often have you had a strong desire or urge to use (first drug, second drug, etc)?	Never	Once or Twice	Monthly	Weekly	Daily or Almost
a. Tobacco products or cigarettes	0	3	4	5	6
b. Alcoholic beverages	0	3	4	5	6
c. Marijuana	0	3	4	5	6
d. Cocaine or Crack	0	3	4	5	6
e. Prescription stimulants	0	3	4	5	6
f. Methamphetamine	0	3	4	5	6
g. Inhalants	0	3	4	5	6
h. Sedatives or sleeping pills	0	3	4	5	6
i. Hallucinogens	0	3	4	5	6
j. Prescription pain medication	0	3	4	5	6
k. Heroin	0	3	4	5	6
l. Other – specify:	0	3	4	5	6

4. <u>During the past 3 months</u> , how often has your use of (first drug, second drug, etc) led to health, social, legal or financial problems?	Never	Once or Twice	Monthly	Weekly	Daily or Almost
a. Tobacco products or cigarettes	0	4	5	6	7
b. Alcoholic beverages	0	4	5	6	7
c. Marijuana	0	4	5	6	7
d. Cocaine or Crack	0	4	5	6	7
e. Prescription stimulants	0	4	5	6	7
f. Methamphetamine	0	4	5	6	7
g. Inhalants	0	4	5	6	7
h. Sedatives or sleeping pills	0	4	5	6	7
i. Hallucinogens	0	4	5	6	7
j. Prescription pain medication	0	4	5	6	7
k. Heroin	0	4	5	6	7
l. Other – specify:	0	4	5	6	7

5. <u>During the past 3 months</u> , how often have you failed to do what was normally expected of you because of your use of (first drug, second drug, etc)?	Never	Once or Twice	Monthly	Weekly	Daily or Almost	Daily

a. Tobacco products or cigarettes					
b. Alcoholic beverages	0	5	6	7	8
c. Marijuana	0	5	6	7	8
d. Cocaine or Crack	0	5	6	7	8
e. Prescription stimulants	0	5	6	7	8
f. Methamphetamine	0	5	6	7	8
g. Inhalants	0	5	6	7	8
h. Sedatives or sleeping pills	0	5	6	7	8
i. Hallucinogens	0	5	6	7	8
j. Prescription pain medication	0	5	6	7	8
k. Heroin	0	5	6	7	8
l. Other – specify:	0	5	6	7	8

- Ask Questions 6 & 7 for all substances ever used (i.e., those endorsed in Question 1).

6. Has a friend or relative or anyone else <u>ever</u> expressed concern about your use of (first drug, second drug, etc)?	No, never	Yes, in the past 3 months	Yes, but not in the past 3 months
a. Tobacco products or cigarettes	0	6	3
b. Alcoholic beverages	0	6	3
c. Marijuana	0	6	3
d. Cocaine or Crack	0	6	3
e. Prescription stimulants	0	6	3
f. Methamphetamine	0	6	3
g. Inhalants	0	6	3
h. Sedatives or sleeping pills	0	6	3
i. Hallucinogens	0	6	3
j. Prescription pain medication	0	6	3
k. Heroin	0	6	3
l. Other – specify:	0	6	3

7. Have you ever tried and failed to control, cut down or stop using (first drug, second drug, etc)?	No, never	Yes, in the past 3 months	Yes, but not in the past 3 months
a. Tobacco products or cigarettes	0	6	3
b. Alcoholic beverages	0	6	3
c. Marijuana	0	6	3
d. Cocaine or Crack	0	6	3
e. Prescription stimulants	0	6	3
f. Methamphetamine	0	6	3
g. Inhalants	0	6	3
h. Sedatives or sleeping pills	0	6	3
i. Hallucinogens	0	6	3
j. Prescription pain medication	0	6	3
k. Heroin	0	6	3
l. Other – specify:	0	6	3

