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# Assessing Providers' Readiness to Integrate MAT Services in a Primary Care Setting

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# Assessing Providers' Readiness to Integrate MAT Services in a Primary Care Setting

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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**Table of Contents**

## List of Tables

## List of Figures

## Abstract

ASSESSING PROVIDERS' READINESS TO INTEGRATE MAT SERVICES IN A PRIMARY CARE SETTING

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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Director: Dr. Sarah Marrs, Assistant Professor, Department of Gerontology

Opioid use disorder is a growing concern in the United States. Despite medication-assisted treatment (MAT) being a more effective treatment option than behavioral treatment alone, the use of MAT for opioid use disorder remains low. Although increasing the ability for the primary care setting to prescribe MAT would increase the capacity for a patient receiving MAT, physicians' rate of adoption and utilization has not matched the demand of the opioid crisis. The largest barrier facing our local community is the availability of organizations and providers that can and will actually provide MAT services. The purpose of this study was to identify factors that impact primary care providers' readiness to treat individuals with opioid use disorder using MAT. This study used the ADKAR model as framework, which is a commonly used model to manage organizational change. This study found MAT trainings increased providers' knowledge and decreased stigma. MAT knowledge and trainings aided in the promotion of perceived appropriateness, personal valence, and diminished individual levels of provider stigma toward individuals with OUD. However, there was no relationship between a providers' level of MAT knowledge and change efficacy and management support. MAT training hours or where the training took place had no impact on providers' readiness to change. MAT training and educational learning environment posed a negative impact on the following ADKAR model

constructs, knowledge, but ability and reinforcement as well. Perceived levels of management support and reinforcement were identified as barriers to readiness to integrate MAT services in clinical practice. The findings align with current literature concluding it will take more than MAT training and knowledge to increase provider readiness to address the need for MAT services in primary care.

## Vita

Carmen Ingram-Thorpe was born in Petersburg, Virginia. She graduated from Nottoway High School, Crewe, Virginia in 2003. She received her Bachelor of Science in Biology from Old Dominion University, Norfolk, Virginia in 2005. She received a Master of Education from Old Dominion University in 2008 and subsequently taught high school in Norfolk and Virginia Beach for nine years. While teaching, she completed a Master of Public Health from Eastern Virginia Medical School, Norfolk, Virginia in 2017. She worked as a program manager over a medical education grant for a year before starting the Health Related Science Ph.D. program at Virginia Commonwealth University.

# 1. Introduction

The purpose of this study was to identify factors that impact primary care providers' readiness to treat individuals with opioid use disorder using medication assisted treatment in academic health profession training centers.

## 1.1 Background

Substance abuse is a growing concern in the United States. According to Chen and colleagues' retrospective study comparing thirteen developed nations in 2015, "the drug overdose mortality rates for both men and women (35 deaths per 100,000 men; 20 deaths per 100,000 women)" were highest in the United States (Chen et al., 2019, p. 352). These rates were more than double those of any other nation included in the study (Chen et al., 2019). Research shows that from 1999-2016, the mortality rate from drug overdose had more than tripled in the United States (Hegegaard et al., 2017). Opioid use disorder (OUD) death rates related to synthetic opioids other than methadone increased 88% (from 1.0 to 6.2 per 100,000) between 2013 and 2016 (Hegegaard et al., 2017). In 2021, opioids accounted for 75.4% (80,411) of all drug overdose deaths (CDC, 2023). Furthermore, the economic burden of OUD in the U.S. has surpassed $1 trillion when OUD-associated health care, crime, loss of work productivity, and reduced quality of life are factored together (Florence et al., 2021). Compounded by an increase in social isolation and limited access to outpatient addiction services related to the COVID-19 pandemic, the opioid epidemic continued to escalate (D'Onofrio et al., 2020).

Methadone, buprenorphine, and naltrexone are three medications used in medication-assisted treatment (MAT) to treat OUD in the United States (SAMHSA, 2019c). Methadone is an opioid taken daily to treat opioid dependence; it can only be prescribed and dispensed by a SAMHSA-certified, opioid treatment program, also known as a methadone clinic (Haffajee et al.,

2018; SAMHSA, 2019c). However, unlike methadone, buprenorphine and naltrexone may be administered to patients in an office-based setting (Korthuis et al., 2017). Naltrexone can also be used to treat alcohol dependence disorder (Walsh, 2019). Since both naltrexone and buprenorphine only require monthly office visits versus a daily trip to an opioid treatment program for methadone, they may be more accessible (Andraka-Christou & Capone, 2018). In addition, there is the potential to reduce stigma for patients since buprenorphine and naltrexone can be prescribed in settings not normally associated with SUD, such as the primary care setting (Andraka-Christou & Capone, 2018).

Despite MAT being a more effective treatment option than behavioral treatment alone, the use of MAT for SUD remains low (Nielson, 2016). Currently, 48 states, including Virginia, lack the systemic capacity to provide sufficient MAT due to the growing number of individuals with OUD (Jones et al., 2015). Almost half of the counties in the United States do not have a physician with a Drug Enforcement Administration (DEA) Drug Addiction Treatment Act (DATA) waiver, also known as a X-waiver, that allows them to prescribe buprenorphine (Rosenblatt et al., 2015). Unfortunately, the number of providers without X-waivers is not the only issue effecting the administering of MAT. For example only 3% of buprenorphine prescribers work in primary care settings (Rosenblatt et al., 2015) and Sigmon (2015) found that 48.1% of physicians with X-waivers were prescribing buprenorphine to five patients or fewer. Physicians have reported limited education, provider stigma, and a lack of institutional support as barriers to implementing MAT into practice (Andraka-Christou & Capone, 2018; Haffajee et al., 2018). The DATA of 2000 allows physicians to obtain a X-waiver to prescribe buprenorphine initially to 30 patients by attending an 8-hour training and registering with the DEA (DEA, n.d.a). In 2016, the Comprehensive Addiction and Recovery Act (CARA) permitted

physician assistants and nurse practitioners to obtain buprenorphine X-waivers (CADCA, n.d.). In addition to the 8-hour DATA training requirement, physician assistants and nurse practitioners must complete an additional 16 hours of training (ASAM, n.d.). In an effort to increase access to buprenorphine treatment, effective April 28, 2021, providers treating 30 patients or less no longer have to complete training for the X-waiver (Practice Guidelines for the Administration of Buprenorphine for Treating Opioid Use Disorder, 2021).

Although increasing the capacity to prescribe MAT in primary care settings would increase the capacity for a patient receiving MAT, physicians' rate of adoption and utilization has not matched the demand of the opioid crisis (Blum et al., 2016). Insufficient education, training, and experience are the largest barriers preventing physicians from both seeking the X-waiver and utilizing MAT once they have a X-waiver (Andraka-Christou & Capone, 2018; Haffajee et al., 2018). This suggests that the current X-waiver process is not enough incentive for providers (Haffajee et al., 2018). Due to the inadequate training in this field, there is limited institutional and peer support to encourage the use of MAT (Haffajee et al., 2018). Additionally, some physicians perceive patients with addictions as "difficult", meaning they may be demanding, manipulative, display criminal behavior and/or have co-morbidities in mental health (Andraka-Christou & Capone, 2018; Haffajee et al., 2018). The willingness of providers to prescribe drugs like buprenorphine has been shown to increase when there are other providers prescribing within the organization (Hutchison et al., 2014). This study updates and expands upon existing research evaluating and addressing provider barriers related to prescribing MAT.

## 1.2 Study Objectives and Research Questions

The primary objective of this study was to identify factors that influence primary care providers' readiness to integrate MAT services into primary care. Table 1.1 outlines the project objectives.

**Table 1.1**

*Project Objectives*

| |
|---|
| Describe the relationship between knowledge and how it influences primary care providers' readiness to integrate MAT services in their practices. |
| Explore differences among training environments and hours in readiness to integrate MAT service among primary care providers. |
| Determine areas in the change process in which primary care providers are resistant to the integration of MAT services. |

This study's expected outcomes were:

- Understand the impact of knowledge on primary care providers' readiness to implement MAT services.
- Identification of factors related to readiness and perceived stigma that influence primary care providers' ability to integrate MAT services into daily practice.
- Understand the influence MAT training type and MAT training environment has on primary care provider readiness and level of perceived stigma.
- Understand how ADKAR model constructs are influenced by providers' scope of practice.

- Identification of opportunities for development of specific interventions that increase primary care providers' readiness and decrease stigma towards the integration MAT services.

This study resulted in three manuscripts that are ready to submit to peer-reviewed journals. Table 1.2 depicts each research question that was addressed in each of the three papers. All three papers' objectives, research questions, and hypotheses are described in further detail in their individual chapters. The first paper identified predictors of the current level of MAT knowledge among primary care providers and investigated the relationship between the level of readiness to integrate MAT services into primary care and MAT knowledge. The second paper presents descriptive statistics and assessment of potential differences in the level of readiness and stigma towards integrating MAT services based on primary care providers' training and training environments. Lastly, the third paper assessed the extent to which level of change readiness to integrate MAT services is based on primary care providers' scope of practice. ADKAR model constructs were used to determined level of readiness.

**Table 1.2**

*Research Questions by Paper*

| Research Question | Paper # |
|---|---|
| What is the relationship between provider knowledge and readiness to integrate MAT services into primary care? | 1 |
| Is there an association between primary care professionals' readiness and stigma in relation to hours of MAT training (none, 8 hr, and 24 hr) and MAT training environment (none, in-person, online, and hybrid)? | 2 |
| Is providers' change readiness to implement MAT services influenced by their scope of practice based on the ADKAR model? | 3 |

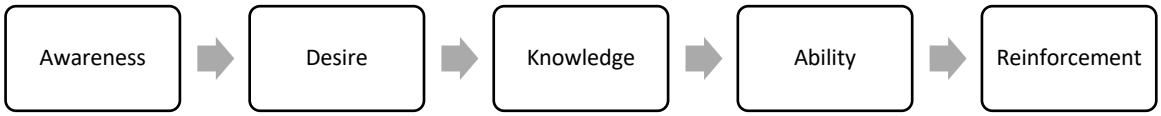
## 1.3 Theoretical Framework

The premise of Prosci's ADKAR (awareness, desire, knowledge, ability, and reinforcement) model to manage organizational change is that change will only happen if each member in the organization has successfully adjusted to the change (Taylor, 2010). The ADKAR model was initially developed as a tool to assess whether or not change management activities such as communication, training, and education were producing desired outcomes for the organization during the change process (Hiatt, 2006). This model has also been used for establishing collaborations among community organizations and services (Ričko, 2018). The ADKAR model's propositions can be used to assess individual employee readiness at each phase of the change process and to help management develop plans to encourage readiness (Kazmi & Naarananoja, 2014). The constructs of the ADKAR model follow the natural progression that is needed for an individual to experience successful change (Prosci, 2012). Furthermore, assessment using the ADKAR model can identify barriers the employee encounters and where in

the transition process employees may be resistant to change (Hiatt, 2006). ADKAR is a strong tool for organizations to use to plan and encourage change since it assists their employees to go through each of the five sequential stages of change (see Figure 1.1) (Kazmi & Naarananoja, 2014).

