

RECOVERY SUPPORT SERVICES  
IN SUBSTANCE USE TREATMENT COMPLETION

Brett S. Bartruff

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Malitta Engstrom, Ph.D.  
Associate Professor  
Faculty Director, Master of Social Work Program  
Faculty Fellow, Ortner Center on Violence & Abuse  
Senior Fellow, Leonard Davis Institute  
Fellow, Gerontological Society of America  
School of Social Policy and Practice  
Dissertation Chair

James R. McKay, Ph.D.  
Professor of Psychology in Psychiatry  
Director, Center of Excellence in Substance Addiction Treatment and Education,  
Philadelphia Veterans Affairs Medical Center  
Perelman School of Medicine, Department of Psychiatry  
Dissertation Committee Member

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**Dedication**

## LAMENT FOR THE MOTHS

A plague has stricken the moths, the moths are dying,  
their bodies are flakes of bronze on the carpet lying.  
Enemies of the delicate everywhere  
have breathed a pestilent mist into the air.

Lament for the velvety moths, for the moths were lovely.  
Often their tender thoughts, for they thought of me,  
eased the neurotic ills that haunt the day.  
Now an invisible evil takes them away.

I move through the shadowy rooms, I cannot be still,  
I must find where the treacherous killer is concealed.  
Feverishly I search and still they fall  
as fragile as ashes broken against a wall.

Now that the plague has taken the moths away,  
who will be cooler than curtains against the day,  
who will come early and softly to ease my lot  
as I move through the shadowy rooms with a troubled heart?

Give them, O mother of moths and mother of men,  
strength to enter the heavy world again,  
for delicate were the moths and badly wanted  
here in a world by mammoth figures haunted!

-Tennessee Williams

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**ABSTRACT****RECOVERY SUPPORT SERVICES  
IN SUBSTANCE USE TREATMENT COMPLETION**

Brett S. Bartruff, University of Pennsylvania  
Dr. Malitta Engstrom, Dissertation Chair, University of Pennsylvania  
Dr. James R. McKay, Dissertation Committee Member, University of Pennsylvania

**Purpose:** This study aims to understand the relationship between recovery support services provided by certified peers and clients' length of time in and completion of substance use treatment. While many innovations in the treatment of substance use have helped improve outcomes for people with substance use disorders, length of time in treatment and completion of treatment continue to be low. Responses to enhance treatment engagement include recovery support programs that are staffed by people with lived experience of substance use and recovery; however, research in this area is limited.

**Methods:** This study involves an archival chart review from a western state community mental health agency in the United States. Data for the study are from the agency's electronic medical record during a 24-month period between January 1, 2018 and December 31, 2019. The sample ( $N=1,007$ ) is comprised of clients who engaged in substance use treatment at the agency during the 24-month inclusion period. The study compares people in substance use treatment who chose to receive recovery support peer services ( $n=216$ ) with people who opted out ( $n=791$ ). Because there were statistically significant differences between the two groups, a subsample comparison group was created using a one-to-one match from the peer and non-peer groups across four variables ( $n=408$ ), which included gender, prior treatment, co-occurring psychiatric disorder, and opioid use. To test treatment effects across groups (people who received peer services and the matched no-peer services comparison group), an independent sample t-test was used to test the difference in length of treatment and a chi-square test of independence was used to examine treatment completion. Additionally, to test treatment effects across peer services groups (people who received peer services and the matched no-peer services comparison group) while controlling for demographic and clinical characteristics, two hierarchical regression analyses were used to test the predictive value of peer services on length of stay in treatment and treatment completion. To test treatment effects in the peer-services group, multivariable regression analysis was used to test two models, one for each dependent variable, length of treatment and treatment completion.

**Results:** This study's initial treatment effect testing finds that people who received any recovery support service stayed in substance use treatment an average of 27 more days than people who did not receive any recovery services. However, the additional hierarchical regression analysis finds that when controlling for demographic and clinical characteristic covariates, there was no statistically significant difference in treatment length between people who received peer services and the matched no-peer services comparison group. Among people who received recovery support services, each additional session with a certified peer worker predicted an 11% increase in the likelihood of completing substance use treatment. No statistically significant difference was found in the likelihood of completing treatment when comparing people who did and did not receive recovery support services. The post-hoc analysis provides additional findings, including the number of different kinds of peer services provided, years of education, and workforce

participation as predictors of both dependent variables among people in the peer services group. The number of previous treatment episodes also had a statistically significant positive association with increased days in treatment among people in the peer services group.

**Implications and Conclusion:** As the involvement of peers to assist in substance use treatment grows around the United States, this study's findings support the promise of this trend. Peer support services may be an important part of enhanced treatment engagement. As substance use treatment professionals and agencies look for ways to improve outcomes with clients, this study provides support for the value of peer support involvement in traditional substance use treatment among people who choose to engage with peer support services.

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## **Chapter One: Recovery Support Services in Substance Use Treatment Completion**

This study examines the relationships between recovery support services provided by certified peers and patients' length of time in and successful completion of substance use treatment. Specifically, this study aims to understand if there is a relationship between receiving any peer services and a patient's number of days in treatment and likelihood of successful completion of treatment, as well as if an increased number of peer sessions lengthens time in treatment and successful completion for people who receive services from a certified peer worker. The study involves a quantitative examination of peer-driven recovery support services (RSS) and substance use treatment provided by a western state's community substance use and mental health agency.

Substance use disorders (SUD) have been treated in programs with variable intensities in order to assist patients in achieving initial abstinence and symptom reduction (Bassuk et al., 2016). Innovations in treatments have made significant strides in addressing the immediate symptoms related to the SUD; however, rates of treatment completion remain low. In 2017, the Substance Abuse and Mental Health Services Administration (SAMHSA) found that only 43% of patients successfully complete SUD treatment. This is problematic, as two frequent predictors of improved post-treatment outcomes are longer treatment episodes and successful completion of treatment (Ghose, 2008; Messina et al., 2000; Simpson, 1981). Thus, increasing the percentage of people who remain in and successfully complete treatment is paramount to improving post-treatment outcomes.

A growing response to improve substance use treatment outcomes incorporates peer-driven RSS to augment existing treatments. In the past, addiction was frequently

conceptualized and treated as an acute illness that should be curable with a single intervention, but recently it has become understood that SUDs are chronic medical conditions for many people (McLellan et al., 2000). Innovations utilizing peer-driven RSS are being coupled with a client-centered orientation that is shifting perspectives from treatment being provided for a curable acute illness to adaptive therapeutics addressing addiction as a chronic condition (Bassuk et al., 2016). RSS approaches are peer-based, non-professional, and non-clinical services designed to support people in reaching long-term recovery (Bassuk et al., 2016), with the key focus being to enhance a person's relationship to recovery and improve their quality of life (White, 2010). Another important aspect of peer-driven RSS is that the services are provided by people who have lived the experience of addiction and recovery, which can provide valuable insight and support (Bassuk et al., 2016). Many places throughout the country find that RSS play a key role in strengthening recovery (Laudet & Humphreys, 2013).

Delivery of RSS is guided by the Recovery-Oriented Systems of Care (ROSC) principles. As described by SAMHSA, "A ROSC is a coordinated network of community-based services and supports that is person-centered and builds on the strengths and resiliencies of individuals, families, and communities to achieve abstinence and improved health, wellness, and quality of life for people with, or at risk of, alcohol and drug problems" (SAMHSA, 2010, p. 2). The basic principles of ROSC propose that recovery is self-directed, individualized, and strengths based. A primary goal of ROSC is to establish a self-directed network of recovery services for people in recovery and their families. Supported by the ROSC framework, recovery services are an important step in implementing needed changes in the recovery treatment community, and the shift from

an acute care model to a chronic illness model can better serve patients with a continuum of care treatment process (Bassuk et al., 2016; Laudet & Humphreys, 2013; White, 2010).

Several barriers to recovery that contribute to poor outcomes have been repeatedly identified throughout the available literature. The barriers are often related to housing, employment, social supports, medical problems, and other mental health conditions (Laudet & Humphreys, 2013). Recovery support peers can guide and connect patients with supports to address these critical risk factors. Patients are more likely to have these risk factors addressed in a treatment approach that incorporates RSS along with traditional addiction therapies. Additionally, a primary reason that patients leave treatment is lack of social support (Laudet & Humphreys, 2013), a factor that RSS aims to ameliorate.

Substance use problems create many losses and compound suffering for the individual. Employment and productivity are among the most prominent losses that can be experienced by people with a SUD. Employees with a SUD miss 50% more days of work as compared to their peers, and three times as many days are missed by people with a SUD related to pain medication (Goplerud et al., 2017). Individuals with a SUD are also more likely to have left or been terminated from employment and significantly more likely to have more than one employer in the past year. Personal loss of productivity not only impacts the individual, but also results in significant harm to the economy. Nationally, lost productivity related to alcohol use alone results in a cost of \$161 billion (Bouchery et al., 2011). An individual with a SUD is more likely to experience health problems that require treatment and hospitalization for co-occurring medical conditions (Goplerud et al., 2017). Additionally, a person with a substance use problem is likely to

experience loss of personal freedom; over half of people incarcerated, on probation, or on parole are diagnosed with a SUD (Oser et al., 2012).

Ultimately, the greatest cost experienced as a result of a SUD is when a mother, son, father, daughter, employee, aunt, uncle, religious leader, friend, or other loved one loses their life due to substance use. In 2017, there was an all-time high of 72,000 overdose fatalities from illegal and prescription drugs (not including alcohol) in the United States (NIH, 2018). This was an increase of almost 10,000 deaths from the previous year and double the number of fatalities compared to a decade prior (NIH, 2018). Since 2017, overdose deaths from all illegal substances have fallen slightly with just over 70,000 recorded in 2019 (NIH, 2020); however, deaths from non-methadone synthetic opioids, primarily fentanyl and methamphetamine type stimulants, have continued to rise. In addition to overdose deaths from prescription and illegal substances, deaths directly or indirectly caused by alcohol-related factors account for over 88,000 fatalities annually, which averages to approximately one in every ten adult deaths involving alcohol (Stahre et al., 2014). Overall, substance use rates continue to climb across the nation, impacting both rural and urban communities (Oser et al., 2012).