Patient Feedback Report

Substance	Risk Level			Your Score
	<i>Low</i>	<i>Moderate</i>	<i>High</i>	
a. Tobacco products such as cigarettes, chewing tobacco, cigars, etc.	0 - 3	4 - 26	27 +	
b. Alcoholic beverages such as beer, wine, hard liquor, etc.	0 - 10	11 - 26	27 +	
c. Marijuana , pot, grass, reefer, weed, ganja, hash, chronic, gangster, joints, blunts, Mary Jane, etc.	0 - 3	4 - 26	27 +	
d. Cocaine or Crack , coke, blow, snow, flake, toot, rock, etc.	0 - 3	4 - 26	27 +	
e. Prescription stimulants such as Ritalin, Concerta, Adderall, Dexedrine, diet pills, etc.	0 - 3	4 - 26	27 +	
f. Methamphetamine , uppers, speed, crystal meth, ice, chalk, glass, fire, crank, etc.	0 - 3	4 - 26	27 +	
g. Inhalants or anything you might huff, like glue, correction fluid, gasoline, butane, paint thinner, lighter fluid, spray paint, poppers, snappers, Rush, Nitrous Oxide, laughing gas, whippets, etc.	0 - 3	4 - 26	27 +	
h. Sedatives or sleeping pills such as Diazepam (Valium), Lorazepam (Ativan), Alprazolam (Xanax), Triazolam, Halcion, Librium, Restoril, Estazolam (ProSom), Rohypnol (roofies, roche, cope), Serepax, Seconal, pentobarbital sodium (Nembutal), Phenobarbital, mephobarbital (Mebacut), GHB (Grievous Bodily Harm, Georgia Home Boy, Liquid X, Liquid Ecstasy), Ketamine (Special K, Vitamin K), downers, tranquilizers, sedatives, hypnotics, etc.	0 - 3	4 - 26	27 +	
i. Hallucinogens/psychedelics , LSD (acid, Boomers, Yellow Sunshine), mushrooms, mescaline, PCP (Angel Dust, Ozone, Wack, Rocket Fuel), MDMA (Ecstasy, XTC, Adam, X), wet, illy, etc.	0 - 3	4 - 26	27 +	
j. Prescription pain medication such as fentanyl, oxycodone, OxyContin, Percocet, hydrocodone, Vicodin, methadone, buprenorphine, codeine, Darvon, Dilaudid, Demerol, Lortab, Talwin-Nx, Tylenol-2, -3, -4, morphine, non-prescription methadone, etc.	0 - 3	4 - 26	27 +	
k. Heroin , opium, Smack, H, Junk , Skag	0 - 3	4 - 26	27 +	
l. Other drug: Something not listed here? Please specify:	0 - 3	4 - 26	27 +	

What do your scores mean?

Low: You are at low risk of health and other problems from your current pattern of use.
Moderate: You are at risk of health and other problems from your current pattern of substance use.
High: You are at high risk of experiencing severe problems (health, social, financial, legal, relationship) as a result of your current pattern of use and are likely to be dependent.

APPENDIX 2: Scoring the ASSIST

Substance Specific Scores.

Sum across questions 2 – 7 for each substance category separately.

For example, the Marijuana Specific Score would be: $2c+3c+4c+5c+6c+7c$

Maximum score for tobacco = 31 (Q5 is not asked)

Maximum score for each of the other drug categories = 39

Substance	ASSIST Score	Risk Level			
		Low	Low-Moderate	High-Moderate	High
SBIRT Class Code		SF	BI	BT	RT
a. Tobacco products or cigarettes		0 - 3	4 - 19	20 - 26	27+
b. Alcoholic beverages		0 - 10	11 - 19	20 - 26	27+
c. Marijuana		0 - 3	4 - 19	20 - 26	27+
d. Cocaine or Crack		0 - 3	4 - 19	20 - 26	27+
e. Prescription stimulants		0 - 3	4 - 19	20 - 26	27+
f. Methamphetamine		0 - 3	4 - 19	20 - 26	27+
g. Inhalants		0 - 3	4 - 19	20 - 26	27+
h. Sedatives or sleeping pills		0 - 3	4 - 19	20 - 26	27+
i. Hallucinogens		0 - 3	4 - 19	20 - 26	27+
j. Prescription pain medication		0 - 3	4 - 19	20 - 26	27+
k. Heroin		0 - 3	4 - 19	20 - 26	27+
l. Other – specify		0 - 3	4 - 19	20 - 26	27+

What do your scores mean?

Low: You are at low risk of health and other problems from your current pattern of use.