**Figure 1.1**

*ADKAR Model*



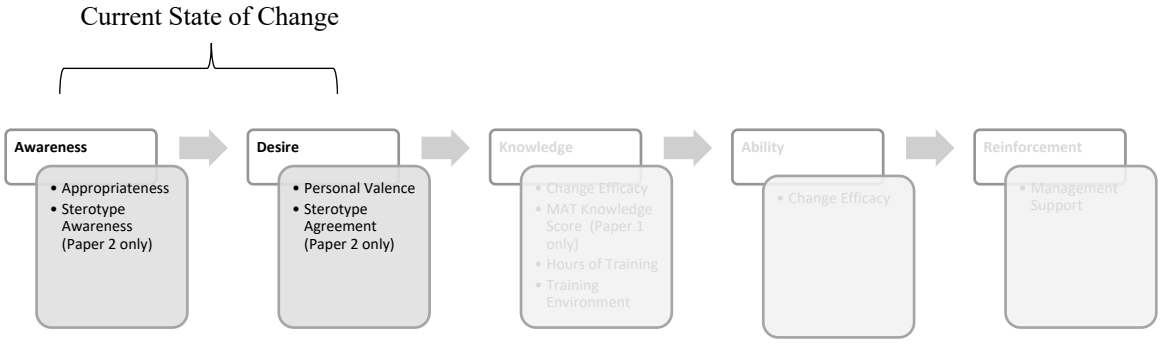

### *1.3.1 Papers 1 and 2*

The ADKAR Model can be broken down into three states of change: current, transition, and future (Prosci Inc., n.d.a). For an individual to move from their current state, they must gain awareness (Prosci Inc., n.d.a). Awareness is the understanding of why the change is needed and the risks associated with not changing (Hiatt, 2006). During this first stage, communication about both internal and external drivers of change are explored, as well as key messages such as: the magnitude of change, who is impacted, and the timeline for change (Hiatt, 2006). Next the individual must desire to participate in the change (Prosci Inc., n.d.a). Desire relates to the individual's willingness to participate and support the change. Desire is a "personal choice influenced by the nature of the change, by an individual's personal situation, as well as intrinsic motivators that are unique to each person" (Hiatt, 2006, p. 2). Providers' own personal beliefs and stigma about the patient population has hindered the provision of MAT medications (Haffajee et al., 2018). Paper 1 assessed the constructs of awareness and desire (Figure 1.2) by first evaluating the level in which primary care providers feel that integration of MAT services

into primary care is legitimate and beneficial for the organization (appropriateness). Secondly, Paper 2 assessed stigma at two levels: a) primary care providers' awareness of stigma (stereotype awareness) toward patients with OUD; and b) primary care providers' individual level of stigma (stereotype agreement) toward patients with OUD. Thirdly, Papers 1 and 2 determined the level of providers' perceived personal benefit from the adoption of MAT practices (personal valence) (Holt et al., 2007).

**Figure 1.2**

*Integration of Awareness and Desire from the ADKAR Model*

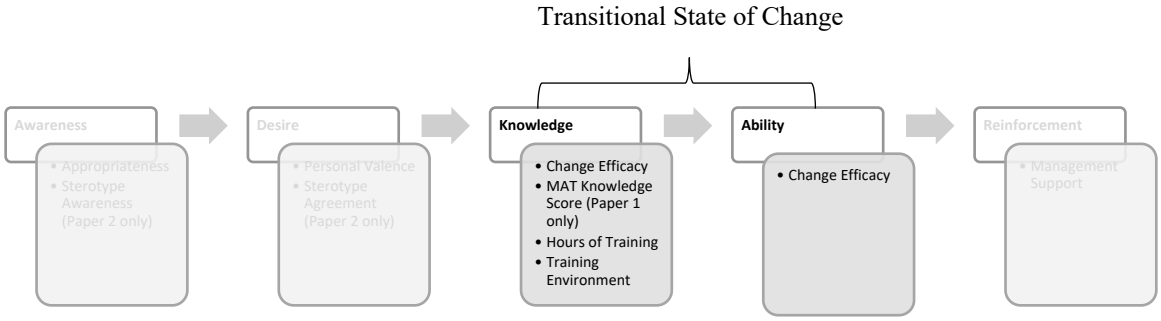



The awareness and desire constructs from the model are both prerequisites for an individual to successfully move through the transitional state (Prosci Inc., n.d.a). The next building block in the change process is knowledge (Hiatt, 2006). The knowledge phase ensures that all parties understand how the change will be implemented and what their part is in the process. Knowledge includes: 1) training and education on skills and behaviors; 2) information needed to use new tools, processes, and systems; and 3) an understanding of the new scope and responsibilities related to the change (Hiatt, 2006). The fourth construct is ability, as knowledge on its own is often not enough to create successful change (Hiatt, 2006). Ability refers to a clear demonstration that the individual or group is capable of implementing new skills and behaviors acquired in the knowledge phase (Hiatt, 2006). Figure 1.3 displays the integration of knowledge

and ability into the studies. Papers 1 and 2 evaluated the constructs of knowledge and ability by examining primary care providers' level of confidence in their training and skills to implement MAT services (change efficacy). Providers' level of knowledge was determined by a MAT knowledge test score (MAT knowledge score; paper 1 only), number of training hours in MAT services (hours of training), and where the individual provider received training (training environment).

**Figure 1.3**

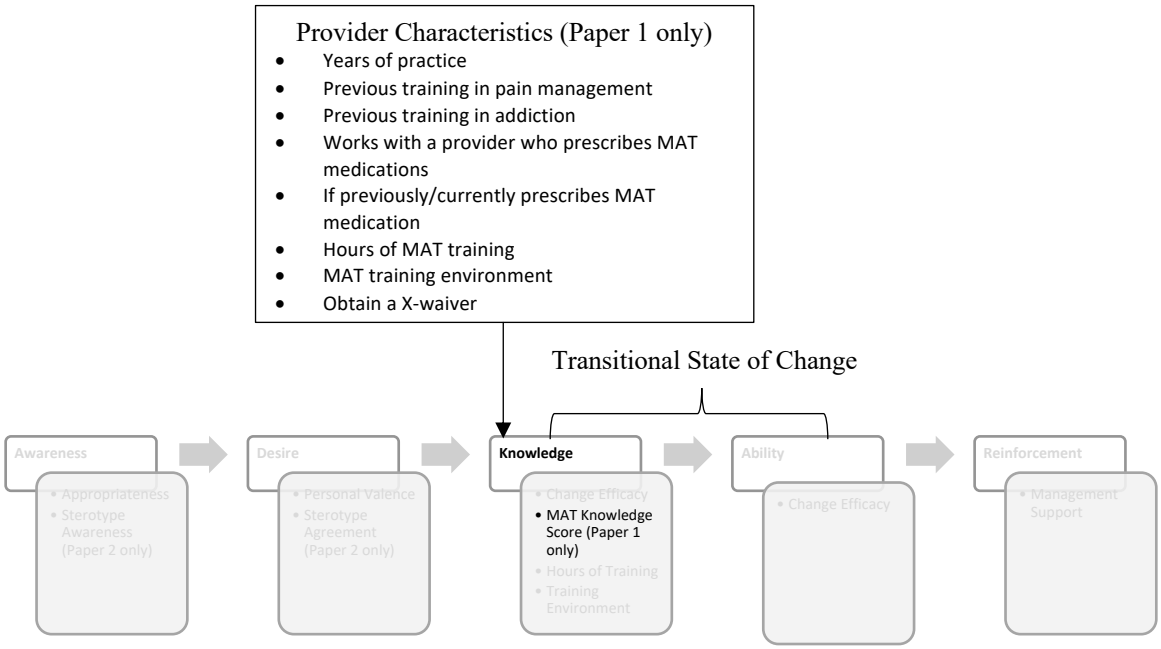
*Integration of Knowledge and Ability from the ADKAR Model*




Paper 1 also determined the relationship between provider characteristics and providers' MAT knowledge scores during the transitional state of change (Figure 1.4).

**Figure 1.4**

*Integration of Provider Characteristics into the ADKAR Model Paper 1*




Lastly, for organizations to sustain successful change in the future, their employees need reinforcement to maintain the desired change (Prosci Inc., n.d.a). Reinforcement refers to factors that sustain change. These factors may include rewards, recognition, compensation, and personal satisfaction (Hiatt, 2006). With so few primary care providers currently prescribing MAT medications, there is a lack of peer and leadership support that can provide mentoring. A lack of support by an institution and/or peers decreases a provider's willingness to prescribe MAT medications (Haffajee et al., 2018; Lanham et al., 2022). This lack of support may diminish providers' self-efficacy to provide adequate SUD and OUD treatment. Thus, Papers 1 and 2 identified the perceived level of support primary care providers feel that they have from management towards the integration of MAT services in primary care (management support), as shown in Figure 1.5.

**Figure 1.5**

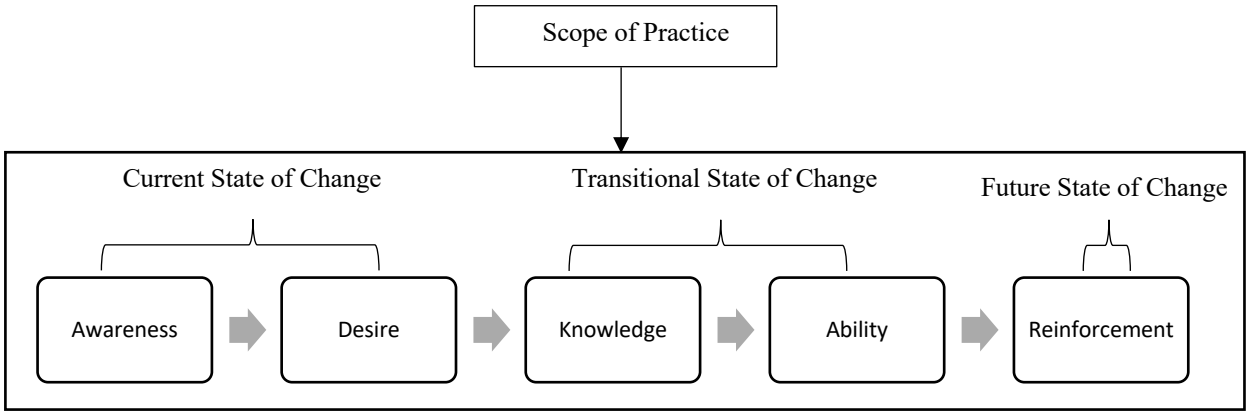
*Integration of Reinforcement from the ADKAR Model*


### *1.3.2 Paper 3*

The ADKAR Model was also used for Paper 3. Each construct of the ADKAR model represents a different stage in an individual's transition through the change process (Hiatt, 2006). Thus, the ADKAR Model is ideal for examining areas of resistance towards change among employees. This paper examined each construct of the ADKAR Model independently to identify areas of resistance towards the adoption of MAT services in primary care and examine how providers' scope of practice influences their outcomes (Figure 1.6).