### **Research Questions**

This study addresses several questions related to recovery support services and substance use treatment. First, is participation with peer recovery support services associated with longer time in treatment and greater likelihood of treatment completion among adults in substance use treatment? Second, among adults who participate in recovery support services, to what extent is a patient's length of time in treatment and likelihood of successful completion of a substance use treatment program associated with



the quantity and type of RSS the patient received during their course of treatment? A course of treatment encompasses all recommended levels of care, including any step-down in service level (i.e., residential to intensive outpatient, and/or general outpatient). A treatment episode is to include all recommended levels of care and not only a single level of care.

## **Chapter Two: Background and Significance**

In a systematic review, Bassuk et al. (2016) found that having peer supports was associated with positive changes related to substance use and recovery outcomes. The improved outcomes included reductions in substance and alcohol use, criminal justice system involvement, and rehospitalization rates; improved housing stability; and increased adherence to outpatient medical and behavioral health treatments. However, evidence of this relationship with strong methodology is very limited. There is also expansive literature describing the relationship between patients' personal risk and protective factors and their treatment completion (Banducci et al., 2013; Mutter et al., 2015; Sayre et al., 2002). However, the current literature includes limited information about the relationship between RSS and a patient's retention in, and successful completion of, substance use treatment.

### **Importance of Time in Treatment and Successful Completion**

Length of time in treatment is consistently found to be one of the strongest predictors of improved outcomes for people with substance use disorders (Ghose, 2008). Additional time in treatment is associated with reduced use of substances post-treatment completion (Schilhaus et al., 2000; Simpson, 1981). Patients engaged in treatment for less than three months exhibit the least favorable post-treatment results, with similar outcomes to people who only received detoxification services or individuals admitted to a program but did not receive treatment (Simpson, 1981). It is important to note that length of time in treatment may be partially explained by self-selection bias. People who stay in treatment longer may experience higher levels of motivation and commitment, may have

more resources to support staying in treatment for a longer time, and may already have a higher likelihood of treatment completion (Hampton et al., 2011; Miller et al., 2019).

Treatment completion is another strong predictor of improvements in substance use outcomes. Messina et al. (2000) found treatment completion to have a positive correlation to negative drug tests, higher rates of employment, and lower rates of future arrests. Successful completion of treatment is also associated with lower mortality and resumed substance use rates (Decker et al., 2017).

### **Barriers to Treatment Completion**

In 2009, the Substance Abuse and Mental Health Services Administration found that the following demographics and socioeconomic characteristics correlate to treatment completion: race, gender, age, education level, and employment status (SAMHSA, 2009). Unemployment has been linked with low treatment completion rates, and employment status is significantly correlated to SUD patients' outcomes. (Brewer et al., 1998; Mutter et al., 2015; Sayre et al., 2002). Brewer et al. (1998) and Sayre et al. (2002) identified that education level also has a significant relationship to treatment completion, with people who have completed high school experiencing higher rates of treatment completion, and Mutter et al. (2015) found that each additional level of education achievement bringing slight increases in completion rates. Gender has also been found to have a relationship to substance use treatment completion, with men experiencing lower rates of completion than women (Herbeck et al., 2016; Sayre et al., 2002). Lastly, older patients were more likely to have more positive treatment outcomes and rates of treatment completion (Mutter et al., 2015; SAMSHA, 2009).

Research has also identified additional characteristics that correspond with successful treatment completion. Earlier studies indicated that opioid use showed a negative correlation to treatment completion (Brewer et al., 1998); however, advances with Medication Assisted Treatment (MAT) have resulted in a positive trend toward increased treatment completion for people who use opioids (Fendrich, et al., 2021). Another risk factor related to treatment completion is the number of previous treatment episodes, in which individuals that have had two or more previous treatment episodes are less likely to complete treatment successfully (Brewer et al., 1998; Mutter et al., 2015; Sayre et al., 2002). Lastly, co-occurring mental health issues and SUDs have a detrimental effect on each other. Zhu et al. (2021) found that individuals with a psychiatric condition demonstrated poorer outcomes related to substance use, as well as greater impairment in their functioning related to their mental health disorder.

### **Brief History of Peer Support Services**

Peer support services, as they are known today, were first formally organized in the 1970s when previous clients were engaged in the treatment of individuals with serious mental illnesses (Solomon & Draine, 2001). Literature regarding the use of peer supports in treatment with people experiencing mental illness was first presented in publications in the early 1990s (Davidson et al., 2012). However, early accounts of engagement of patients in treatment of peers date back to the 1920s with psychiatrist Harry Stack Sullivan (Davidson et al., 2010). Over the past 20 years, programs providing peer services have exploded, with more than 10,000 certified peer specialists working in the United States alone (Davidson et al., 2012).

Harry Stack Sullivan was one of the first clinicians to engage former patients as paraprofessionals to help in the treatment of people with severe mental illness. Sullivan had been hospitalized in his youth for symptoms of schizophrenia, so when he led a treatment unit in Baltimore from 1925 to 1929, he theorized that ‘like cures like’ and hired former patients he considered like himself to be well qualified based on their lived experience (Palombo et al., 2009). Inspired by the mental health consumer movement and advocacy, peers were formally engaged in the 1970s as non-clinical and non-certified service providers (Davidson et al., 2012). The first formal state-recognized peer support certification initially appeared in 2001 (Kaufman et al., 2016). By 2016, 41 U.S. states and the District of Columbia had their own training and certification programs for certified peer specialists, and two states were in development of their programs.

The engagement of people with lived experience with recovery has long been part of treatment with people experiencing substance use issues. The self-help and 12-step models have relied on the importance of people with successful lived experience helping newer members. Substance use treatment has often drawn people in recovery towards the profession, and they were often employed as substance use counselors (Curtis & Eby, 2010). As the field has moved towards more employment of licensed mental health professionals, the involvement of certified peer support has become an important part of the treatment.

### **Recovery Support Services (RSS) for Substance Use**

In a qualitative study, Reingle et al. (2019) found that a peer’s lived experience with recovery helped them establish rapport with patients. The same study suggested that a peer’s personal lived experience helped patients seek services for substance use and

mental health conditions, as well as guided them through obtaining services, including housing and employment. Experiential theory and social comparison theory suggest that consumers find identification with, and are attracted to, people who are perceived to share similar experiences. Additionally, successful peers are found to be more credible to consumers as they are a demonstration of the successful navigation through similar problems/illness (Salzer, 2002; Solomon, 2004). Recovery support peers have also been found to help strengthen motivation for behavioral changes (Jack et al., 2018). Jozaghi et al. (2016) found that recovery peers were instrumental in reducing high-risk behaviors of individuals with crack and methamphetamine SUD. Education from peer workers has been found to decrease sharing of pipes between people who use substances while increasing their use of safer supplies.

RSSs are delivered through both individual and group formats (Bassuk et al., 2016; Laudet & Humphreys, 2013; White, 2010). Laudet and Humphreys (2013) state that recovery coaching is an essential piece of RSS, which they describe as:

where a peer mentors the individual seeking recovery (e.g., assists in setting recovery goals and a recovery plan, serves as a role model in recovery). This coaching includes helping connect the individual to recovery-supportive resources needed to restructure life (e.g., professional/non-professional services including housing and employment) and serving as an advocate and liaison to formal and informal community supports, resources, and recovery-supportive activities (pp. 131–132).

White (2010) describes several specific roles that peer-based RSS individuals fulfil, including motivator and cheerleader, ally and confidant, truth-teller, role model and

mentor, problem solver, resources broker, advocate, community organizer, lifestyle consultant, and friend.

A systematic review of peer-driven supports found that RSS were helpful in improving substance use outcomes. However, the systematic review also noted that further research is needed to understand specific RSS approaches and interventions that are effective (Bassuk et al., 2016). Additionally, the literature showed that RSS helped to increase treatment retention, improved relationships with treatment providers and social support, and improved satisfaction with the overall treatment experience (Reif et al., 2014). Though data suggest the use of RSS helps increase treatment retention, the literature is limited regarding length of time and successful completion of treatment regarding peer supports, and it does not address how dosage of peer provided services impacts patients' time in treatment and successful completion of treatment. While much of the available literature has been focused on engagement of peer supports in mental health services, fewer studies about certified peers within substance use treatment exist. This study addresses these gaps in the literature by examining associations between the number of peer-provided services with time in treatment and treatment completion among adults engaged in substance use treatment.

### **Hypotheses**

First, it is predicted that receiving any RSS from a peer worker will be associated with longer time in treatment and greater likelihood of treatment completion than treatment as usual without peer services among adults in a substance use treatment program, and this relationship will exist while controlling for mental health conditions,

gender, number of previous treatment episodes, age, opioid use, race, employment status, and years of education.

Second, it is predicted that greater quantity of recovery services will be associated with longer time in treatment and greater likelihood of treatment completion among adults in a substance use treatment program who participated in peer-recovery services, and this relationship will exist while controlling for mental health conditions, gender, number of previous treatment episodes, age, opioid use, race, employment status, and years of education.



### **Chapter Three: Methods**

This study is an investigation into the associations between engagement with RSS and both length of stay and likelihood of successful completion of substance use treatment. The study also examines the relationship between many clinical characteristics of clients, identified as control variables, and their relationship to the dependent variables. The results of this study help expand understanding regarding the role of RSS in substance use treatment, which fills some of the gaps in research regarding peer supports within substance use treatment.

#### **Design**

The study involves archival record review from a community mental health agency's Electronic Medical Records (EMR) and its data management system. The study draws upon data from the EMRs of patients discharged during a 24-month period, including January 1, 2018 to December 31, 2019. The selected dates represent the years the agency fully implemented its model for RSS from 2018 through the end of 2019. The agency had an initial test and design to develop its recovery support model during 2016-2017.

#### ***Setting***

The study took place at a western-state community mental health agency in the U.S. that contracts with the county to provide the public with substance use and mental health treatment services. The assigned county has a population of just over 300,000 people and is organized primarily into suburban and rural areas with just over 40% of the population commuting out of the county for their employment (U.S. Census Bureau, 2011).