Moderate: You are at risk of health and other problems from your current pattern of substance use.

High: You are at high risk of experiencing severe problems (health, social, financial, legal, relationship) as a result of your current pattern of use and are likely to be dependent.

REFERENCES

- American Society of Addiction Medicine. (2014). Patient Placement Criteria, Second Edition Revised. Retrieved May 19, 2014 from <http://www.asam.org/ppc/ppc2.htm>
- Agerwala SM, McCance-Katz, MD. (2012). Integrating Screening, Brief Intervention, and Referral to Treatment (SBIRT) into Clinical Practice Settings: A Brief Review. *J Psychoactive Drugs*. 44(4): 307-317.
- Aschengraun A, Seage G. (2014). *Essentials of Epidemiology in Public Health*, Third Edition. Jones & Bartlett Learning.
- Austin, PC. (2011). An Introduction to Propensity Score Methods for Reducing the Effects of Confounding in Observational Studies. *Multivariate Behav Res*. 2011 May; 46(3): 399-424.
- Babor TF, Stenius K, Romelsjo A. (2008). Alcohol and drug treatment systems in public health perspective: mediators and moderators of population effects. *International Journal of Methods in Psychiatric Research*. 17(S1): S50-S59.
- Babor TF, McRee BM, Kassebaum PA, Grimaldi PL, Ahmed K & Bray J. (2007). Screening, Brief Intervention, and Referral to Treatment (SBIRT): Toward a Public Health Approach to the Management of Substance Abuse. *Substance Abuse*, 28, 7-30.
- Babor TF & Higgins-Biddle JC. 2001. *Brief Interventions for Hazardous and Harmful Drinking: A manual for use in primary care*. Department of Mental Health and Substance Dependence, World Health Organization, Geneva, Switzerland.
- Bernstein E, Bernstein J, & Levenson S. (1997). Project ASSERT: an ED-based intervention to increase access to primary care, preventative services, and substance abuse treatment system. *Ann Emerg Med*. 30:181-189.
- Bernstein J, Bernstein E, Tassiopoulos K, Heeren T, Levenson S, & Hingson R. (2005). Brief motivational intervention at a clinic visit reduces cocaine and heroin use. *Drug Alcohol Depend*. 77, 49-59.
- Bertholet E, Daeppen JB, Wietlisbach V, Fleming M, & Burnand B. (2005). Reduction of alcohol consumption by brief alcohol intervention in primary care: systematic review and meta-analysis. *Archives of Internal Medicine*, 165, 986-995.
- Bien T, Miller WR & Tonigan JS. (1993). Brief interventions for alcohol problems: A review. *Addiction*, 88, 315-336.
- Bray JW, Cowell AJ, & Hinde JM.(2011). A systematic review and meta-analysis of health care utilization outcomes in alcohol screening and brief intervention trials. *Medical Care*. 2011 March; 49(3): 287-94.