**Figure 1.6**

*Integration of ADKAR Model Paper 3*



## 1.4 Study Sample

This study was performed at academic health profession training centers in the Hampton Roads area of Virginia (Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach). The target population for this study was primary care providers. Participants were recruited through nonprobability convenience sampling, which is the most commonly used method (Polit & Beck, 2017). Screening and enrolling of participants was based on the criteria listed in Table 1.3 below.

**Table 1.3**

*Study Inclusion/Exclusion Criteria*

| **Inclusion Criteria** |
| --- |
| • The participant is a Drug Enforcement Administration licensed provider: physician, physician assistant, or nurse practitioner; or a resident; or a physician assistant student in clerkship rotations; or a nurse practitioner student in clerkship rotations. |
| • Participant works in a primary care setting: family practice or internal medicine. |
| • Participant's clinical practice is in one of the seven Hampton Roads cities of Virginia: Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, or Virginia Beach. |
| **Exclusion Criteria:** |
| • Provider is no longer practicing at one of the clinical practice sites (e.g., retired). |

Primary care providers were selected for this study because there is a growing push for these practitioners to be the first-line providers to identify and manage OUD because of the amount of contact hours with the patient (Levin et al., 2016). However, the Hampton Roads area has a limited number of providers that have obtained the X-waiver to treat patients with MAT

medications. According to the Health Resources and Services Administration (HRSA) 2017 data there were 1,058 primary care physicians and 1,029 nurse practitioners in the seven cities of Hampton Roads (HRSA, 2019). In 2018 there were a total of 680 physician assistants in Virginia Beach, Newport News, and Norfolk (Bureau of Labor Statistics, 2018). However, SAMHSA only had 132 providers listed who had obtained a X-waiver in the Hampton Roads area and only a third (approximately 45) of those providers worked in a primary care setting (SAMHSA, 2019b). Although the number of primary care physicians has continued to rise in the Hampton Roads area (HRSA, 2023), those able to treat OUD with buprenorphine who have made themselves publicly accessible on SAMHSA's site has not grown (SAMHSA, 2024). With such low numbers of buprenorphine waivered providers, the Hampton Roads area could provide a greater understanding of factors that impede readiness to adopt MAT practices into primary care.

### 1.5 Methodology

For research papers one through three, a prospective cross-sectional study design was used. The primary source for all data was a single survey comprising the following sections: provider demographics, MAT knowledge test, a modified version of the Readiness for Change questionnaire (Holt et al., 2007), the ADKAR model questionnaire (Kachian et al., 2018), and a modified version of the Brief Opioid Stigma Scale (Yang et al., 2019). The items from each instrument were combined into one survey, which is available in Appendix A. Data were collected using an anonymous, self-administered, online survey hosted on QuestionPro®. The data collection period was March 2022-May 2022. The research protocol was submitted and approved by the Virginia Commonwealth University Institutional Review Board.

Paper 1 utilized data from the demographic questionnaire, Readiness for Change questionnaire, and a MAT knowledge test. Hierarchical multiple and simple linear regressions

were performed to identify factors that influenced primary care professionals' MAT knowledge scores and to understand any associations between MAT knowledge scores and readiness to provide MAT services among primary care providers. Paper 2 used data from the demographic questionnaire, Readiness for Change questionnaire, and the modified Brief Opioid Stigma Scale. Similarly, Paper 2 used multiple linear regression analyses to explore the influence of hours of MAT training and MAT training environment on readiness to provide MAT service among primary care providers. Paper 3's data were obtained from the demographic questionnaire and the ADKAR model questionnaire. A principal component analysis and hierarchical multiple linear regression were performed. These analyses determined the relationship between providers' readiness to implement MAT services and their scope of practice based on the ADKAR model.

### 1.6 Overview of Upcoming Chapters

The remaining chapters provide more details about Papers 1, 2, and 3. Chapter 2 describes in detail the background, study objectives, hypothesis, methods, analysis, results, and conclusion for Paper 1. Chapters 3 and 4 have similar information for Papers 2 and 3, respectively. Chapter 5 concludes this dissertation and provides the conclusions relevant to all three papers.

## 2. Research Paper 1: The Impact of MAT Knowledge on Primary Care Providers' Readiness to Adopt MAT Practices

### 2.1 Introduction

In the United States, the drug overdose mortality rate has more than tripled from 1999-2016 (Hegegaard et al., 2017). In 2019, substance use disorder (SUD) death rates related to synthetic opioids other than methadone were 11 times higher than in 2013 (Mattson et al., 2021), and these synthetic opioids (e.g., fentanyl and carfentanil) accounted for more than 36,000 deaths (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2021). In 2021, opioid related overdoses accounted for more than 75% of drug related overdose deaths (>80,000 deaths; Spencer et al., 2022). The Council of Economic Advisors (2019) found that between the years of 2015-2018, more than $2.5 trillion was spent to treat opioid use disorder (OUD), when health care, crime, and loss of work productivity related to OUD are factored together. Compounded by an increase in social isolation and limited access to outpatient addiction services related to the COVID-19 pandemic, the opioid epidemic continued to escalate (D'Onofrio et al., 2020). As the Joint Economic Committee (2022) found opioid related cost in 2020 alone was over $1.4 trillion.

Medication-assisted treatment (MAT), a combination of behavioral therapy, counseling, and medications, can be used to treat OUD (SAMHSA, 2019c). There are three forms of MAT medications available to treat OUD in the United States: methadone, buprenorphine, and naltrexone. However, buprenorphine and naltrexone are the only ones legally permitted to be administered in an office-based setting (Korthuis, et al. 2017). Buprenorphine is highly regulated by the federal government because if patients are improperly dosed, they may become addicted to the medications (Jones et al., 2015). Buprenorphine can be prescribed in an office-based

setting in sublingual form, monthly injections, or a six-month implant (SAMHSA, 2019a). Naltrexone is not a controlled substance; thus, it has fewer federal regulations governing its use (Andraka-Christou & Capone, 2018). Much like buprenorphine, naltrexone can be prescribed in oral form and patients can receive their medication from their local pharmacy monthly. Also, there is an office-based monthly extended-release injection option available for naltrexone (Arfken et al., 2010).

Training in MAT for providers who wish treat more than 30 patients with buprenorphine involves the completion of an 8-hour curriculum for physicians and a 24-hour curriculum for physician assistants and advanced practice registered nurses (SAMHSA, 2021). Those who complete their training online or in a hybrid format (a combination of online and in-person) must pass a test with a score of 75% or higher to receive a X-waiver that allows them to prescribe buprenorphine (PCSS, 2021).

Despite the evidence that prescribing medication specifically for OUD decreases opioid use, only about a quarter of people who need treatment for OUD receive it in a year (Fiellin et al. 2014; Fudala et al., 2003; SAMHSA, 2018). There is a need to integrate MAT treatment into everyday healthcare to increase access to care for those who experience OUD. Because of the amount of contact hours primary care practitioners spend with patients, there is a growing push for them to be the first-line providers to identify and manage OUD (Levin et al., 2016). However, only about 3% of providers who have been granted a X-waiver to treat patients with OUD work in a primary care setting (Rosenblatt et al., 2015). In 2022, the number of providers in the U.S. with a X-waiver had increased, but still remained low with only 8.5% of advance practice nurses, 5.8% of physicians, and 5.3% of physician assistants able to prescribe buprenorphine (Spetz et al., 2022).

The number of providers without X-waivers is not the only issue affecting the use of MAT. Sigmon (2015) found that 48.1% of physicians with X-waivers were prescribing buprenorphine to five or fewer patients. Similarly, Jones et al. (2023b) reported over a third of providers had not prescribed buprenorphine and over half of X-waivered providers only treated 1 to 4 patients monthly. McGinty and colleagues (2020) found only a fifth of primary care physicians expressed interest in treating individuals with OUD and only 7.6 % of primary care physicians in their study were prescribing buprenorphine. Primary care providers' slow adoption rates of MAT services combined with a workforce that may not have adequate training and education in OUD have been large barriers in increasing access to effective treatment (HHS, 2018). The barriers of insufficient education, training, experience, and support are preventing physicians from seeking the X-waiver and preventing those who have obtained X-waivers from utilizing MAT with their patients who have OUD (Andraka-Christou & Capone, 2018; Haffajee, et al., 2018; Lanham et al., 2022). The primary purpose of this study was to understand how primary care providers' level of MAT knowledge influences their readiness to integrate MAT services in the primary care clinical setting. The study also identified factors that impact primary care providers' level of MAT knowledge.

## 2.2 Theoretical Framework

The premise of Prosci's ADKAR (awareness, desire, knowledge, ability, and reinforcement) model to manage organizational change is that change will only happen if each member in the organization has successfully adjusted to the change (Taylor, 2010). The ADKAR model was initially developed as a tool to assess whether change management activities such as communication, training, and education were producing desired outcomes for the organization during the change process (Hiatt, 2006). It has also been used for establishing collaborations

among community organizations and services (Ričko, 2018). This model's propositions can be used to assess individual employee readiness at each phase, and also aids management in developing a plan to encourage readiness (Kazmi & Naarananoja, 2014). The constructs of the ADKAR model follow the natural progression that is needed for an individual to experience successful change (Prosci, 2012). Furthermore, assessment using the ADKAR model can identify barriers the employee encounters and where in the transition process employees may be resistant to change (Hiatt, 2006). The ADKAR model links individual performance, organizational change, and results together (Hiatt, 2006).

This study focused on the knowledge construct of the model and how a primary care practitioner's MAT knowledge influenced their readiness to integrate MAT services into practice. The knowledge phase of the ADKAR model represents the processes through which change will be implemented. Knowledge includes: 1) training and education on skills and behaviors; 2) information needed to use new tools, processes, and systems; and 3) understanding of new scope and responsibilities related to the change (Hiatt, 2006).