Data for this study were from the agency's adult substance use treatment programs, which serve approximately 1,000 new patients each year. Patients were evaluated by one of the substance use program's 20+ Master's-level clinicians who are state-licensed mental health professionals. Most patients who attend substance use treatment with the agency are mandated to treatment by a court. While patients are often legally compelled to pursue treatment, patients' participation in RSSs at the agency is voluntary. The agency has found that patients' successful completion of treatment rates are comparable among people who are mandated and people who refer themselves to treatment. While some of the court programs have length of time standards as part of their completion, most allow for length of time in treatment to be based on each client's assessed need. One court program has a specific length of time requirement to complete, but this program represents a very small portion of the sample and does not mandate participation in RSS.

A typical course of substance use treatment with the agency is intended to range from 9 to 12 months in duration. Patients are evaluated for dosage of substance use treatment based on the American Society of Addiction Medicine's (ASAM) level-of-care placement criteria (Mee-Lee & American Society of Addiction Medicine, 2013). The agency provides a range of levels of care that include prevention/early intervention, general outpatient, intensive outpatient, residential, and continued/aftercare. The level of care assessment is completed regularly throughout treatment, and the assessment prescribes the number of weekly sessions. A patient is prescribed to attend a minimum of one therapy session per week during the entire course of treatment.

All patients experiencing challenges related to substance use are offered peer recovery support by the agency. One of the agency's recovery support specialists contacts the patient and offers recovery coaching, peer support groups, case management services, and engagement in various social activities. Patients may voluntarily opt into RSS; in some cases, a therapist may include RSS as part of the treatment plan, but only if the patient is in agreement.

### *Sample*

The sample was comprised of patients with a discharge service from traditional substance use treatment at the agency during the inclusive 24-month period described earlier. Each patient who had a discharge during that timeframe had the data from their course of treatment analyzed for this study. As this study design was an archival review of the data (Vassar & Holzmann, 2013; Gearing et al., 2006), it was possible for the entire population group of discharged patients to be included in the study.

The selected agency was a community mental health center, which is also the county's local mental health and substance use authority in a western state of the U.S. The population served by the agency primarily identifies as white adults aged 18 and over. The majority of patients in substance use treatment within the agency are mandated to treatment from criminal justice involvement, with less than 10% being self-referred. Medicaid and third-party insurance provide payment for less than 20% of patients in substance use treatment, with the majority being unfunded/uninsured.

**Inclusion Criteria.** Patients who were discharged from substance use services with reason for discharge indicated as treatment complete, discontinued, or left against

professional advice between January 1, 2018 and December 31, 2019 were included in the analyses.

**Exclusion Criteria.** Any patient discharged outside the selected timeframe or an identified reason for discharge including a transfer to another provider, terminated by the facility, death, or incarceration was excluded from the analyses.

### **Measures**

SAMHSA (2014) maintains a data archive to which substance use treatment facilities in the county report. SAMHSA's Treatment Episode Data: Discharge (TEDS-D) categorizes and operationalizes many of the variable categories used in this study. As the information comes from the EMR service that reports data for TEDS-D, the operational definitions used are congruent with national practices (Mutter et al., 2015).

### ***Independent Variables***

The independent variable in both hypotheses was the receipt of RSS by a patient during a treatment episode. It is important to note that quantity of services received from recovery support is patient-driven and voluntary. A patient may participate with recovery services at any time in treatment and end their participation at any time. Because participation in RSS is voluntary, there is a degree of variability among patients who engage with RSS during treatment, with some utilizing very few services compared to other participants. This variable was extracted from the patient's EMR and included the amount of individual or group services recorded under the recovery support program. The type and title of the included services were:

- Targeted Case Management—Individual, one-on-one service with a peer specialist focused on connection to resources and/or removing barriers to

recovery. Qualifications of providers able to offer this service include any peer who has completed the state's required case management training.

- Individual Skill Development— Individual, one-on-one service with a peer specialist focused on learning skills or engaging in social activities that connect patients to recovery. This service can be provided by any peer provider; no additional qualifications required.
- Individual Behavior Management—Individual, one-on-one service with a peer specialist focused on changing or implementing desired behavior needed to support healthy recovery. To provide these services, a peer must have a Bachelor of Social Work degree.
- Peer Service—Individual, one-on-one service with a peer specialist focused on a peer sharing their recovery story to support the patient in finding hope or motivation for their own recovery. These services can be completed by any provider who has completed the Certified Peer Support Specialist training.
- Group Skills Development—Group activity with other patients that is facilitated by a peer to focus on learning skills or engaging in social activities that connect patients to recovery. Any peer provider is qualified to provide the service.
- Group Behavior Management—Group activity with other patients, which is facilitated by a peer to focus on changing or implementing desired behaviors needed to support healthy recovery. A peer must have a Bachelor of Social Work degree to meet the qualifications to provide these services.

### *Dependent Variables*

For hypothesis one, length of stay was defined as the number of days in the substance use treatment episode. Treatment episode was measured as number of days between first psychotherapy service to final psychotherapy service that occurred before EMR discharge. These services included diagnostic evaluations, individual therapy, or group therapy services and are completed by a master's-level psychotherapist. The second dependent variable, treatment completion, was dichotomously coded. Treatment completion status was determined by the patient's assigned psychotherapist at time of discharge. Category options of status came from the federal 2014 TEDS-D standard options and are based upon prior research with TEDS-D data (Mutter et al., 2015).

Treatment completion will be categorized and defined as:

- Treatment complete—A patient has completed the requirements for the treatment program and successful progress on the treatment plan. Treatment complete includes completion of all recommended levels of care and not completion of a single level of care.

### *Control Variables*

Throughout the existing literature, several themes emerge as factors associated with treatment completion. The following variables were extracted from patients' EMRs and have nationally recognized operational definitions from TEDS-D reporting requirements.

- Psychiatric Condition—Patient has been diagnosed with a mental health disorder other than a substance use diagnosis.

- Gender—Nominal variable categorized as male or female (during the selected timeframe of the study, the agency’s TEDS-D data reporting elements were not inclusive of non-binary, gender diverse, transgender, or other gender identity categories).
- Number of Previous Treatment Episodes—Ordinal level of measure categorized as one, two, three, four, five, six, or more than six.
- Age—Continuous variable that indicated the client’s age in years at the time of discharge.
- Opioid Use—A nominal variable that indicated if the client had a primary, secondary, or tertiary substance of choice that included heroin, methadone, other opioids and synthetics (prescription opioids).
- Race —A nominal variable categorized based on TED-S data as follows:
  - Alaska Native (Aleut, Eskimo, Indian): Origins in any of the original people of Alaska.
  - American Indian (other than Alaska Native): Origins in any of the original people of North America and South America (including Central America) and who maintain cultural identification through tribal affiliation or community attachment.
  - Asian or Pacific Islander: Origins in any of the original people of the Far East, the Indian subcontinent, Southeast Asia, or the Pacific Islands.
  - Black or African American: Origins in any of the Black racial groups of Africa.

- White: Origins in any of the original people of Europe, North Africa, or the Middle East.
- Asian: Origins in any of the original people of the Far East, the Indian subcontinent, or Southeast Asia, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Philippine Islands, Thailand, and Vietnam.
- Other single race: Instances in which the client was not represented in any category above or whose origin group, because of area custom, is regarded as a racial class distinct from the above categories. (This category was not used for clients indicating multiple races.)
- Two or more races: Utilized when the state data system allows multiple race selection, and more than one race is indicated.
- Native Hawaiian or other Pacific Islander: Origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.
- Employment Status – A nominal variable indicating employment status at admission:
  - Employed Full Time, working 35 hours or more a week
  - Employed Part Time, working less than 35 hours a week
  - Unemployed
  - Homemaker
  - Student
  - Retired
  - Disabled
  - Not in the labor force – not looking for work in past 30 days



- Employment status unknown
- Education Level—A continuous variable from 0-25 representing the number of years of education a client completed.

### **Data Collection**

The agency provided the data for analysis. The agency's clinic manager extracted the requested variables from EMRs and removed any patient identifiers prior to providing the data set to the study investigators. The person primarily responsible for the data was the student investigator, a doctoral student. The student investigator saved the data set on secure password-protected hard drives. Others who had access to the data set included a faculty principal investigator and a university-affiliated statistician. The doctoral student principal investigator and statistician saved the data set with password encryption on a password-protected hard drive and deleted the data set after analysis was completed. Penn+Box was used to share data.

### **Consideration of Human Subjects**

The research study did not qualify as being conducted with human subjects as the investigators used a coded dataset that did not include any identifying information. The agency's clinic manager was the only person to have access to the identifiable data and signed an agreement prohibiting access to patient identifiers by study investigators. Since the study did not include human subjects, approval from the University of Pennsylvania's Institutional Review Board (IRB) was not required. The student investigator requested review by and confirmation from the University of Pennsylvania IRB that human subjects' participation approval was not necessary. An approval email from the agency's CEO outlining the role of the office manager and study investigators in how the data

would be handled was provided to IRB reviewers. A confirmation email from the IRB that the study does not involve human subjects was received and retained by the student investigator.

### Comparison of Groups

To establish that the groups did not differ in statistically significant ways (peer services versus no-peer services comparison group), a series of tests were conducted using all relevant and available variables. Independent-samples t-tests were used to establish equivalency of continuous variables: age, years of education, number of prior treatment episodes. Chi-square tests of independence were used to establish equivalency of categorical variables: gender, race, employment, co-occurring disorder (yes or no), and previous opioid use (yes or no).

By comparing people who received peer services ( $n=216$ ) to people who received no peer services ( $n=791$ ), we identified that people who received no peer services came to treatment with significantly fewer prior treatment episodes compared to people who received peer services. The two groups were equivalent on mean age and years of education (see Table 2.1).

**Table 2.1**

*Continuous Variables: Peer Services vs. All Cases of No Peer Services*

	Peer Services Mean (SD)	No Peer Services Mean (SD)	t-value	p-value (2-tailed)
Age	35.59 (10.16)	35.90 (11.60)	-0.36	0.72
Education	12.39 (1.85)	12.51(1.69)	-0.89	0.38
Prior Treatment Episodes	1.28 (1.35)	0.96 (1.50)	2.90	0.00

The two groups were significantly different on gender categories [ $X^2(1, N=1007) = 11.77, p=0.001$ ], with the peer services group having fewer men ( $Std Res = -2.0$ ) and

more women (*Std Res* = 2.3) than the no peer services group. See Table 2.2 for additional detail.