- Burke BL, Arkowitz H, & Menchola M. 2003. The efficacy of motivational interviewing: a meta-analysis of controlled clinical trials. *J. Consult. Clin. Psychol.* 71, 843-861.
- Coletti SD. (1998). Service providers and treatment access issues. In C. L. Wetherington & A. B. Roman (Eds.), *Drug addiction research and the health of women* (pp. 236–244, NIH Publication No. 98–4290). Rockville, MD: National Institute on Drug Abuse.
- Connecticut Collection and Evaluation of Data Related to Substance Abuse Use, Abuse, and Addiction Programs, 2013 Biennial Report. (2013). Connecticut Department of Mental Health and Addiction Services, Hartford, CT.
- Connecticut Department of Mental Health and Addiction Services (CT DMHAS). (2016). Triennial State Substance Abuse Plan. DMHAS, Hartford, CT.
- Connecticut Department of Mental Health and Addiction Services (CT DMHAS). (2016). Annual Statistical Report SFY2015. DMHAS, Hartford, CT.
- Connecticut Department of Mental Health and Addiction Services (CT DMHAS) CT SBIRT Program Website: www.ct.gov/dmhas/cwp/view.asp? Accessed 1/16/2015.
- Connecticut Department of Mental Health and Addiction Services (CT DMHAS). (2011). CT SBIRT Proposal Application. DMHAS, Hartford, CT.
- Dawson DA, Grant BF, & Chou PS. (2006a). Estimating the effect of help seeking on achieving recovery from alcohol dependence. *Addiction* 101, 824-834.
- Dean RH. (2004). Retrospective Studies and Chart Reviews. *Respir Care* 2004;49(10):1171–1174.
- D’Onofrio G, Bernstein J, Wollard RH, Brewer PA & Craig SA. (1998). Patients with alcohol problems in the emergency department, part 2: Intervention and referral. SAEM Substance Abuse Task Force. *Academic Emergency Medicine*, 5, 1210-1217.
- Dunn CW & Ries R. (1997). Linking substance abuse services with general medical care: Integrated, brief interventions with hospitalized patients. *American Journal of Drug and Alcohol Abuse*, 23, 1-13.
- Estee S, Wickizer T, He L, Shah M & Mancuso D. (2010). Evaluation of the Washington State Screening, Brief Intervention, and Referral to Treatment Project: Cost Outcomes for Medicaid Patients Screened in Hospital Emergency Departments. *Medical Care*, Volume 48, Number 1.
- Estee S, He L, Mancuso D & Felver B. (2006). Medicaid cost outcomes: Department of Social and Health Services, research and Data Analysis Division: Olympia, Washington.
- Finkelstein N (1993). Treatment programming for alcohol and drug-dependent pregnant women. *International Journal of Addiction* 28(13):1275-1309.

Fleming MF, Mundt MP, Manwell LB, Stauffacher EA & Barry KL (2002). Brief physician advice for problem drinkers: long-term efficacy and benefit-cost analysis. *Alcohol. Clin. Exp. Res.* 26, 36-43.

Fleming MF, Mundt MP, French MT, Manwell LB, Stauffacher EA, & Barry KL. (2000). Benefit cost analysis of brief physician advice with problem drinkers in primary care settings. *Med. Care* 38, 7-18.

Fleming MF, Barry KL, Manwell LB, Johnson K & London R. (1997). Brief physician advice for problem alcohol drinkers: A randomized controlled trial in community-based primary care practices. *JAMA*, 277, 1039-1045.

Gavin DR, Ross HE, & Skinner HA. (1989). Diagnostic validity of the Drug Abuse Screening Test in the assessment of DSM-III drug disorders. *Br. J. Addict.* 84, 301-307.

Gelber S & Renaldo DW. (2000). The state of the state of behavioral health in California: alcohol, drug, and mental health services systems. RAND Health Report. Berkeley, CA: California Healthcare Foundation.

Gentilello L, Ebel BE, Wickizer TM, Salkever DS & Rivara FP. (2005). Alcohol interventions for trauma patients treated in emergency departments and hospitals: a cost benefit analysis. *Ann. Surg.* 241, 541-550.

George AA & Tucker JA. (1996). Help-seeking for alcohol-related problems: Social contexts surrounding entry into alcoholism treatment or Alcoholics Anonymous. *Journal of Studies on Alcohol* 1996;57:449– 457. [PubMed: 8776687.

Government Performance and Results Act (GPRA) Client Outcome Measures for Discretionary Programs: Question-By-Question Instruction Guide. 2 March 2010. Version 8.6

Grant BF. (1997). Barriers to alcoholism treatment: Reasons for not seeking treatment in a general population sample. *Journal of Studies on Alcohol* 1997;58:365–371. [PubMed: 9203117].

IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Released 2013.

Imbens GW. (2004). Nonparametric estimation of average treatment effects under exogeneity: A review. *The Review of Economics and Statistics.* 2004;86:4–29.

Higgins ST, Budney AJ, Bickel WK, Foerg FE, Donham R & Badger GJ. (1994). Incentives improve outcome in outpatient behavioral treatment of cocaine dependence. *Archives of General Psychiatry*, 568-576.

Hulley SB, Cummings SR, Browner WS, Grady DG, Newman TB. (2007). *Designing Clinical Research*, Third Edition. Lippincott Williams & Wilkins.