Before the primary objective of the study could be addressed, it was first critical to understand relevant influences on knowledge. An individual's knowledge can be impacted by four factors: current level of knowledge, the ability to learn, availability of educational and training resources, and access to knowledge needed (Hiatt, 2006). The difference between a person's current knowledge level and the level of knowledge required is correlated with the odds of the individual implementing a new change effectively (Prosci, n.d.b). Current knowledge levels can be assessed based on the person's education or work experience (Hiatt, 2006). In addition to people's varying levels of knowledge, individuals' capacity for learning may differ as well. Some individuals may find learning new concepts and skills easier than others and this

variation in capacity can be reflected in the retention of knowledge (Hiatt, 2006; Prosci, n.d.b). The third influence on knowledge is the availability of educational and training resources, such as access to equipment and systems, training facilities, educational materials, experts, instructors, and funding (Hiatt, 2006). The access to, or existence of, the required knowledge is the last factor that influences knowledge. This factor explores the possibility that information needed to increase knowledge may not be readily available. For example, there may be geographic locations where there are few educational institutions or limited access to the internet.

Factors that influence knowledge that were used in this study are displayed in Figure 2.1. This study assessed the current level of knowledge by: 1) evaluating providers' required level of knowledge by administering a MAT knowledge test; and 2) assessing an individual's current level of knowledge by examining an individual's years of practice, previous training in pain management, previous training in addiction, previously or currently prescribed MAT medications, the number hours of MAT training, and if the individual has obtained a X-waiver. Investigating the availability of educational and training resources provides insight into the different training environments where MAT education is offered and whether an individual works with a provider who prescribes MAT medications. Figure 2.2 illustrates the influence of these provider characteristics on whether a provider has the knowledge needed to change their practice and provide MAT services. Providers' capacity to learn is outside the scope of this study and was not addressed. Because the institutions where the study was conducted did not experience significant access challenges to MAT education and training resources, access to, or existence of, the required knowledge were not included in this study.

**Figure 2.1**

*Adapted Factors Influencing Knowledge (Hiatt, 2006)*

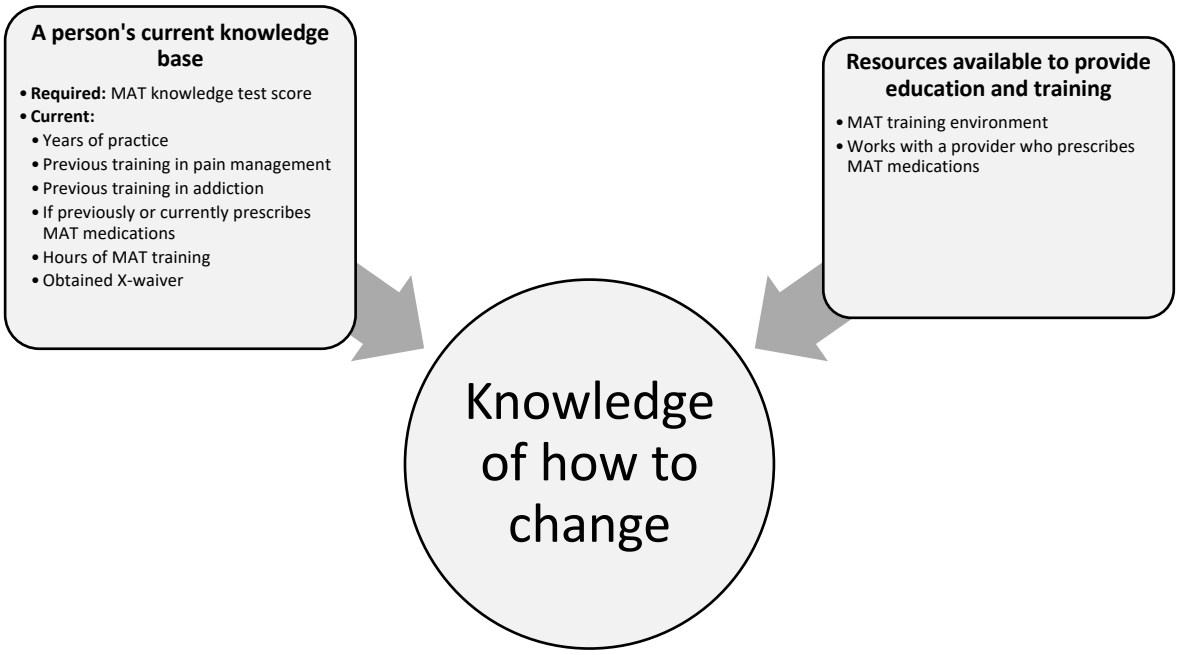
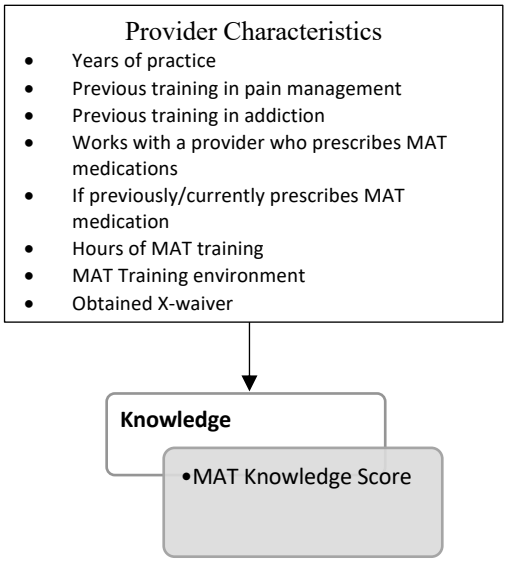


**Figure 2.2**

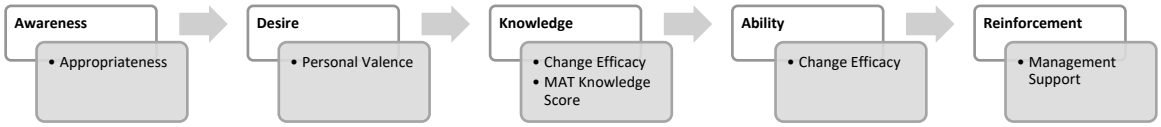
*Provider Characteristics and Knowledge Relationship in the ADKAR Model*




Once there was a better understanding of what factors influence knowledge, the primary objective of this study was addressed. To address this objective, four areas of organizational readiness were examined: the perceived level of appropriateness for integrating MAT into primary care, perceived level of personal benefit the integration of MAT will bring, perceived level of confidence in knowledge and skills to perform MAT services, and the perceived level of support from senior leadership towards integrating MAT services (Holt, Armenakis et al., 2007). These areas of readiness were examined to see if there was a relationship between providers' MAT knowledge scores and their level of readiness to integrate MAT services into primary care. Figure 2.3 displays the relationship between these components and the ADKAR model. Further detail about how each of these areas align with the ADKAR model is discussed in Paper 2.

**Figure 2.3**

*Integration of Organizational Readiness Components into the ADKAR Model*




Aim one was to investigate the extent to which an individual's years of practice, previous training in pain management, previous training in addiction, MAT medications prescription practices, number of hours of MAT training, MAT training environment, and whether they work with a provider who prescribes MAT medications, and X-waiver obtainment can predict an individual's current level of MAT knowledge. The research questions, hypotheses, and supporting evidence are presented in Figure 2.4.

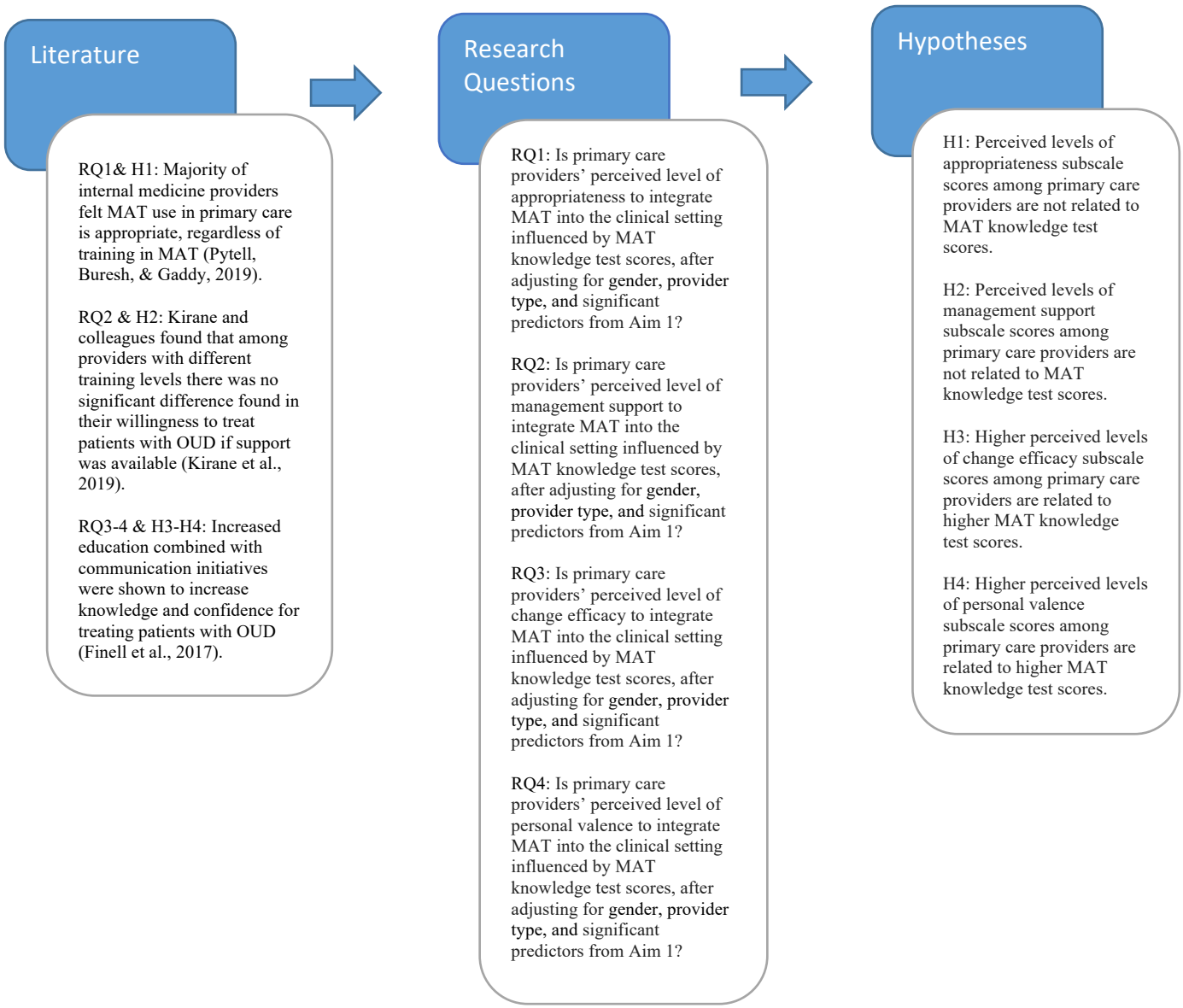
**Figure 2.4**

*Aim 1: Literature, Research Questions, and Hypotheses*

Aim two was to examine the effect of current level of providers MAT knowledge and the perceived level of appropriateness, management support, change efficacy, and personal valence towards integrating MAT in primary care by providers. The research questions, hypotheses, and supporting evidence are provided in Figure 2.5.