**Table 2.2.**

*Gender Characteristics: Peer Services vs. All Cases of No Peer Services*

		Service Group		
		No Peer Services	Peer Services	Total
Female	Count	318	115	433
	% in Service Group	40%	53%	43%
	Std Res	-1.20	2.30	
Male	Count	473	101	574
	% in Service Group	60%	47%	57%
	Std Res	1.00	-2.00	
Total		791	216	1007
% of Total		79%	21%	100%
$X^2 (1, N=1007) = 11.77, p=0.001$				

The two groups did not differ with statistical significance across racial categories [ $X^2 (8, N=1007) = 1.40, p=0.99$ ] and employment categories [ $X^2 (7, N=1007) = 9.32, p=0.23$ ]. See Table 2.3 for additional detail on racial categories and see Table 2.4 for additional detail on employment categories.

**Table 2.3.***Racial Characteristics: Peer Services vs. All Cases of No Peer Services*

		Service Group		
		No Peer Services	Peer Services	Total
Alaskan Native	Count	1	0	1
	% in Service Group	0.1%	0.0%	0.1%
	Std Res	0.24	-0.46	
American Indian	Count	15	5	20
	% in Service Group	1.9%	2.3%	2.0%
	Std Res	-0.18	0.34	
Asian	Count	5	1	6
	% in Service Group	0.6%	0.5%	0.6%
	Std Res	0.13	-0.25	
Native Hawaiian or Other Pacific Islander	Count	12	2	14
	% in Service Group	1.5%	0.9%	1.4%
	Std Res	0.30	-0.58	
Black/African American	Count	20	5	25
	% in Service Group	2.5%	2.3%	2.5%
	Std Res	0.08	-0.16	
White	Count	653	178	831
	% in Service Group	82.6%	82.4%	82.5%
	Std Res	0.01	-0.02	
Other single race	Count	55	16	71
	% in Service Group	7.0%	7.4%	7.1%
	Std Res	-0.10	0.20	
Two or more races	Count	29	9	38
	% in Service Group	3.7%	4.2%	3.8%
	Std Res	-0.16	0.30	
Unknown	Count	1	0	1
	% in Service Group	0.1%	0.0%	0.1%
	Std Res	0.24	-0.46	
Total		791	216	1007
% of Total		78.6%	21.4%	100.0%

$X^2 (8, N=1007) = 1.40, p=0.99$

**Table 2.4.***Employment Characteristics: Peer Services vs. All Cases of No Peer Services*

		Service Group		
		No Peer Services	Peer Services	Total
Full-time	Count	275	61	336
	% in Service Group	34.8%	28.2%	33.4%
	Std Res	0.68	-1.30	
Part-time	Count	103	36	139
	% in Service Group	13.0%	16.7%	13.8%
	Std Res	-0.59	1.13	
Unemployed	Count	223	76	299
	% in Service Group	28.2%	35.2%	29.7%
	Std Res	-0.77	1.48	
Homemaker	Count	13	3	16
	% in Service Group	1.6%	1.4%	1.6%
	Std Res	0.12	-0.23	
Student	Count	8	1	9
	% in Service Group	1.0%	0.5%	0.9%
	Std Res	0.35	-0.67	
Retired	Count	6	3	9
	% in Service Group	0.8%	1.4%	0.9%
	Std Res	-0.40	0.77	
Disabled	Count	64	14	78
	% in Service Group	8.1%	6.5%	7.7%
	Std Res	0.35	-0.67	
Not in labor force	Count	99	22	121
	% in Service Group	12.5%	10.2%	12.0%
	Std Res	0.41	-0.78	
Total		791	216	1007
% of Total		78.6%	21.4%	100.0%

$\chi^2 (7, N=1007) = 9.32, p=0.23$

Although the two groups did not differ significantly in the number of people who had a co-occurring disorder, significantly fewer people across the sample as a whole reported having a co-occurring mental health condition than would be expected if the sample was equally split between those having and not having a co-occurring disorder [ $\chi^2 (1, N=1007) = 4.75, p=0.03$ ]. The two groups were significantly different in the

number of people reporting prior opioid use [ $\chi^2(1, N=1007) = 19.48, p<0.01$ ], with the peer services group having significantly more people reporting opioid use (*Std. Res* = 3.1). See Table 2.5 for additional detail regarding both co-occurring disorders and prior opioid use.

**Table 2.5.**

*Clinical Characteristics: Peer Services vs. All Cases of No Peer Services*

		Service Group			
		No Peer Services	Peer Services	Total	
Co-Occurring Disorder		Count	583	143	726
	No	% in Service Group	73.7%	66.2%	72.1%
		Std Res	0.53	-1.02	
		Count	208	73	281
	Yes	% in Service Group	26.3%	33.8%	27.9%
		Std Res	-0.86	1.64	
		Total	791	216	1007
		% of Total	78.6%	21.4%	100.0%
$\chi^2 (1, N=1007) = 4.75, p=0.03$					
Opioid		Count	535	111	646
	No	% in Service Group	67.6%	51.4%	64.2%
		Std Res	1.22	-2.34	
		Count	256	105	361
	Yes	% in Service Group	32.4%	48.6%	35.8%
		Std Res	-1.64	3.13	
		Total	791	216	1007
		% of Total	78.6%	21.4%	100.0%
$\chi^2 (1, N=1007) = 19.48, p<0.001$					

Because the group receiving peer-services and the group receiving no-peer services were significantly different on several variables (number of prior treatment episodes, gender, and opioid use), and there was a substantially higher number of clients in the no-peer service ( $n=791$ ) compared to the peer-services group ( $n=216$ ), a

comparison group was created using a sub-sample of the no-peer services group. Each client in the peer-services group was matched one-to-one with a client in the no-peer service group using four variables: gender, number of prior treatment episodes, having/not having a co-occurring psychiatric disorder, and reporting prior opioid use or not. A total of  $n=197$  matches from the no-peer services group were made.

To examine potential differences between the peer services and new no-peer services matched comparison group, a series of tests were again conducted using available and relevant variables. Independent-samples t-tests were used to establish examine continuous variables: age, years of education, and number of prior treatment episodes. Chi-square tests of independence were used to examine categorical variables: gender, race, employment, co-occurring disorder (yes or no) and previous opioid use (yes or no).

The two groups did not differ with statistical significance on mean age, years of education, and number of prior treatment episodes. See Table 2.6 for additional detail.

**Table 2.6.**

*Continuous Variables: Peer Services vs. Matched Cases of No Peer Services*

	Peer Services Mean (SD)	No Peer Services Mean (SD)	t-value	p-value (2-tailed)
Age	35.59 (10.16)	37.03 (10.96)	-1.375	0.17
Education	12.39 (1.85)	12.33 (1.58)	0.38	0.70
Prior Treatment Episodes	1.28 (1.35)	1.18 (1.28)	0.77	0.44

The two groups also did not differ significantly on gender [ $X^2(1, N=408) = 0.94$ ,  $p=0.33$ ] or racial categories [ $X^2(7, N=408) = 4.66$ ,  $p=0.70$ ]. See Table 2.7 for additional detail on gender categories and see Table 2.8 for additional detail on racial categories.

**Table 2.7.**

*Gender Characteristics: Peer Services vs. Matched Cases of No Peer Services*

		Service Group		
		No Peer Services	Peer Services	Total
Female	Count	93	115	208
	% in Service Group	48.4%	53.2%	51.0%
	Std Res	-0.49	0.47	
Male	Count	99	101	200
	% in Service Group	51.6%	46.8%	49.0%
	Std Res	0.50	-0.47	
Total		192	216	408
% of Total		47.1%	52.9%	100.0%
$X^2(1, N=408) = 0.94, p=0.33$				



**Table 2.8.***Racial Characteristics: Peer Services vs. Matched Cases of No Peer Services*

		Service Group		
		No Peer Services	Peer Services	Total
Alaskan Native	Count	1	0	1
	% in Service Group	0.5%	0.0%	0.2%
	Std Res	0.77	-0.73	
American Indian	Count	3	5	8
	% in Service Group	1.6%	2.3%	2.0%
	Std Res	-0.39	0.37	
Asian	Count	2	1	3
	% in Service Group	1.0%	0.5%	0.7%
	Std Res	0.50	-0.47	
Native Hawaiian or Other Pacific Islander	Count	3	2	5
	% in Service Group	1.6%	0.9%	1.2%
	Std Res	0.42	-0.40	
Black/African American	Count	6	5	11
	% in Service Group	3.1%	2.3%	2.7%
	Std Res	0.36	-0.34	
White	Count	163	178	341
	% in Service Group	84.9%	82.4%	83.6%
	Std Res	0.20	-0.19	
Other single race	Count	8	16	24
	% in Service Group	4.2%	7.4%	5.9%
	Std Res	-0.98	0.92	
Two or more races	Count	6	9	15
	% in Service Group	3.1%	4.2%	3.7%
	Std Res	-0.40	0.38	
Total		192	216	408
% of Total		47.1%	52.9%	100.0%

$X^2(7, N=408) = 4.66, p=0.70$

Although the two groups did not differ significantly in the number of people in each employment category, there was a significant difference across the sample as a whole [ $\chi^2(7, N=408) = 18.33, p=0.01$ ]. Looking at the totals across the two groups, it appears that there were more people reporting being unemployed than would be expected if the sample was equally dispersed across categories. See Table 2.9 for additional detail.