Humeniuk RE, Ali RA, Babor TF, Farrell M, Formigoni ML, Boerngen de Larcerda R, Ling W, McRee B, Newcombe D, Hemraj P, Poznyak V, Simon S & Vendetti J. (2011). A randomized controlled trial of a brief intervention for illicit drugs linked to the Alcohol Smoking and Substance Involvement Screening Test (ASSIST) in clients recruited from primary health-care settings in four countries. *Addiction* 107(6): 957-966.

Humeniuk RE, Ali RA, Babor TF, Farrell M, Formigoni ML, Jittiwutikarn J, Boerngen de Larcerda R, Ling W, Marsden J, Monteiro M, Nhiwhatiwa S, Pal H, Poznyak V & Simon S. (2008). Validation of the Alcohol Smoking and Substance Involvement Screening Test (ASSIST). *Addiction* 103(6): 1039-1047.

Kadden R, Carroll K, Donovan D, Cooney N, Monti P, Abrams D, Litt M & Hester R. (1994). *Cognitive-Behavioral Coping Skills Therapy Manual: A Clinical Research Guide for Treating Individuals with Alcohol Abuse and Dependence*. Rockville, MD: National Institute on Alcohol Abuse and Alcoholism.

Kaner EF, Dickinson HO, Beyer F, Pienaar E, Schlesinger C, Campbell FN, Saunders JB, Burnand B & Heather N. (2009). The effectiveness of brief alcohol interventions in primary care settings: a systematic review. *Drug Alcohol Rev.* 28, 301-323.

Kaner EF, Beyer F, Dickinson HO, Pienaar E, Campbell F, Schlesinger C, Heather N, Saunders J & Burnand B. (2007). Effectiveness of brief alcohol interventions in primary care populations. *Cochrane Database of Systematic Reviews* (2): CD004148.

Krupski A, Sears JM, Joesch JM, Estee S, Dunn C, Huber A, Roy-Byrne P & Ries R (2010). Impact of brief interventions and brief treatment on admissions to chemical dependency treatment. *Drug and Alcohol Dependence*, 110, 126-136.

Lewallen S & Courtright P. (1998). *Epidemiology in Practice: Case-Control Studies*. *Community Eye Health Journal*. 11(28): 57-58.

Longabaugh R, Woolard RE, Nirenberg TD, Minugh AP, Becker B, Clifford PR, Carty K, Sparadeo F, Gogineni A: Evaluating the effects of brief motivational intervention for injured drinkers in the emergency room. *J Stud Alcohol* 2001.

Luchansky B, Nordlund D, Estee S, Lund P, Krupski A & Stark K. (2006) Substance abuse treatment and criminal justice involvement for SSI recipients: results from Washington State. *Am.J. Addict.* 15, 370-379.

Madras BK, Compton WM, Avula D, Stegbauer T, Stein JB & Clark HW. (2009). Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: Comparison at intake and 6 months later. *Drug and Alcohol Dependence*, 99, 280-295.

McCaul ME & Petry NM. (2003). The role of psychosocial treatments in Pharmacotherapy for alcoholism. *The American Journal on Addictions*, 12, S41-S52.

McLellan AT, Alterman AI, Metzger DS, Grissom GR, Woody GE & Luborsky L. (1994). Similarity of outcome predictors across opiate, cocaine, and alcohol treatments: Role of treatment services. *Journal of Consulting and Clinical Psychology* 1994;62:1141–1158.

Mdege ND, Fayter D., Watson JM, Stirk L, Sowden A & Godfrey C. (2013). Interventions for reducing alcohol consumption among general hospital inpatient heavy alcohol users: A systematic review. *Drug and Alcohol Dependence*. 2013 July; 131(1-2): 1-22.

Miles MB & Huberman AM. (1994). [Qualitative Data Analysis](#) (2nd edition). Thousand Oaks, CA: Sage Publications.

Miller WR & Rollnick S. (2002). *Motivational interviewing: Preparing people for change*. (2nd ed.) New York, NY: The Guilford Press.

Miller W & Sanchez V. (1993). Motivating young adults for treatment and lifestyle change. In Howard G, ed. *Issues in alcohol use and misuse by young adults*. Notre Dame IN. University of Notre Dame Press.