**Figure 2.5**

*Aim 2: Literature, Research Questions, and Hypotheses*



## 2.3 Methods

### *2.3.1 Study Design*

To answer the study research questions, a prospective cross-sectional descriptive study was conducted at two academic health profession training centers in Virginia. The study examined the relationship between providers' MAT knowledge and their readiness to integrate MAT services into primary care. The primary source for all data was a single survey comprised of the following sections: MAT knowledge test, a modified version of the Readiness for Change questionnaire (Holt et al., 2007), and provider demographics. Data were collected using an anonymous self-administered online survey. The data collection period was March 2022-May 2022. The research protocol was submitted and approved by the Virginia Commonwealth University Institutional Review Board.

### *2.3.2 Setting and Participants*

The target population for this study was primary care providers. Participants were recruited through nonprobability convenience sampling. This study recruited primary care providers in family and internal medicine who work for the academic health profession training centers and/or their partnering clinical sites. Primary care providers for this study were defined as practicing physicians, physician assistants, nurse practitioners, residents, physician assistant students in their clinical year, and nurse practitioner students in their clinical year. Screening and enrolling of participants was based on the following inclusion and exclusion criteria.

Inclusion Criteria:

1. The participant was a Drug Enforcement Administration licensed provider: physician, physician assistant, nurse practitioner, resident; physician assistant or nurse practitioner student in clinical rotations.

2. Participant was currently practicing in a primary care setting: family practice or internal medicine.

3. Participant's clinical practice was in one of the seven Hampton Roads cities of Virginia: Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, or Virginia Beach.

Exclusion Criteria:

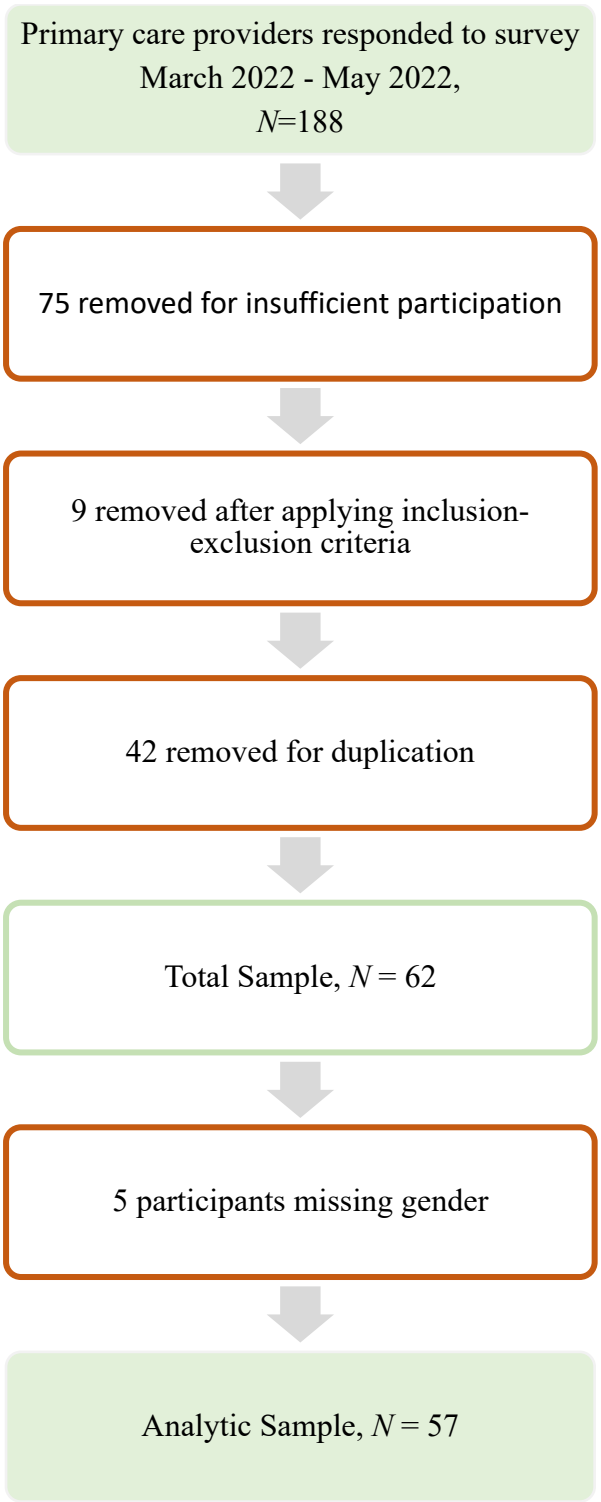
1. Provider was no longer practicing at one of the clinical practice sites (e.g. retired).

### *2.3.3 Participant Recruitment*

Recruitment of participants occurred exclusively through passive recruiting strategies due to the COVID-19 pandemic. Scripted emails (see Appendix B) about the study were sent out from the academic health profession training centers to primary care providers both at the institution and at clinical partner sites. These notifications included the purpose of the study, estimated time requirement, and a data confidentiality statement. The academic health profession training centers agreed to distribute the initial recruitment email and survey link. The online survey was available through QuestionPro®. Due to low initial response rates, the academic health profession training centers were approached to resend the survey link (see Appendix C) as a reminder three times. After removing surveys with insufficient survey participation, duplicate surveys, and applying the inclusion and exclusion criteria, the data set was reduced from 188 to 62 surveys. Figure 2.6 displays the process used to obtain the final sample.

**Figure 2.6**

*Application of inclusion and exclusion criteria to the study sample for Paper 1*



### *2.3.4 Sample and Power Analysis*

An a priori power analysis was used to calculate sample size. According to Polit and Beck (2017), when multiple linear regression is used, the number of predictors must be considered when calculating the sample size. With 14 predictors, a sample of 86 participants was needed to achieve a medium effect size $f^2 = 0.25$ and power of 0.80 when $\alpha = 0.05$, according to G*Power 3.1 software. As the second aim of the study only had one predictor, a sample of $n = 86$ was more than adequate to achieve a medium effect size $f^2 = 0.25$ and power of 0.80 when $\alpha = 0.05$.

A post hoc power analysis was completed for the first specific aim. As a result of the hierarchical multiple regression only two predictors were significant. With 2 predictors, a sample of 57 participants, a power of .92 was achieved when $\alpha = 0.05$, according to G*Power 3.1 software. The second aim of the study only had one predictor. A post hoc power analysis determined a power of .96 was achieved when $\alpha = 0.05$, according to G*Power 3.1 software.

### *2.3.5 Instruments*

**MAT Knowledge Test.** There were three instruments used for this study. The first instrument was the MAT knowledge test (see Appendix A, Part III). The development of a survey instrument was necessary to evaluate MAT knowledge due to lack of validated surveys assessing this topic. Questionnaire development steps suggested by Czaja and Blair (2005) were used. An extensive review of the literature was completed to identify surveys, training materials, governing regulations, and published research. Health care providers who are familiar with MAT training and who develop MAT educational components for an academic health center were consulted to ensure content validity. A ten-item instrument was developed from previously published training materials, governing agencies, and content experts (“8 hour MAT training”,

2019; PCSS, n.d.; SAMHSA, 2019c; SAMHSA, 2021). The MAT knowledge test produced a single score that was recorded and stored in QuestionPro®.

**Readiness for Change Questionnaire.** The second study instrument was the Readiness for Change Questionnaire (RFCQ), a reliable and validated 25-item Likert scale instrument that is designed to assess organizational change at the individual level. This study examined four factors (appropriateness, management support, change efficacy, and personal valence) that were measured using the validated RFCQ subscales, shown in Table 2.1 (Holt et al., 2007). Holt and colleagues (2007) tested the content validity through factor analysis (four factors emerged accounting for 67.20% of the variance), convergent validity (the readiness factors were correlated $r = .46$), and internal consistency of it for subscales (Cronbach's alphas: $\alpha = .94$ appropriateness, $\alpha = .87$ management support, $\alpha = .82$ change self-efficacy, and $\alpha = .66$ personal valence). Although the personal valence alpha coefficient was lower than the other subscales, the consistency measurement scores still demonstrated acceptable reliability (Holt et al., 2007). However, changes to the original instrument were needed, as it was designed to evaluate organizational readiness. Survey items mentioning the words "organization" and "change" have been modified to clearly define the items to fit the needs of this study. All modifications to the RFCQ are shown in Appendix D. Pilot testing was performed to test the reliability and validity of the modified instrument items used in the current study. The data were collected from the RFCQ and entered into SPSS v.26. Questions were answered using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Recorded answers for each of the 25 items were collected from the RFCQ and stored in QuestionPro®. Likert responses were coded into numerical variables so a single mean score could be calculated for each individual.