**Table 2.9.***Employment Characteristics: Peer Services vs. Matched Cases of No Peer Services*

		Service Group		
		No Peer Services	Peer Services	Total
Full-time	Count	43	61	104
	% in Service Group	22.4%	28.2%	25.5%
	Std Res	-0.85	0.80	
Part-time	Count	17	36	53
	% in Service Group	8.9%	16.7%	13.0%
	Std Res	-1.59	1.50	
Unemployed	Count	76	76	152
	% in Service Group	39.6%	35.2%	37.3%
	Std Res	0.53	-0.50	
Homemaker	Count	0	3	3
	% in Service Group	0.0%	1.4%	0.7%
	Std Res	-1.19	1.12	
Student	Count	3	1	4
	% in Service Group	1.6%	0.5%	1.0%
	Std Res	0.81	-0.77	
Retired	Count	1	3	4
	% in Service Group	0.5%	1.4%	1.0%
	Std Res	-0.64	0.61	
Disabled	Count	28	14	42
	% in Service Group	14.6%	6.5%	10.3%
	Std Res	1.85	-1.75	
Not in labor force	Count	24	22	46
	% in Service Group	12.5%	10.2%	11.3%
	Std Res	0.51	-0.48	
Total		192	216	408
% of Total		47.1%	52.9%	100.0%

$\chi^2(7, N=408) = 18.33, p=0.01$

The two groups did not differ significantly on the number of people reporting a co-occurring disorder [ $\chi^2(1, N=408) = 0.15, p=0.90$ ] or the number of people reporting prior opioid use [ $\chi^2(1, N=408) = 0.32, p=0.58$ ]. See Table 2.10 for additional detail.

**Table 2.10.**

*Clinical Characteristics: Peer Services vs. Matched Cases of No Peer Services*

		Service Group			
		No Peer Services	Peer Services	Total	
Co-Occurring Disorder	No	Count	126	143	269
		% in Service Group	65.6%	66.2%	65.9%
		Std Res	-0.05	0.05	
	Yes	Count	66	73	139
		% in Service Group	34.4%	33.8%	34.1%
		Std Res	0.07	-0.07	
	Total		192	216	408
	% of Total		47.1%	52.9%	100.0%
	$X^2(1, N=408) = 0.15, p=0.90$				
Opioids	No	Count	104	111	215
		% in Service Group	54.2%	51.4%	52.7%
		Std Res	0.28	-0.26	
	Yes	Count	88	105	193
		% in Service Group	45.8%	48.6%	47.3%
		Std Res	-0.30	0.28	
	Total		192	216	408
	% of Total		47.1%	52.9%	100.0%
	$X^2(1, N=408) = 0.32, p=0.58$				

This analysis provides support for comparability of the peer services and no-peer services matched group in the new sample on age, years of education, number of prior treatment episodes, gender, race, employment, co-occurring disorders, and previous opioid use. Therefore, the sub-sample from the no-peer services group was used in hypothesis testing as the comparison group for clients who received peer services.

**Data Preparation**

Prior to data analysis, three new variables were created for inclusion in the regression analyses. The first two variables were created from *Employment Status*: one representing participation in the workforce or not (*InWorkforce: Full time=1, Part time = 1, Unemployed = 0, Homemaker = 0, Student = 0, Retired = 0, Disabled = 0, Ages 0-5 =*

0, *Not in labor force/not looking for work* = 0, *Employment status unknown* set to missing) and one representing full-time employment or not (*FulltimeEmploy*: *Full time*=1, *Part time* = 0, *Unemployed* = 0, *Homemaker* = 0, *Student* = 0, *Retired* = 0, *Disabled* = 0, *Ages 0-5* = 0, *Not in labor force* = 0, *Employment status unknown* set to missing). The third, *PeerServices*, was created with number of peer service sessions greater than 1 = 1 and no peer service sessions = 0.

### **Data Analysis Strategy**

Descriptive statistics were summarized for all variables for each of the following groups: 1) the overall sample ( $N=1007$ ), which included clients who received peer services and clients who did not; 2) clients from the overall sample who did not receive peer services ( $n=791$ ), 3) the matched sample ( $n=408$ ), which included clients who received peer services and the no-peer services matched group; 4) the no-peer services matched group ( $n=192$ ); 5) and the group from the overall sample that did receive peer services ( $n=216$ ). Means and standard deviations were calculated for continuous variables (number of treatment sessions, number of types of treatment, length of stay, years of education, age, and number of previous treatment episodes), and frequencies were calculated for categorical variables (completed treatment, gender, race/ethnicity, psychiatric diagnosis, opioid use, and employment).

### **Hypothesis Testing**

To test treatment effects across groups (people who received peer services versus the matched no-peer services comparison group), an independent t-test was conducted to test difference in length of time in treatment and a chi-square test of independence was used to compare the number of clients in each group who did and did not complete

treatment. Additionally, to test treatment effects across peer services groups (people who received peer services versus the matched no-peer services comparison group) while controlling for demographic and clinical characteristics, two hierarchical regression analyses were conducted to test the predictive value of peer services group on length of stay in treatment and treatment completion. Two multiple regression models were used to test differences in the length of stay based on peer services group, demographic and clinical characteristics, with covariates included in model 1 and peer services group added for model 2:

*Model 1: LengthStay = Age + GenderBinary + Years of education + InWorkforce + FulltimeEmploy + Number of previous treatment episodes + PsychiatricBinary + OpioidBinary.*

*Model 2: LengthStay = Age + GenderBinary + Years of education + InWorkforce + FulltimeEmploy + Number of previous treatment episodes + PsychiatricBinary + OpioidBinary + PeerServicesGroup*

Two logistic regression models were conducted to test the likelihood of completing treatment based on peer services group, demographic and clinical characteristics, with covariates included in model 1 and peer services group added to model 2:

*Model 1: TreatmentCompletion = Age + GenderBinary + Years of education + InWorkforce + FulltimeEmploy + Number of previous treatment episodes + PsychiatricBinary + OpioidBinary*

*Model 2: TreatmentCompletion = Age + GenderBinary + Years of education + InWorkforce + FulltimeEmploy + Number of previous treatment episodes + PsychiatricBinary + OpioidBinary + PeerServicesGroup*

To test treatment effects within the peer-services group, regression analysis was conducted to test two models, one for each dependent variable. Multiple regression was conducted to test the differences in length of stay based on the number of peer sessions and the number of types of peer services while controlling for demographic and clinical characteristics:

$$\begin{aligned} \text{LengthStay} = & \text{Number of peer sessions} + \text{Number of types of treatment} + \text{Years of} \\ & \text{education} + \text{Age} + \text{Number of previous treatment episodes} + \text{GenderBinary}, \\ & \text{PsychiatricBinary} + \text{OpioidBinary} + \text{InWorkforce} + \text{FulltimeEmploy}. \end{aligned}$$

Logistic regression was conducted to examine the odds of completing treatment based on the number of peer sessions and the number of types of peer services while controlling for demographic and clinical characteristics:

$$\begin{aligned} \text{TreatmentComplete} = & \text{Number of peer sessions} + \text{Number of types of peer services} + \\ & \text{Years of education} + \text{Age} + \text{Number of previous treatment episodes} + \text{GenderBinary}, \\ & \text{PsychiatricBinary} + \text{OpioidBinary} + \text{InWorkforce} + \text{FulltimeEmploy} \end{aligned}$$

### **Exploratory Analysis**

Because race has been shown to be associated with SUD treatment outcomes (SAMHSA, 2009), analysis of Variance (ANOVA) was used to explore mean differences in the continuous dependent variable, length of stay, across the nine racial/ethnic categories: Alaska Native (Aleut, Eskimo, Indian), American Indian (other than Alaska Native), Asian or Pacific Islander, Black or African American, White, Asian, Native Hawaiian or other Pacific Islander, Other single race, and Two or more races. Chi-Square Test of Independence was used to explore whether a relationship existed between racial categories and completing treatment.

Because opioid use has been shown to be associated with SUD treatment outcomes (Brewer et al., 1998), an independent samples t-test was used to explore mean differences in the continuous dependent variable, length of stay, between people who used opioids and people who did not. Chi-Square Test of Independence was used to explore whether a relationship existed between opioid use and completing treatment.

All comparisons were conducted for each group separately: people who received peer services and people who did not.



### Chapter Four: Results

A total of 1,007 people who received services during the specified timeframe were included in this study's analysis. Among this group, 192 people opted to receive recovery support services. This group was matched on four variables with participants who did not receive recovery support services. Among all people in the sample ( $N=1,007$ ), the average age was 36 years ( $SD=11.1$ ), which was similar among people who did and did not receive recovery support services. There was also a comparable number of years of education, with an average of approximately 12.5 years (range 12.33-12.49 years). People who opted to engage in RSS had the highest number of prior treatment episodes among the groups of participants (mean=1.26,  $SD=1.35$ ), which was statistically significantly higher than the average number of treatment episodes among people who did not receive peer services (mean=0.96,  $SD=1.50$ ). The group of people who received RSS had the highest average number of days in treatment, 173 days; the entire sample group had the lowest average number of days (137 days). Among the group of individuals who received peer services, the mean number of different types of services provided was 1.50 and the number of peer sessions was 6.72. Full details are displayed in Table 3.1 below.

**Table 3.1.***Continuous Demographics: Total Sample and Final Sample by Group*

	Overall Sample				Final Sample				Both Samples	
	Total (N=1007)		No-Peer (n=791)		Total (N=408)		Matched (n=192)		Peer Services (n=216)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	36	11.31	36	11.60	36	10.56	37	10.96	36	10.16
Education	12.49	1.72	12.51	1.69	12.36	1.73	12.33	1.58	12.39	1.85
Prior Episodes	1.03	1.47	0.96	1.50	1.24	1.32	1.18	1.28	1.28	1.35
Length of Stay	137	115.0	127	114.9	161	114.4	146	117.2	173	110.0
Types of Peer Services									1.50	0.75
Peer Sessions									6.72	7.84

Each table below provides data for all five of groups of people included in this study. For clarity, the text descriptions will primarily focus on the three groups included in comparison testing: the group who received peer services ( $n=216$ ); the matched group who did not receive peer services ( $n=192$ ); and the total comparison group (peer service group + matched non-peer service group;  $n= 408$ ). As listed in Table 3.2, the total comparison group was comprised of 49.0% ( $n=200$ ) women and 51.0% ( $n=208$ ) men, with the matched group who did not receive peer services including 51.6% 9 ( $n=99$ ) women and 48.4% ( $n=93$ ) men and the group who received peer services including 46.8% ( $n=101$ ) women and 53.2% ( $n=115$ ) men. Regarding race, Table 3.2 indicates that all sample groups are predominantly represented by people who identify as white (82.4-84.9% across the three groups). According to Table 3.2, most individuals across all sample categories were in the work force and employed either on a full-time or part-time basis. People who are not employed represent 37.3% ( $n=152$ ) of the total comparison group, 39.6% ( $n=76$ ) of the matched group who did not receive peer services, and 35.2% ( $n=76$ ) of the group who received peer services.