Miller W, Zweben A, Di Clemente C & Rychtarik R. (1992). *Motivational enhancement therapy manual: A clinical resource guide for therapists treating individuals with alcohol abuse and dependence*. (Project MATCH Monograph Series Vol 2). Rockville Maryland: National Institute on Alcohol Abuse and Alcoholism.

Moos RH & Moos BS. (2003). Risk factors for non-remission among untreated individuals with alcohol use disorders. *Journal of Studies on Alcohol*. 64, 555-563.

National Institute on Drug Abuse (NIDA). (2013). *Drug Abuse Costs In the United States*. <http://www.drugabuse.gov/publications/addiction-science-molecules-to-managed-care/introduction/drug-abuse-costs-united-states-economy-hundreds-billions-dollars-in-increased-health>. Accessed website on July 3, 2017.

National Institute on Drug Abuse (NIDA). (2016). *Effectiveness of Treatment*. <http://www.drugabuse.gov/publications/teaching-packets/understanding-drug-abuse-addiction/section-iv/4-effectiveness-treatment>. Accessed website on January 31, 2018.

Nowinski J, Baker S & Carroll K. (1994). *Twelve Step Facilitation Therapy Manual: A Clinical Research Guide for Therapists Treating Individuals with Alcohol Abuse and Dependence*. Rockville, MD: National Institute on Alcohol Abuse and Alcoholism.

Office of National Drug Control Policy (ONDCP). (2012). *Fact Sheet: Screening, Brief Intervention, and Referral to Treatment (SBIRT)*. ONDCP.

Office of National Drug Control Policy (ONDCP). (2012). National Drug Control Strategy 2012. Washington, DC.

Office of National Drug Control Policy (ONDCP). (2011). National Drug Control Strategy 2011. Washington, DC.

Parsons LS. (2004). Performing a 1:N Case-Control Match on Propensity Score. Ovation Research Group, Seattle, Washington.

Prochaska JO & DiClemente CC. (1984). The Transtheoretical Approach: Crossing the Traditional Boundaries of Therapy. Homewood, IL: Dorsey/Dow Jones-Irwin.

Roy-Byrne P, Bumgradner K, Krupski A, Dunn C, Ries R, Donovan D, West I, Maynard C, Atkins D, Graves MC, Joesch JM & Zarkins GA. (2014). Brief Intervention for Problem Drug Use in Safety-Net Primary Care Settings: A Randomized Clinical Trial. *JAMA*. 312 (5): 492-501.

Rubin DB. (1997). Estimating causal effects from large data sets using propensity scores. *Ann Intern Med* 1997;127:757-763.

Saitz R, Palfai TP, Cheng DM, Alford DP, Bernstein JA, Lloyd-Travaglini CA, Meli SM, Chaisson CE & Samet JH. (2014). Screening and Brief Intervention for Drug Use in Primary Care: The ASPIRE Randomized Clinical Trial. *JAMA*. 312 (5): 502-513.

Saitz R, Alford DP, Bernstein J, Cheng DM, Samet J & Palfait T. (2010). Screening and brief intervention for unhealthy drug use in primary care settings: randomized clinical trials are needed. *Journal of Addiction Medicine*. 4(3): 123-130.

Schafer JL & Kang J. (2008). Average causal effects from nonrandomized studies: A practical guide and simulated example. *Psychological Methods*. 2008;13:279–313.

Substance Abuse and Mental Health Services Administration (SAMHSA). "Performance Measurement/GPRA Tools, Substance Abuse & Mental Health Services Administration." The Substance Abuse and Mental Health Services Administration–Homepage. Accessed 11/21/2014. <<http://www.samhsa.gov/grants/tools.aspx>>.

Substance Abuse and Mental Health Services Administration. Center for Substance Abuse Treatment. Screening, Brief Intervention, and Referral to Treatment. Available at: <http://sbirt.samhsa.gov/>. Accessed May 14, 2014.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2014). National Survey on Drug Use and Health (NSDUH) (2012, Revised 2014). SAMHSA.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2013). Systems-Level Implementation of Screening, Brief Intervention, and Referral to Treatment. Technical

Assistance Publication (TAP) Series 33. HHS Publication No. (SMA) 13-4741. Rockville, MD: SAMHSA.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2012). 2008 – 2010 National Survey on Drug Use and Health (Revised March 2012): American Community Survey National Survey on Drug Use and Health (NSDUH). SAMHSA

Substance Abuse and Mental Health Services Administration (SAMHSA). (2011). White Paper on Screening, Brief Intervention and Referral to Treatment (SBIRT) in Behavioral Healthcare. SAMHSA.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2010). National Survey on Drug Use and Health (NSDUH). SAMHSA.