**Table 2.1**

*Readiness for Change Instrument Questions and Subscales*

| | |
|---|---|
| **Appropriateness Subscale** | 1. In the long run, I feel it will be worthwhile for me if MAT is integrated into primary care.<br>*2. It doesn't make much sense for us to initiate the integration of MAT into primary care.<br>3. I think that the primary care will benefit from integration of MAT.<br>4. Integrating MAT into primary care makes my job easier.<br>*5. When MAT integration into primary care is implemented, I don't believe there is anything for me to gain.<br>6. Integrating MAT into primary care will improve our clinic's/department's overall efficiency.<br>7. This MAT integration matches the priorities of our clinic/department.<br>*8. The time we are spending on this integration should be spent on something else.<br>9. There are legitimate reasons for us to make this change to MAT integration.<br>10. There are a number of rational reasons for the adoption of MAT into primary care. |
| **Management Support Subscale** | 1. Management has sent a clear signal that my clinic/department is going to change.<br>2. This clinic's/department's most senior leader is committed to the integration of MAT into primary care.<br>3. Our clinic/department's top decision makers have put all their support behind this MAT integration.<br>*4. I think we are spending a lot of time on this MAT integration when the senior managers don't even want it implemented. (This item was deleted from final analysis.)<br>5. Every senior manager has stressed the importance of implementing MAT integration into primary care.<br>6. Our senior leaders have encouraged all of us to embrace this change to implementing MAT into primary care. |
| **Change Efficacy Subscale** | 1. My past experiences make me confident that I will be able to perform successfully after MAT is integrated into primary care.<br>*2. There are some tasks that will be required when we implement the integration of MAT into primary care that I don't think I can do well.<br>3. I do not anticipate any problems adjusting to the work I will have when MAT is integrated into primary care.<br>4. When I set my mind to it, I can learn everything that will be required when this integration of MAT into primary care is adopted.<br>5 I have the skills that are needed to make this MAT integration work.<br>6. When we implement this MAT integration, I feel I can handle it with ease. |
| **Personal Valence Subscale** | *1. My future in this job will be limited because of the integration of MAT into primary care.<br>*2. I am worried I will lose some of my status in the clinic/department when MAT is integrated into primary care.<br>*3. Implementing MAT integration into primary care will disrupt many of the personal relationships I have developed. |

*Note.* Responses are 1= strongly disagree, 2=disagree, 3=somewhat disagree, 4=neither agree or disagree, 5=somewhat agree, 6= agree, 7= strongly agree
Items with an * were reverse coded.

**Provider Demographics Form.** The third instrument was the provider characteristics form. The following data were collected from the provider characteristics form and entered into QuestionPro®: gender (male, female, transgender male, transgender female, gender variant/non-conforming, not listed, and prefer not to say), provider type (physician, physician assistant, nurse practitioner, resident, and physician assistant student, and nurse practitioner student), years of practice (in school, in residency, <3 years, 3-5 years, 6-10 years, and >10 years), previous training in pain management (yes, no), previous training in addiction (yes, no), previously/currently prescribes MAT medications (yes, no), works with a provider who prescribes MAT medications (yes, no), MAT hours of training (<8 hours, 8 hours of training, and 24 hours of training), and training environment (in-person, online, hybrid, none), and obtained a X-waiver (yes, no).

### *2.3.6 Measures*

**Dependent Variable Measurements.** The primary outcome for Aim 1 was the current level of primary care provider's MAT knowledge. Their level of MAT knowledge was assessed by the MAT knowledge test. The MAT knowledge test produced a single score that was recorded as a percentage, as depicted in Table 2.2.

The primary outcomes for Aim 2 consisted of four measures derived from the Readiness for Change Questionnaire (Holt et al., 2007). The dependent variables were appropriateness, management support, change efficacy, and personal valence. Appropriateness is the extent to which an individual feels the change is needed and is beneficial to the organization (Holt et al., 2007). The score was the mean of the ten items relative to level of appropriateness. Management support is the extent to which an individual feels the change is supported by senior leadership (Holt et al., 2007). The score was the mean of the five items relative to level of Management

support. Change efficacy is the extent to which an individual feels confident that they have the knowledge and skills needed to make the change successfully (Holt et al., 2007). Change efficacy scores were the result of the mean of the six construct-related items. Personal valence is the extent to which an individual feels the change will be personally beneficial (Holt et al., 2007). The score was the result of the mean of the three items in the valence subscale. For subscales that were not completed, the score was the result of the mean of the number of completed items. Each subscale used a 7-point Likert scale to measure all items. Questions for each subscale are listed in Table 2.1.

**Independent Variables Measurements.** For Aim 1, the independent variables were years of practice, previous training in pain management, previous training in addiction, if previously or currently prescribed MAT medications, works with a provider who prescribes MAT medications, hours of MAT training, MAT training environment, and X-waiver obtainment. Study variables were derived from literature and specific aspects of the ADKAR model. Table 2.2 displays the independent variables. For Aim 2, the independent variable was the MAT knowledge test score. As previously described, this variable produced a single score recorded as a percentage.

**Table 2.2**

*Variables of Interest for Proposed Study Aim 1*

| **Independent Variables** | **Description and Measurement** | **Data Source** |
|---|---|---|
| *Years of practice (was represented by 4 dummy variables) | Ordinal:<br>In school<br>In residency<br><3 years<br>3-5 years<br>6-10 years<br>>10 years | Provider demographics form |
| Previous training in pain management | Dichotomous: Yes, No | Provider demographics form |
| Previous training in addiction | Dichotomous: Yes, No | Provider demographics form |
| Previously/currently prescribes MAT medications | Dichotomous: Yes, No | Provider demographics form |
| Works with a provider who prescribes MAT medications | Dichotomous: Yes, No | Provider demographics form |
| Hours of MAT training (was represented by 2 dummy variables) | Ordinal: <8 hours of training, 8 hours of trainings, and 24 hours of training | Provider demographics form |
| MAT training environment (was represented by 3 dummy variables) | Nominal: in-person, online, hybrid, none | Provider demographics form |
| Obtained X-waiver | Dichotomous: Yes, No | Provider demographics form |
| **Dependent Variable** | **Description and Measurement** | **Data Source** |
| MAT knowledge test score | Continuous: Score in percentage | MAT Knowledge Test |
| **Control Variables** | **Description and Measurement** | **Data Source** |
| *Gender | Nominal:<br>• Male<br>• Female<br>• Transgender male<br>• Transgender female<br>• Gender variant/non-conforming<br>• Not listed<br>• Prefer Not to Say | Provider demographics form |
| *Provider type | Nominal: | Provider demographics form |

| | | |
|---|---|---|
| | • Physician (MD or DO)<br>• Physician Assistant (PA)<br>• Nurse Practitioner (NP)<br>• Resident<br>• PA student<br>• NP student | |

*Note.* Variables marked with an * were collapsed. See section 2.4.1 for further details.

**Covariates.** As there were multiple variables that may effect outcomes, this study used control variables to adjust for these effects. For Aim 1, covariates were limited to gender and provider type, as several factors that could influence that outcome were used as predictors to understand which one(s) have the most impact on the independent variable (Table 2.3).

For Aim 2, there were several control variables: gender, provider type, and the rest were determined based on significant predictors found in Aim 1. Aim 2 control variables are summarized in Table 2.3.

**Table 2.3**

*Variables of Interest for Proposed Study Aim 2*

| **Independent Variable** | **Description and Measurement** | **Data Source** |
|---|---|---|
| MAT knowledge test score | Continuous: Score in percentage | MAT knowledge test |
| **Dependent Variables** | **Description and Measurement** | **Data Source** |
| Appropriateness score | Continuous: Mean of the ten 7-point Likert scale items | The RFCQ: Appropriateness subscale (10 items) |
| Management support score | Continuous: Mean of the five 7-point Likert scale items | The RFCQ: Management support subscale 6 items) |
| Change efficacy score | Continuous: Mean of the six 7-point Likert scale items | The RFCQ: Change efficacy subscale (6 items) |
| Personal valence score | Continuous: Mean of the three 7-point Likert scale items | The RFCQ: Personal valence subscale (3 items) |
| **Control Variables** | **Description and Measurement** | **Data Source** |
| *Gender | Nominal:<br>• Male<br>• Female<br>• Transgender male<br>• Transgender female<br>• Gender variant/non-conforming<br>• Not listed<br>• Prefer Not to Say | Provider demographics form |
| *Provider type | Nominal<br>• Physician (MD or DO)<br>• Physician Assistant (PA)<br>• Nurse Practitioner (NP)<br>• Resident<br>• PA student<br>• NP student | Provider demographics form |
| *Years of practice<br>(was represented by 4 dummy variables) | Ordinal:<br>In school<br>In residency<br><3 years<br>3-5 years | Provider demographics form |

| | | |
|---|---|---|
| | 6-10 years<br>>10 years | |
| Previous training in pain Management | Dichotomous: Yes, No | Provider demographics form |
| Previous training in addiction | Dichotomous: Yes, No | Provider demographics form |
| Previously/currently prescribes MAT medications | Dichotomous: Yes, No | Provider demographics form |
| Works with a provider who prescribes MAT medications | Dichotomous: Yes, No | Provider demographics form |
| Hours of MAT training (was represented by 2 dummy variables) | Ordinal: <8 hours of training, 8 hours of trainings, and 24 hours of training | Provider demographics form |
| MAT training environment (was represented by 3 dummy variables) | Nominal: in-person, online, hybrid, none | Provider demographics form |
| Obtained X-waiver | Dichotomous: Yes, No | Provider demographics form |

*Note.* Variables marked with an * were collapsed. See section 2.4.1 for further details.

### *2.3.7 Data Analysis*

This prospective cross-sectional study used SPSS v.26 to conduct all analyses. Before transferring data from QuestionPro® into SPSS, a codebook was developed in Microsoft Excel. The codebook included a listing of all variables, their corresponding values, and their relationship to the study. The codebook also included a detailed log of data cleaning procedures, to include any necessary variable transformations, modifications, and deletions of any variables (Polit & Beck, 2017).

**Descriptive Statistics.** Upon completion of recruitment and enrollment of a sufficient number of study participants to power the study and data collection, descriptive statistics were performed analyzing participants' gender, provider type, years of practice, previous training in pain management, previous training in addiction, previously or currently prescribing MAT medications, whether participants work with a provider who prescribes MAT medications, hours of MAT training, MAT training environment, and whether participants have obtained a X-

waiver. Frequencies, percentages, means, standard deviations and ranges were calculated, as appropriate. Descriptive analyses were used to assess the distribution of the data and to compare baseline characteristics to assess comparability.

**Multivariate Analyses Techniques.** Hierarchical multiple linear regression analysis (Aim 1) was performed to determine a model of the most robust predictors of MAT knowledge scores, based on fourteen independent variables (years of practice (4 dummy variables), previous training in pain management, if previously or currently prescribes MAT medications, previous addiction training, works with a provider who prescribes MAT medications, hours of MAT training (2 dummy variables), MAT training environment (3 dummy variables), and obtained a X-waiver. This statistical technique was useful for this research study because it predicts MAT knowledge test scores based on multiple predictors. Furthermore, this technique allows for the overall fit of the model to be determined, as well as the total variance explained by each predictor (Laerd, 2017). To ensure that assumptions of a multiple linear regression analysis were met, a test of assumptions for the analysis was performed, as outlined in Table 2.4 (Laerd, 2017; Tabachnick & Fidell, 2013). If any data points needed to be modified to meet statistical assumptions, these data cleaning processes were reported in the results.