**Table 3.2.***Demographic Characteristics of the Total Sample, Final Sample, and Peer Services**Sample*

		Overall Sample				Final Sample				Peer Services (Both Samples)	
		Total		No Peer		Total		Matched		N	%
		N	%	N	%	N	%	N	%		
Gender	Male	433	43.0	318	40.2	208	51.0	93	48.4	115	53.2
	Female	574	57.0	473	59.8	200	49.0	99	51.6	101	46.8
	Total	1007	100.0	791	100.0	408	100.0	192	100	216	100.0
Race	Alaskan Native	1	0.1	1	0.1	1	0.2	1	0.5	0	0.0
	American Indian	20	2.0	15	1.9	8	2.0	3	1.6	5	2.3
	Asian	6	0.6	5	0.6	3	0.7	2	1	1	0.5
	Nat Hawaiian/Pacific Islander	14	1.4	12	1.5	5	1.2	3	1.6	2	0.9
	Black/African American	25	2.5	20	2.5	11	2.7	6	3.1	5	2.3
	White	831	82.5	653	82.6	341	83.6	163	84.9	178	82.4
	Other single race	71	7.1	55	7.0	24	5.9	8	4.2	16	7.4
	Two or more races	38	3.8	29	3.7	15	3.7	6	3.1	9	4.2
	Unkown	1	0.1	1	0.1	0	0.0	0	0	0	0.0
	Total	1007	100.0	791	100.0	408	100.0	192	100	216	100.0
Employment	Full-time	336	33.4	275	34.8	104	25.5	43	22.4	61	28.2
	Part-time	139	13.8	103	13.0	53	13.0	17	8.9	36	16.7
	Unemployed	299	29.7	223	28.2	152	37.3	76	39.6	76	35.2
	Homemaker	16	1.6	13	1.6	3	0.7	0	0	3	1.4
	Student	9	0.9	8	1.0	4	1.0	3	1.6	1	0.5
	Retired	9	0.9	6	0.8	4	1.0	1	0.5	3	1.4
	Disabled	78	7.7	64	8.1	42	10.3	28	14.6	14	6.5
	Not in labor force	121	12.0	99	12.5	46	11.3	24	12.5	22	10.2
	Total	1007	100.0	791	100.0	408	100.0	192	100	216	100.0

Regarding successful completion of treatment, Table 3.3 indicates that, for the total comparison group, 66.7% ( $n=272$ ) completed treatment successfully as defined by the service provider. Among the matched sample group who did not receive peer services, 62.5% of clients ( $n=120$ ) completed treatment successfully. Among the group who did receive peer services, 70.4% of clients ( $n=152$ ) completed treatment successfully. In relation to mental health conditions co-occurring with substance use diagnosis, Table 3.3 illustrates that approximately one-quarter of all participants, 27.9%

( $n=281$ ), experienced co-occurring mental health condition(s), with the total comparison group, matched group who did not receive peer services, and the group who did receive peer services all experiencing a higher prevalence of co-occurring mental health conditions of approximately 34%. Table 3.3 summarizes opioid use in the total comparison group as 47.3% ( $n=193$ ), the matched group who did not receive peer services as 45.8% ( $n=88$ ), and the group who received peer services as 48.6% ( $n=105$ ).

**Table 3.3.**

*Clinical Characteristics of the Total Sample, Final Sample, and Peer Services Sample*

		Overall Sample				Final Sample				Peer Services (Both Samples)	
		Total		No Peer		Total		Matched			
		N	%	N	%	N	%	N	%	N	%
Discharge	Tx Not Completed	306	30.4	242	30.6	136	33.3	72	37.5	64	29.6
	TxCompleted	701	69.6	549	69.4	272	66.7	120	62.5	152	70.4
	Total	1007	100	791	100	408	100.0	192	100	216	100
Co-Occurring Disorder	No Co-Occurring	726	72.1	583	73.7	269	65.9	126	65.6	143	66.2
	Co-Occurring	281	27.9	208	26.3	139	34.1	66	34.4	73	33.8
	Total	1007	100.0	791	100.0	408	100.0	192	100	216	100.0
Opioid Use	No Opioid Use	646	64.2	535	67.6	215	52.7	104	54.2	111	51.4
	Opioid Use	361	35.8	256	32.4	193	47.3	88	45.8	105	48.6
	Total	1007	100.0	791	100.0	408	100.0	192	100	216	100.0

### Hypothesis Testing: Group Differences

In the matched comparison sample of participants, the length of stay in treatment (number of days) was significantly different between the group who received peer supports and the matched group who did not receive peer supports [ $t(406)=2.40$ ,  $p=0.01$ ]. People who received peer services stayed an average of 173 days ( $SD=110.50$ ), 27 more days than people in the no-peer services group, who stayed an average of 146 days ( $SD=117.21$ ). See Table 3.4 for additional detail.

**Table 3.4***Independent t-tests of Length of Stay in Treatment: Peer Services vs. No Peer Services*

	Mean	SD	SE Mean	Mean Difference	t-value	df	p-value (2-tailed)	Cohen's <i>d</i>
Peer Services	173.37	110.50	7.52	27.08	2.40	406	0.01	0.24
No Peer Services	146.28	117.27	8.46					

In the matched comparison group, there was no statistically significant difference in the rates of successful treatment completion as determined by the service provider among people who did and did not receive peer services [ $X^2(1, N=408) = 2.83, p=0.09$ ]. A total of 152 clients (70%) in the peer-services group and 120 clients (63%) in the no peer-services group completed treatment. See Table 3.5 for additional detail.

**Table 3.5.***Chi-Square Test of Independence: Treatment Complete at Discharge by Service Group*

Completed Treatment		Service Group		
		No Peer Services	Peer Services	Total
No	Count	72	64	136
	% in ServiceGroup	37.50%	29.60%	33.30%
	Std. Res	1.00	-0.90	
Yes	Count	120	152	272
	% in ServiceGroup	62.5%	70.4%	66.7%
	Std. Res	-0.70	0.70	
	Total	192	216	408
	% of Total	47.1%	52.9%	100.0%

$X^2(1, N=408) = 2.83, p=0.09$

As shown in Table 3.6, the combination of variables in the first model explained 26% of the variance in *Length of Stay* among participants in the total comparison group [ $R^2=0.26, F(8, 399)=3.66, p<0.001$ ]. Education and prior treatment episodes both predicted significantly more days in treatment, with each additional year of education predicting approximately 7 additional days in treatment ( $B=7.24, p<0.05$ ) and each

additional prior treatment episode predicting approximately 15 additional days ( $B=15.13$ ,  $p<0.001$ ). The combination of variables in the second model, which included peer service group as a variable, explained 28% of the variance in *Length of Stay* [ $R^2=0.28$ ,  $F(9, 398) = 6.63$ ,  $p<0.001$ ]. Education and prior treatment episodes were again significant predictors of days in treatment, with each additional year of education predicting approximately 7 additional days in treatment ( $B=7.07$ ,  $p<0.05$ ) and each additional prior treatment episode predicting approximately 15 additional days ( $B=14.96$ ,  $p<0.001$ ). Receiving peer services did not predict significantly more or fewer days in treatment. The change in the amount of variance accounted for in the length of stay in treatment between Model 1 and Model 2 was significant [ $\Delta R^2=0.02$ ,  $F(1, 997) = 18.81$ ,  $p<0.001$ ].

**Table 3.6***Multiple Regression Analysis of Length of Stay in Peer & Matched No-Peer Services**Groups*

	Model 1		Model 2			
	B	SE	B	B	SE	B
(Constant)	66.39	42.79		56.61	43.00	
Age	-0.72	0.55	-0.07	-0.67	0.55	-0.06
Gender	-5.01	11.56	-0.02	-3.68	11.55	-0.02
Education	7.25*	3.35	0.11	7.07*	3.34	0.11
In Workforce	29.86	16.96	0.13	25.80	17.06	0.11
Fulltime Employment	-3.58	19.12	-0.01	-2.02	19.08	-0.01
Co-occurring Disorder	-0.78	12.38	0.00	-0.78	12.35	0.00
Prior Treatment Episodes	15.13**	4.41	0.17	14.96**	4.40	0.17
Opioid Use	9.08	11.67	0.04	8.72	11.64	0.04
Peer Service Group				20.34	11.21	0.09
	<i>R</i> <sup>2</sup> =0.26		<i>R</i> <sup>2</sup> = 0.28			
	[F(8, 399)=3.66, p<0.001]		[F(9, 398)=6.63, p<0.001]			

As shown in Table 3.7, having a co-occurring disorder or prior opioid use predicted significant decreases in the odds of completing treatment in both models, with people in either group approximately 40% less likely to complete treatment ( $OR=0.62$ ,  $p<0.05$ ). Receiving peer services did not significantly predict treatment completion.

**Table 3.7.***Logistic Regression of Treatment Completion in Peer & Matched No-Peer Services**Groups*

	Model 1				Model 2			
	B	SE	OR	Wald	B	SE	OR	Wald
Constant	0.34	0.83	1.40	0.17	0.20	0.84	1.22	0.05
Age	-0.01	0.01	0.99	1.19	-0.01	0.01	0.99	0.99
Gender	0.05	0.22	1.05	0.05	0.07	0.23	1.07	0.09
Education	0.07	0.07	1.07	1.19	0.07	0.07	1.07	1.11
In Workforce	0.60	0.35	1.82	2.90	0.54	0.35	1.72	2.33
Fulltime Employment	-0.18	0.40	0.84	0.20	-0.16	0.40	0.85	0.16
Prior Treatment Episodes	0.09	0.09	1.10	1.09	0.09	0.09	1.09	1.03
Co-occurring Disorder*	-0.48	0.23	0.62*	4.27	-0.49	0.23	0.62*	4.28
Opioid Use*	-0.47	0.23	0.62*	4.31	-0.48	0.23	0.62*	4.39
Peer Service Group					0.29	0.22	1.34	1.75

\* $p < 0.05$ **Hypothesis Testing: Treatment Effects Among People Who Received Recovery****Services**

As shown in Table 3.8, the combination of variables in the first model explained 11% of the variance in *Length of Stay* [ $R^2=0.11$ ,  $F(10, 205) = 2.57$ ,  $p < 0.006$ ]. The number of peer sessions predicted significantly fewer days in treatment, with each additional session predicting approximately 2.5 fewer days in treatment ( $B = -2.46$ ,  $p < 0.05$ ). The number of treatment types predicted significantly more days in treatment, with each additional peer service type predicting approximately 27 additional days in treatment ( $B = 27.17$ ,  $p < 0.05$ ).