Substance Abuse and Mental Health Services Administration (SAMHSA). (2009). National Survey on Drug Use and Health (NSDUH). SAMHSA.

Substance Abuse and Mental Health Services Administration (SAMHSA), (1999). Brief Interventions and Brief Therapies for Substance Abuse. Treatment Improvement Protocol (TIP) Series, No. 34. Rockville (MD): SAMHSA.

Timko C, Moos RH, Finney JW & Kaplowitz MS. (1999). Long-term treatment careers and outcomes of previously untreated alcoholics. *Journal of Studies on Alcohol*, 60, 437-447.

Tucker JA, Vuchinich RE & Rippens PD. A factor analytic study of influences on patterns of help- Seeking among treated and untreated alcohol dependent persons. *Journal of Substance Abuse Treatment* 2004;26:237–242. [PubMed: 15063919]

U.S. Preventive Services Task Force (USPSTF). (2004). Screening and behavioral counseling interventions in primary care to reduce alcohol misuse: Recommendation statement. *Annals of Internal Medicine*, 140(7), 554-556.

Whitlock EP, Polen MR, Green CA, Orleans T & Klein J. (2004). Behavioral counseling interventions in primary care to reduce risky/harmful alcohol use by adults: a summary of evidence for the U.S. Preventative Services Task Force. *Ann. Intern. Med.* 140, 557-568.

Wickizer TM, Krupski A & Stark KD. (2006). The effect of substance abuse treatment on Medicaid expenditures among general assistance welfare clients in Washington state. *Milbank Quarterly* 2006;84(3):555–576.

Wickizer TM, Campbell K, Krupski A & Stark K. (2000). Employment outcomes among AFDC recipients treated for substance abuse in Washington State. *Milbank Q* 78; 585-608.

Wilk AI, Jensen NM & Havighurst TC. (1997). Meta-analysis of randomized control trials addressing brief interventions in heavy alcohol drinkers. *Journal of General Internal Medicine*, 12(5), 274-283.

World Health Organization (2014). Screening and brief interventions for hazardous and harmful alcohol use. Accessed from website 12.22.2014.
http://www.who.int/mental_health/mhgap/evidence/alcohol/q1/en/

World Health Organization (WHO). (2014). Global Status Report on Alcohol and Health. WHO: Geneva, Switzerland.

World Health Organization (WHO). (2012). World Drug Report. WHO: Geneva, Switzerland.
United Nations Office of Drugs and Crime (UNODC). (2014). World Drug Report. UNODC: New York, NY.

World Health Organization (WHO). 2008. The effectiveness of a brief intervention for illicit drugs linked to the alcohol, smoking, and substance involvement screening test (ASSIST) in primary health care settings: a technical report of phase III findings of the WHO ASSIST Randomized control trial.

World Health Organization (WHO). ASSIST Working Group (2002). The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): development, reliability and feasibility. *Addiction*, 97 (9): 1183-1194. WHO: Geneva, Switzerland.

World Health Organization (WHO), Brief Intervention Study Group (1996). A randomized cross national clinical trial of brief interventions with heavy drinkers. *American Journal of Public Health*, 86 (7):948-955.

Wutzke SE, Shiell A, Gomel MK & Conigrave KM. (2001), Cost effectiveness of brief interventions for reducing alcohol consumption. *Social Science & Medicine*, 52 (6), 863-870.

Young MM, Stevens A, Galipeau J, Pirie T, Garritty C, Singh K, Yazdi F, Golfam M, Pratt M, Turner L, Porath-Waller A, Arratoon C, Haley N, Leslie K, Reardon R, Sproule B, Grimshaw J, & Moher D. (2014). Effectiveness of brief interventions as part of the SBIRT model for reducing the nonmedical use of psychoactive substances: a systematic review. *Systematic Review Journal*, 3:50.