**Table 2.4**

*Multiple Linear Regression Assumptions*

| Assumption | Assessment |
|---|---|
| One continuous dependent variable | MAT Knowledge Test Score outcome is a percentage |
| Two or more independent variables | 14 independent variables were used |
| Independence of observations | All categories for both the dependent variable and the independent variables were mutually exclusive. |
| Linearity | 1. Examined scatterplots for linear relationship between dependent variable and independent variables collectively.<br>2. Examined partial regression plots were examined between the dependent variable and each independent variable separately.<br>3. If data were not linear than deletion occurred and was reported. |
| Homoscedasticity | Examined plots of the studentized residuals against the unstandardized predicted values. Heteroscedastic data was transformed. If this does not resolve the issue, a weighted least-squares regression were run instead of a multiple linear regression. |
| Absence of multicollinearity | Correlation coefficients >.70, and Tolerance value <.10 were used as criteria for deletion of variables |
| No significant outliers | Cases with standard deviations greater than ±3 were inspected individually, and the variable was modified through transformation or score alternation. If modification was not appropriate than either deletion occurred, or case was kept and was reported. |
| Normality | Scatterplots were examined for skewness and kurtosis. If the assumption of normality was violated, a regression that does not rely on normally distribution of data was run, or deletion occurred and was reported. |

*Note.* Adapted from *Using Multivariate Statistics* by B.G. Tabachnick and L.S. Fidell, (6th edition), 2013, Pearson and Laerd Statistics, 2017 (https://statistics.laerd.com).

The hierarchical multiple linear regression analysis: 1) established the proportion of variation in MAT knowledge test scores explained by the independent variables; 2) predicted

MAT knowledge test scores based on the new values of the independent variables; and 3) determined how much MAT knowledge test scores changed per one unit of change in the independent variables (Laerd, 2017). Before the multiple linear regression was run, data coding was completed. Data coding was examined with a case processing summary table, which was used to check for missing cases. The dependent variable was double checked for correct coding by inspecting the dependent variable encoding table; low counts among predictors were determined through a review of the categorical variables' codings table (Laerd, 2017). To assess the fit of the model the coefficients of determination, the $R^2$ value was used to determine the amount of variation explained by the model. Statistical significance of the overall model was represented by the *p* value. A $p < .05$ was be considered statistically significant. F-statistic and the degrees of freedom were be reported. Standardized coefficients (Beta) were used to represent the change in MAT knowledge test scores caused by each independent variable. A range of possible values for the standardized coefficients was determined using the 95% confidence interval, and *p* values of $< .05$ was used to assess for statistical significance for the standardized coefficients (Tabachnick & Fidell, 2013).

A simple linear regression analysis evaluated Aim 2. This analysis assessed the relationship between providers' MAT knowledge test scores (the IV) and the four subscales of the RFCQ: appropriateness, management support, change efficacy, and personal valence (the DVs). This statistical technique is useful for this research study because it determines the relationship between the predictor (MAT knowledge test scores) and each of the readiness constructs separately. Furthermore, this technique determined if the relationship between the variables was significant, established the total variance explained by the MAT knowledge test scores, explained the direction and magnitude of the relationship, and was able to predict values

for each readiness construct base on MAT knowledge test scores (Laerd, 2017). Prior to the simple linear regression analysis, a series of tests was performed to ensure that the necessary analysis assumptions were met, as outlined in Table 2.5 (Laerd, 2017; Tabachnick & Fidell, 2013). If any cases failed to meet assumptions or were modified to meet assumptions, details of the transformations are reported in the results.

**Table 2.5**

*Simple Linear Regression Assumptions*

| Assumption | Assessment |
|---|---|
| One continuous dependent variable | Each subscale analyzed independently |
| One continuous independent variable | MAT Knowledge Test Score outcome was a percentage |
| Linearity | Examined scatterplots for linear relationship between dependent variable and independent variables collectively.<br>If data was not linear, transformation may be applied to the independent variables and/or dependent variable. |
| Independence of observations | Durbin-Watson test performed. Durbin-Watson statistic ≈2.00 was considered to have no correlation between residuals. If this assumption is not met, then outliers were examined for transformation and/or deletion. |
| No significant outliers | Cases with standard deviations greater than ±3 were inspected individually, and the variable was modified through transformation or score alternation. If modification was not appropriate than either deletion occurred, or case was kept and was reported |
| Homoscedasticity | Examined plots of the studentized residuals against the unstandardized predicted values. Heteroscedastic data was transformed. If this does not work, a weighted least-squares regression can be run. |
| Normality | Scatterplots were examined for skewness and kurtosis. If the assumption of normality was violated, transformation may be applied to the independent variables and/or dependent variable, a regression that does not rely on normally distribution of data can be run, or deletion occurred and was reported. |

*Note.* Adapted from *Using Multivariate Statistics* by B.G. Tabachnick and L.S. Fidell, (6th edition), 2013, Pearson and Laerd Statistics, 2017 (https://statistics.laerd.com).

The simple linear regression: 1) established the proportion of variation in appropriateness, management support, change efficacy, and personal valence (separately) explained by the MAT knowledge test scores; 2) predicted appropriateness, management

support, change efficacy, and personal valence based on the new values of the MAT knowledge test scores; and 3) determined how much each readiness for change construct changed per one unit of change in the MAT knowledge test scores (Laerd, 2017). Four simple linear regressions were conducted to adjust for any potential confounders on each dependent variable separately. As outlined in Holt et al. (2007), each dependent variable (as measured by the appropriateness, management support, change efficacy, and personal valence RFCQ subscales) was assessed through factor analysis to adequately measure each of the readiness for change constructs. Prior to running the regression analysis, data coding was examined with a case processing summary table, which was used to check for missing cases. The dependent variable was double checked for correct coding by inspecting the dependent variable encoding table; low counts among predictors were determined through a review of the categorical variable codings table (Laerd, 2017). To assess the fit of the model, the adjusted $R^2$ value was used to determine the amount of variation explained by the model. The *F*-statistic, degrees of freedom and statistical significance of the overall model, represented by the *p* value, are reported. A *p*-value <.05 is considered statistically significant. Standardized coefficients (Beta) were used to represent the change in each dependent variable caused by MAT knowledge test scores. A range of possible values standardized coefficients were determined by using the 95% confidence interval, and *p*-values of < .05 were used to assess for statistical significance for the standardized coefficients (Tabachnick & Fidell, 2013).

## 2.4 Results

### *2.4.1 Provider Descriptive Statistics*

There were 62 participants analyzed in the final dataset. The perceived extent in which each organization incorporated MAT services varied greatly (see Table 2.6). Table 2.7

summarizes the demographic characteristics of the respondents. Years of practice categories < 3 years and 3-5 years after completing residency were collapsed into ≤5 years due to the low numbers of providers in these categories. Due to the limited number of NPs coupled with the fact that NPs and PAs need to complete the same 24 hours of MAT training in order to receive a X-waiver (SAMHSA, 2021), PA, PA student, and NP providers were collapsed into an "other" category. Residents were combined with MD/DO for provider type. Four participants preferred not to provide their gender and one participant's gender was not listed; these values were treated as missing. As all other gender categories (e.g., transgender male) had no participants except male and female thus, gender was collapsed and treated as binary. Most primary care providers were MD/DOs (*n* = 46, 74.20%), still in residency (*n* = 23, 37.10%), had no pain management training (*n* = 34, 54.80%), had no addiction training (*n* = 34, 54.80%), had never prescribed MAT medications (*n* = 48, 77.40%), never worked with a provider who prescribed MAT medications (*n* = 38, 61.30%), received less than 8 hours of MAT training (*n* = 37, 59.70%), never been in a MAT training environment (*n* = 32, 51.60%), had no X-waiver (*n* = 41, 66.10%), and female (*n* = 31, 50.00%).

**Table 2.6**

*A Summary of the Extent of Organizations' Integration of MAT Services (N=62)*

| Extent | Frequency (*n*) | Percentage |
|---|---|---|
| MAT has not been discussed | 7 | 11.30 |
| It has been discussed but decided not to move forward | 7 | 11.30 |
| MAT is part of clinical practice | 5 | 8.10 |
| Unsure | 28 | 45.20 |
| Currently discussing | 13 | 21.00 |
| Currently piloting | 2 | 3.20 |

**Table 2.7**

*Primary Care Providers' Characteristics (N=62)*

| Provider Characteristics | Frequency (*n*) | Percentage |
|---|---|---|
| Provider Type | | |
| MD/DO | 46 | 74.20 |
| Other (PA/NP) | 16 | 25.80 |
| Years of Practice | | |
| In School | 10 | 16.10 |
| In Residency | 23 | 37.10 |
| 5 or less years | 8 | 12.90 |
| 6-10 years | 5 | 8.10 |
| >10 years | 16 | 25.80 |
| Previous training in pain management | | |
| Yes | 28 | 45.20 |
| No | 34 | 54.80 |
| Previous training in addiction | | |
| Yes | 28 | 45.20 |
| No | 34 | 54.80 |
| Previously/currently prescribes MAT medications | | |
| Yes | 14 | 22.60 |
| No | 48 | 77.40 |
| Works with a provider who prescribes MAT medications | | |
| Yes | 24 | 38.70 |
| No | 38 | 61.30 |
| Hours of MAT training | | |
| <8 hours | 37 | 59.70 |
| 8 hours | 15 | 24.20 |
| 24 hours | 10 | 16.10 |
| MAT training environment | | |
| In-person | 9 | 14.50 |
| Online | 15 | 24.20 |
| Hybrid | 6 | 9.70 |
| None | 32 | 51.60 |
| Obtained X-waiver | | |
| Yes | 20 | 32.30 |
| No | 41 | 66.10 |
| Missing | 1 | 1.60 |
| Gender | | |
| Female | 31 | 50.00 |
| Male | 26 | 41.90 |
| Missing | 5 | 8.10 |

### *2.4.2 Instrument Descriptive Statistics*

**MAT Knowledge Test.** The MAT knowledge test was a 10-item instrument used to measure a provider's current MAT knowledge (see Table 2.8). The average provider score was 57.26 out of 100.00 (*SD* = ± 20.97).