**Table 3.8.***Multiple Regression Analysis of Length of Stay Among People Receiving Peer Services*

	B	SE	<i>B</i>	t-value
(Constant)	53.89	58.48		0.92
Age	-0.94	0.75	-0.09	-1.25
Gender	1.33	15.38	0.01	0.09
Education	9.27*	4.18	0.15	2.22
In Workforce	41.22*	20.46	0.19	2.01
Fulltime Employment	-18.74	22.73	-0.08	-0.82
Co-occurring Disorder	-28.41	16.48	-0.12	-1.72
Prior Treatment Episodes	11.23*	5.74	0.14	1.96
Opioid Use	-9.87	15.35	-0.04	-0.64
Peer Sessions	-2.46*	1.15	-0.17	-2.14
Types of Peer Services	27.17*	12.06	0.19	2.25
<i>R</i> <sup>2</sup> = 0.11, <i>F</i> (10, 205) = 2.57, <i>p</i> < 0.006				

\**p* < 0.05

As shown in Table 3.9, the number of peer sessions predicted a significant increase in the odds of completing treatment among people who received recovery support services, with each additional session predicting an 11% increase in the likelihood of completing treatment (*OR*= 1.11, *p*<0.05). The number of types of peer services predicted a significant increase in completing treatment, with each additional peer service type increasing the likelihood of completing treatment by approximately 2.5 times (*OR*= 2.53, *p*<0.05).

**Table 3.9.**

*Logistic Regression Analysis of the Likelihood of Completing Treatment Among People Receiving Peer Services*

	B	SE	OR	Wald
Age	-0.01	0.02	0.99	0.19
Gender	-0.05	0.36	0.95	0.02
Education	0.24*	0.11	1.28	5.05
In Workforce	1.34*	0.52	3.81	6.57
Fulltime Employment	-0.10	0.59	0.91	0.03
Co-occurring Disorder	-0.51	0.37	0.60	1.89
Prior Treatment Episodes	0.12	0.13	1.13	0.82
Opioid Use	-0.04	0.36	0.96	0.01
Peer Sessions	0.10*	0.04	1.11	7.09
Types of Peer Services	0.93*	0.35	2.53	6.94
Constant	-4.13	1.53	0.02	7.29

\* $p < 0.05$

### Post-hoc Analysis

As shown in Table 3.8, the number of peer service types predicted significantly more days in treatment, with each additional modality predicting an additional 27 days in treatment among people who received peer services ( $B = 27.17, p < 0.05$ ). Table 3.6 also indicates that increased level of education predicts significantly more days in treatment ( $B = 9.27, p < 0.05$ ). Individuals who are part of the workforce had a significant increase in time in treatment ( $B = 42.11, p < 0.05$ ). Number of previous treatment episodes predicted 11 more days in treatment ( $B = 11.23, p < 0.05$ ).

Summarized in Table 3.9, increased education level ( $OR = 1.28, p < 0.05$ ) and participation in the workforce ( $OR = 3.81, p < 0.05$ ) each predicted treatment completion among people who received peer services. The number of treatment types also predicted

a significant increase in completing treatment, with each additional modality increasing the likelihood of completing treatment by ~2.5 times ( $OR= 2.53, p<0.05$ ).

### Exploratory Analysis

There were no statistically significant differences by racial categories in the length of stay in either the peer-services group [ $F(6, 209) = 0.41, p= 0.87$ ] or the no-peer services group [ $F(6, 184) = 0.38, p= 0.91$ ]. There were also no statistically significant differences by racial categories in completing treatment in either the peer-services group [ $X^2(7, N=216) = 4.69, p= 0.59$ ] or the no-peer services group [ $X^2(7, N=192) = 7.91, p= 0.34$ ].

There was no statistically significant difference in the peer-services group in the length of stay among people who did and did not report prior opioid use [ $t(214) = -0.33, p=0.75$ ]. However, as summarized in Table 3.8, there was a statistically significant difference in the no-peer services group between people reporting prior opioid use (mean days = 171.33) and people reporting no prior opioid use (mean days = 125.09), with people reporting prior opioid use staying an average of 46 more days [ $t(190) = 2.77, p=0.006$ ].

**Table 3.10.**

*Independent t-tests of Length of Stay in Treatment and Opioid Use Among People Not Receiving Peer Services*

	Mean	SD	SE Mean	Mean Difference	t- value	df	p- value (2-tail)
No Opioid Use	125.09	114.40	11.22				
Opioid Use	171.33	116.30	12.40	46.24	2.77	190	0.006

There was no statistically significant difference in treatment completion by opioid use in the peer-services group [ $X^2 (1, N=216) = 0.001, p=0.97$ ]. Although standardized

residuals did not indicate a statistically significant difference in treatment completion by opioid use in the no-peer services group, significantly more clients in the no-peer services group completed treatment than not across opioid categories [ $X^2 (1, N=192) = 10.83, p < 0.001$ ]. See Table 3.11 for additional detail.

**Table 3.11.**

*Chi-Square Test of Independence: Treatment Completion by Opioid Use Among People Not Receiving Peer Services*

Opioid Use		Completed Treatment		Total
		No	Yes	
No	Count	28	76	104
	% Tx Complete	14.6%	39.6%	54.2%
	Std.Res	-1.80	1.40	
Yes	Count	44	44	88
	% Tx Complete	22.9%	22.9%	45.8%
	Std.Res	1.90	-1.50	
Total		72	120	192
% of Total		37.5%	62.5%	100.0%
$X^2 (1, N=192) = 10.83, p < 0.001$				

## **Chapter Five: Discussion and Conclusion**

This study examined the relationship between the receipt of RSS provided by a certified peer worker and clients' length of time in substance use treatment and treatment completion. Specifically, the study examined if receiving any RSS from a peer worker increased clients' time in substance use treatment and likelihood of successful completion of treatment when compared to patients who opted out of receiving any recovery service from certified peer workers. This study used two methodological approaches to examine this relationship among a matched sample of clients who did and did not receive recovery support services. Additionally, this study investigated whether increasing the number of recovery services was related to an increase in clients' number of days in treatment and likelihood of substance use treatment completion for patients who opted into receiving services from certified peer workers.

### **Recovery Support Services and Time in Treatment**

This study began by analyzing the role of recovery support services in enhancing time in treatment among a matched sample of participants in substance use treatment. All participants who received recovery support services were matched with participants who did not receive recovery support services. With the initial analysis, the study found that people who received any recovery support service stayed in substance use treatment for an average of 27 more days than people who did not receive any recovery services. However, the second analysis, which involved regression analyses controlling for sociodemographic and clinical characteristics, found no statistically significant difference in treatment length between people who did and did not receive peer services, rather,

years of education and prior treatment episodes were significant predictors of length of time in treatment.

There are a couple of ways to understand this difference in the findings in the two sets of analyses. In the first analysis, the groups were matched on four variables, including gender, prior treatment episodes, co-occurring mental health condition, and opioid use; potential differences between the groups were tested for other sociodemographic characteristics, such as race and employment. However, this quasi-experimental approach did not control for potential differences across the two groups of clients who did and did not receive peer services, as would be the case in a randomized trial. Additionally, a limitation of nonrandomized approaches is a potential overestimation of treatment effects (Schweizer et al., 2016). This limitation, along with the recognition that there could be self-selection and other unobserved differences between the two groups, prompted the second analysis to further control for sociodemographic and clinical factors that could be associated with length of time in treatment. In doing so, the findings indicated that additional years of education and additional prior treatment episodes played statistically significant roles in predicting more time in treatment. Education was an important predictor that was not part of the matching process in the first analysis and may help elucidate the difference in the two sets of findings. The importance of education in improved recovery outcomes has been supported in prior research (Brewer et al., 1998; Sayre et al., 2002; Mutter et al., 2015).

While the initial findings supported the promise of peer support services in extending length of time in treatment, the second set of analyses suggest that addressing disparities based on education and prior treatment may be particularly important in

extending time in treatment. Simultaneously, it is important to recognize that the average length of stay for participants in this substance use treatment program (137 days) is relatively long. Research suggests that approximately 80% of people complete less than 90 days of treatment (SAMHSA, 2019). A treatment duration of at least 90 days is considered a minimum threshold for positive outcomes (Ghose, 2008; Schildaus et al., 2000; Simpson, 1981). Future research would benefit from examination of recovery support services, education, and prior treatment in relation to substance use treatment settings with more brief lengths of stay.

It is also helpful to consider the current findings in the context of prior research in the field. To my knowledge, there has been one prior study of recovery support services, which involved a quasi-experiential design that found a link between peer supports and increased number of days in treatment (Mangrum, 2008). Unfortunately, this report is no longer available, and its findings are only summarized in previous systematic reviews (Bassuk et al., 2016; Reif et al., 2014). Without details regarding the research methodology in Mangrum's (2008) study, it is not possible to further examine methodological similarities and differences with this dissertation that may elucidate the findings and implications for future research and practice. However, it is worth noting that the quasi-experimental findings of this dissertation align with the findings of Mangrum's (2008) quasi-experimental approach.

### **Recovery Support Services and Substance Use Treatment Completion**

This study's initial analysis, which compared the group of participants who received peer services with the matched group of participants who did not receive peer services, found no statistical significance in substance use treatment completion between

the two groups. Additionally, the second analysis, which involved regression analyses controlling for sociodemographic and clinical characteristics, found similar results. However the regression models identified that the presence of a co-occurring mental health condition and opioid use were associated with decreased likelihood of successful treatment completion as identified by the primary service provider. These findings are in line with previous studies that found co-occurring mental health issues (Zhu et al., 2021) and use of opioids (Brewer et al., 1998) to be associated with decreased likelihood of treatment completion. While previous systematic reviews found promise in client engagement in recovery support and likelihood of successful completion of treatment (Bassuk et al., 2016; Reif et al., 2014), this link appears to be primarily attributed to one report (Mangrum, 2008), which is no longer accessible. As the report is not available, it is difficult to determine differences and similarities in methodology and/or participants that may account for the differences.

This study's findings indicate that treatment completion is a complicated outcome that is impacted by multiple factors related to clients' experiences, including co-occurring mental health conditions and prior opioid use. Further, this study relied on the agency's subjective measure for treatment completion. Additional examination of treatment completion, including definitions of "successful" treatment completion from perspectives of service providers and clients, experiences with co-occurring mental health conditions and prior opioid use, and their associations with recovery support services, would add to research in this area. Although there are ways that future research can build upon the current study, the findings highlight the value of incorporating therapies that specifically address opioid use, such as medications for opioid use disorder, and that address mental



health conditions as part of substance use treatment. Additionally, as the roles of peer supports continue to expand, further program design and research can address ways peers can implement specific interventions to target clients' opioid use and mental health conditions.

### **Number and Types of Peer Support Services and Time in Treatment and Treatment Completion Among People who Opted to Engage in Peer Support Services**

Consistent with evidence-supported recommendations to provide a “menu of options” in substance use treatment (Miller et al., 2019), participants in this substance use treatment program were able to elect to participate in recovery support services. Among people who opted to participate in recovery support services, there were several important findings with implications for future research and practice. Interestingly, there was an 11% increase in the likelihood of treatment completion with each additional peer session provided. Additionally, among the peer service group, this analysis also found that employment and more years of education were strong predictors of successful completion of treatment, which is in line with previous research (Brewer et al., 1998; Mutter et al., 2015; Sayre et al., 2002). Further, the regression analyses with participants in the peer services group indicated that provision of additional types of peer service increased the likelihood of successful completion by approximately 2.5 times with each different type. This finding appears to be unique as previous studies have not addressed types of peer services and the link to treatment completion.

The self-selection process for people who chose to engage with peer workers may indicate that people are deciding to participate in RSS to access additional resources needed to be successful in completing treatment. It may also indicate other factors that

have not been identified or examined in this study. Future qualitative research would be helpful to better understand the reasons people choose to participate with RSS and their experiences with peer providers and services. This study's findings also amplify the need for future research to help address and clarify how clinical and demographic factors interact with and influence disparities in client outcomes, particularly regarding education, employment, mental health conditions, and types of substances used.

### **Implications for Social Work Practice**

This study's findings add promise to roles RSS may play to treatment duration and completion. Study implications also reinforce the value of social work services to address each client's clinical and psychosocial experiences, including education, employment, mental health, and substance use. Social workers are uniquely positioned to address clinical and environmental factors. Additionally, for example, findings within the peer services group linked an increase in peer sessions to successful completion of treatment; however, only 30% of the people in this sample chose to participate in RSS. This study provides empirical support for clinicians to encourage clients to consider engaging in services that include a peer component to help achieve successful completion of treatment. Social workers may also assist clients with weighing potential benefits and exploring and addressing potential concerns about peer service engagement. Finally, the generalist social worker may play a key role in addressing dynamic risk factors and disparities as part of case management plans, such as employment, education, connection to mental health services, and programs with medications for opioid use disorder.

**Limitations and Strengths of Study**

An important potential limitation of this study involves self-selection bias. Participants opted to participate in recovery support services as part of usual substance use treatment at this agency. There was no random assignment or requirement to engage in these services. Although legal requirements or pressures may have been present for some participants in the substance use treatment program, there was no requirement to engage with recovery support services. It is possible that people who decided to participate in recovery supports may already experience factors that can positively influence motivation, access to resources, and outcomes. However, people who received peer services experienced high levels of unemployment, co-occurring mental health conditions, and previous treatment episodes, suggesting that the group of people who participated in RSS experienced multiple co-occurring challenges in their substance use treatment engagement and completion. Future research that involves random assignment and examination of a wide range of outcomes, including substance use treatment engagement and completion and multidimensional outcomes related to substance use, quality of life, physical and mental health, social relationships, and access to resources to meet basic needs, would strengthen research in this area.

Retrospective chart reviews have inherent limitations as the available data are not often collected for research purposes. Vassar and Holzmann (2013) identified frequent challenges related to retrospective chart review, including concerns in design, methodology, abstraction, and analysis. The common mistakes made with retrospective chart reviews include 1) failure to create well-defined, clearly-articulated research question, 2) failure to consider sampling issues a priori, 3) failure to adequately

operationalize variables in the study, 4) failure to train and monitor data abstractors, 5) failure to use standard abstraction forms, 6) failure to create an adequate procedural manual for data abstraction, 7) failure to explicitly develop inclusion and exclusion criteria, 8) failure to address interrater or intratester reliability, 9) failure to perform a pilot test, and 10) failure to address confidentiality and ethical considerations. Additionally, Gearing et al. (2006) offer a ten-step process for retrospective chart reviews that guided the concept phase, literature review, and proposal development of this study. The student investigator worked to follow guidelines in the two articles to develop clear research questions, operationalize variables, establish appropriate inclusion/exclusion criteria, develop a plan for data abstraction, and determine a required sampling quantity for analysis. Ethical/confidentiality considerations have been addressed as the study does not involve the use of human subjects, which was confirmed by the University's IRB. The student investigator worked with a skilled statistical consultant and on data abstraction and analysis procedures. The student investigator trained the agency electronic medical record manager on data abstraction procedures. Though the investigators used these articles to carefully create the study methods and research plan, there were still unforeseen issues with data abstraction that resulted in the inability to use access some variables intended for the study, including any trauma-related information, which is often salient in the context of substance use treatment and outcomes (Engstrom et al., 2012; Miller et al., 2019).

Another limitation of this study relates to the subjective nature of the dependent variable of treatment completion status. At the agency, the requirement for participants to complete substance use treatment successfully is driven by the duration of requirements

of their court program or the duration that their assigned therapist determines appropriate, with the patient completing at least 70% of their prescribed treatment plan. The decision regarding what constitutes 70% completion of a treatment plan is guided by program requirements and participant input but is primarily at the discretion of the clinical judgment of the appointed clinician. However, given the agency's use of treatment plans with measurable timelines, activities, and goals, it is expected that there should be some level of reliability with providers' clinical judgement of treatment completion.

Additionally, limitations in the agency's available information from the electronic medical record impacted inclusion of important possible confounding variables. For example, trauma experiences and symptoms may be confounding factors that were not able to be assessed. Among people with SUDs, trauma disorders and adverse events in childhood represent frequent co-occurring conditions (Engstrom et al., 2008; Flynn & Brown, 2008; Saladin et al., 1995; Simpson & Miller, 2002). People in substance use treatment with a trauma diagnosis or early adverse life events are more likely to discontinue treatment early (Kang et al., 2002). Additionally, individuals with severe trauma histories often experience higher rates of substance use disorders in their lifetimes (Khoury et al., 2010). Patients with PTSD display a more complicated clinical presentation and people with early age adverse experiences often exhibit more psychiatric symptoms. These factors can complicate and be detrimental to success in substance use treatment (Mergler et al., 2018). The study design originally included PTSD and Acute Stress Disorders as control variables; however, during data extraction, the agency found it impossible to pull diagnosis lists and link to the TEDS data. Every effort was made to attempt to include trauma as a variable, but ultimately it was not possible. Additionally,

the electronic medical record does not have a mechanism to accurately document a patient's social supports, which have been identified as impactful to recovery outcomes (See discussion by Miller et al., 2019). Recovery support services aim to improve a patient's social supports by offering social engagement with recovery support specialists, as well as connecting them to existing natural supports and building new social supports. Future research that examines these dimensions of recovery support services and substance use treatment would be beneficial.

Despite these limitations, the study offers several significant and relevant strengths. The archival chart review provided a total sample study size of 1,007 people. Without a sample of this size, it may not have been possible to establish statistical comparisons and develop sub-groups for analysis. The study helped address some of the gaps in previous research by examining dosage and frequency of peer supports provided as part of its analysis. Importantly, it examined peer support services and treatment length and completion in a real-world setting of publicly funded substance use treatment. Another strength of the study is that many of its findings are in line with and echo years of study in the field regarding several disparities in substance use treatment engagement and outcomes related to education, employment, and mental health conditions. These findings seem especially salient as the impact of COVID-19 pandemic on these disparities continues to unfold (Marel et al., 2021).

### **Conclusion**

While substance use and problems associated with it continue to rise in the United States, completion of substance use treatment remains low (SAMHSA, 2017). A response to improve substance use treatment completion and outcomes utilizes peer-driven

recovery support services. This study aimed to address the limited research regarding the relationship between services provided by certified peer supports and clients' length of time in and completion of treatment.

While an initial quasi-experimental analysis found that clients who received peer services stayed in treatment more days than a matched group of clients who did not participate in RSS, additional hierarchical regression analysis did not find statistical significance when controlling for clinical and demographic characteristics. The additional regression analysis found years of education and prior treatment episodes to be significant predictors of clients' length of time in treatment. Neither the quasi-experimental analysis nor the hierarchical regression analysis found statistical significance between RSS and treatment completion when comparing the group of clients who received peer services and the matched group of clients who did not receive RSS. However, the regression analysis indicated that the presence of a co-occurring mental health condition and prior opioid use were associated with decreased likelihood of treatment completion.

Among the group of clients who received peer support services, the likelihood of treatment completion increased with each additional session provided by a certified peer; employment and education also predicted treatment completion among this group of clients. This study appears to have a unique finding that additional types of peer services were associated with increased likelihood of treatment completion among the group of clients who chose to receive RSS. The findings of this study support the promise of the roles RSS may play in substance use treatment duration and completion, while also

reinforcing the value of social work services to address each client's unique clinical, psychological, and life experiences.



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