**Table 2.8**

*Readiness for Change Questionnaire and MAT Knowledge Test Descriptive Statistics (N=62)*

| | Appropriateness Subscale Score | Personal Valence Subscale Score | Change Efficacy Subscale Score | Management Support Subscale Score | MAT Knowledge Test Score |
|---|---|---|---|---|---|
| Mean | 4.76 | 5.07 | 4.54 | 3.84 | 57.26 |
| Std. Error of Mean | .14 | .17 | .13 | .14 | 2.66 |
| Median | 4.80 | 5.33 | 4.55 | 4.00 | 60.00 |
| Mode | 4.40 | 6.67 | 4.17 | 4.00 | 70.00 |
| Std. Deviation | 1.07 | 1.36 | 1.05 | 1.09 | 20.97 |
| Variance | 1.14 | 1.85 | 1.10 | 1.19 | 439.90 |
| Skewness | -.80 | -.60 | -.62 | -.34 | -.05 |
| Std. Error of Skewness | .30 | .30 | .30 | .30 | .30 |
| Kurtosis | .67 | -.14 | 1.22 | 1.17 | -.70 |
| Std. Error of Kurtosis | .60 | .60 | .60 | .60 | .60 |
| Minimum | 1.60 | 1.00 | 1.00 | 1.00 | 10.00 |
| Maximum | 6.50 | 7.00 | 6.67 | 6.60 | 100.00 |

**Readiness for Change Questionnaire.** Reliability analyses were performed to test internal consistency of the RFCQ and its subscales. Cronbach's alpha for the overall RFCQ, which measures organizational change at the individual level, was α = .91. The Appropriateness Subscale consisted of ten items from the RFCQ (α = .85) and had an average score of 4.76 (*SD* = ± 1.07). The Management Support Subscale originally consisted of six items from the RFCQ. The fourth item of the subscale, "I think we are spending a lot of time on this MAT integration

when the senior managers don't even want it implemented," was removed to increase reliability. The Cronbach's alpha improved from .75 to .84 with the five-item subscale that had an average score of 3.84 (*SD* = ± 1.09). The Change Efficacy Subscale consisted of six items from the RFCQ (α = .77) and had an average score of 4.54 (*SD* = ± 1.05). The Personal Valence Subscale consisted of three items from the RFCQ (α = .78) and had an average score of 5.07 (*SD* = ± 1.36). Although the Personal Valence and Change Efficacy alpha coefficient were lower than .8, the consistency measurement scores still demonstrate acceptable reliability (Holt et al., 2007). All Likert scale response options were used for the RFCQ survey except for in items 10 and 24. For a summary of individual item response frequencies see Table 2.9.

**Table 2.9**

*Frequencies and Percentages of Responses to Readiness for Change Questionnaire Items (N=62)*

| Item | Frequency (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
| **Appropriateness Subscale** (α = .85) | | | | | | | |
| 1. In the long run, I feel it will be worthwhile for me if MAT is integrated into primary care. | 4 (6.50) | 4 (6.50) | 5 (8.10) | 5 (8.10) | 7 (11.30) | 21 (33.90) | 16 (25.80) |
| 2. It doesn't make much sense for us to initiate the integration of MAT into primary care. | 16 (25.80) | 14 (22.60) | 12 (19.40) | 6 (9.70) | 7 (11.30) | 4 (6.50) | 3 (4.80) |
| 3. I think that the primary care will benefit from integration of MAT. | 2 (3.20) | 5 (8.10) | 3 (4.80) | 7 (11.30) | 13 (21.00) | 18 (29.00) | 14 (22.60) |
| **4. Integrating MAT into primary care makes my job easier. | 3 (4.80) | 7 (11.30) | 13 (21.00) | 17 (27.40) | 10 (16.10) | 10 (16.10) | 1 (1.60) |
| 5. When MAT integration into primary care is implemented, I don't believe there is anything for me to gain. | 7 (11.30) | 21 (33.90) | 7 (11.30) | 8 (12.90) | 7 (11.30) | 9 (14.50) | 3 (4.80) |
| 6. Integrating MAT into primary care will improve our clinic's/department's overall efficiency. | 4 (6.50) | 8 (12.90) | 8 (12.90) | 12 (19.40) | 12 (19.40) | 15 (24.20) | 3 (4.80) |
| 7. This MAT integration matches the priorities of our clinic/department. | 2 (3.20) | 4 (6.50) | 5 (8.10) | 21 (33.90) | 15 (24.20) | 11 (17.70) | 4 (6.50) |
| 8. The time we are spending on this integration should be spent on something else. | 4 (6.50) | 17 (27.40) | 11 (17.70) | 12 (19.40) | 10 (16.10) | 5 (8.10) | 3 (4.80) |
| 9. There are legitimate reasons for us to make this change to MAT integration. | 3 (4.80) | 1 (1.60) | 2 (3.20) | 10 (16.10) | 13 (21.00) | 23 (37.10) | 10 (16.10) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10. There are a number of rational reasons for the adoption of MAT into primary care. | 2 (1.60) | 0 (0.00) | 1 (1.60) | 12 (19.40) | 19 (30.60) | 19 (30.60) | 9 (14.50) |
| **Management Support Subscale** (α = .84) | | | | | | | |
| 11. Management has sent a clear signal that my clinic/department is going to change. | 6 (9.70) | 10 (16.10) | 5 (8.10) | 26 (41.90) | 7 (11.30) | 6 (9.70) | 2 (3.20) |
| 12. This clinic's/department's most senior leader is committed to the integration of MAT into primary care. | 5 (8.10) | 4 (6.50) | 2 (3.20) | 30 (48.40) | 10 (16.10) | 7 (11.30) | 4 (6.50) |
| 13. Our clinic's/department's top decision makers have put all their support behind this MAT integration. | 4 (6.50) | 3 (4.80) | 5 (8.10) | 35 (56.50) | 8 (12.90) | 6 (9.70) | 1 (1.60) |
| *14. I think we are spending a lot of time on this MAT integration when the senior managers don't even want it implemented. | 3 (4.80) | 8 (12.90) | 6 (9.70) | 32 (51.60) | 7 (11.30) | 5 (8.10) | 1 (1.60) |
| 15. Every senior manager has stressed the importance of implementing MAT integration into primary care. | 8 (12.90) | 7 (11.30) | 7 (11.30) | 29 (46.80) | 7 (11.30) | 2 (3.20) | 2 (3.20) |
| 16. Our senior leaders have encouraged all of us to embrace this change to implementing MAT into primary care. | 5 (8.10) | 7 (11.30) | 3 (4.80) | 36 (58.10) | 7 (11.30) | 3 (4.80) | 1 (1.60) |
| **Change Efficacy Subscale** (α = .77) | | | | | | | |
| 17. My past experiences make me confident that I will be able to perform successfully after MAT is integrated into primary care. | 4 (6.50) | 5 (8.10) | 3 (4.80) | 12 (19.40) | 16 (25.80) | 18 (29.00) | 4 (6.50) |
| 18. There are some tasks that will be required when we implement the integration of MAT into primary care that I don't think I can do well. | 2 (3.20) | 18 (29.00) | 8 (12.90) | 13 (21.00) | 12 (19.40) | 4 (6.50) | 5 (8.10) |
| **19. I do not anticipate any problems adjusting to the work I will have when MAT is integrated into primary care. | 2 (3.20) | 14 (22.60) | 19 (30.60) | 4 (6.50) | 8 (12.90) | 12 (19.40) | 2 (3.20) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 20. When I set my mind to it, I can learn everything that will be required when this integration of MAT into primary care is adopted. | 3 (4.80) | 2 (3.20) | 2 (3.20) | 6 (9.70) | 13 (21.00) | 28 (45.20) | 8 (12.90) |
| **21. I have the skills that are needed to make this MAT integration work. | 1 (1.60) | 3 (4.80) | 5 (8.10) | 11 (17.70) | 15 (24.20) | 19 (30.60) | 7 (11.30) |
| **22. When we implement this MAT integration, I feel I can handle it with ease. | 2 (3.20) | 5 (8.10) | 10 (16.10) | 13 (21.00) | 15 (24.20) | 14 (22.60) | 2 (3.20) |
| **Personal Valence Subscale** (α = .78) | | | | | | | |
| 23. My future in this job will be limited because of the integration of MAT into primary care. | 13 (21.00) | 18 (29.00) | 9 (14.50) | 10 (16.10) | 5 (8.10) | 5 (8.10) | 2 (3.20) |
| 24. I am worried I will lose some of my status in the clinic/department when MAT is integrated into primary care. | 14 (22.60) | 17 (27.40) | 9 (14.50) | 14 (22.60) | 5 (8.10) | 0 (0.00) | 3 (4.80) |
| 25. Implementing MAT integration into primary care will disrupt many of the personal relationships I have developed. | 9 (14.50) | 22 (35.50) | 11 (17.70) | 11 (17.70) | 4 (6.50) | 1 (1.60) | 4 (6.50) |

*Note.* Item marked with an * was not included in subsequent analyses. Items marked with ** had missing data.

### *2.4.3 Specific Aim One*

The first aim of the study was to identify the extent to which an individual's years of practice, previous training in pain management, previous training in addiction, if previously or currently prescribing MAT medications, the number hours of MAT training, MAT training environment, and working with a provider who prescribes MAT medications can predict an individual's current level of MAT knowledge.

A hierarchical multiple linear regression was conducted to understand the effect of provider characteristics on current MAT knowledge, after adjusting for gender. Gender was treated as a covariate and not a predictor. To assess linearity, a scatterplot of observed MAT Knowledge test scores against predicted MAT Knowledge test scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and was found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.40. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field, 2013). Cases were individually inspected for standard deviations greater than ±3, no outliers were observed (Tabachnick & Fidell, 2013).

Hypotheses 1.1 through 1.9 explored the impact of a provider's demographics on provides MAT knowledge. The initial statistical regression model included all provider demographic variables excluding covariates. Working with a provider who prescribes MAT medications, previous training in pain management, and online MAT training environment were statistically significant. Then control variables, provider's gender and provider type, were entered at the first step of the hierarchical regression model. Provider type was not statistically

significant and was dropped from the model. The remaining predictor variables were stepped into the equation in the following empirical order: whether they work with a provider who prescribes MAT medications, previous training in pain management, and online MAT training environment.

Post hoc analysis with a Bonferroni adjustment revealed the full model of working with a provider who prescribes MAT medications and previous training in pain management, after adjusting for gender to predict MAT Knowledge test scores (Model 3) was statistically significant, $R^2 = .40$, $F(2, 54) = 11.91$, $p = .000$. The addition of working with a provider who prescribes MAT medication to the prediction of MAT Knowledge test scores (Model 2) led to a statistically significant increase in $R^2$ of .24, $F(1, 55) = 20.12$, $p = .000$. The addition of previous training in pain management to the prediction of MAT Knowledge test scores (Model 3) also led to a statistically significant change in $R^2$ of .05, $F(1, 53) = 4.52$, $p = .038$. The addition of online MAT training environment to model 3 produced a statistically significant result, $p = .000$. However, the change in $F$ was not statistically significant, $p = .06$ and online MAT training environment was dropped from the final model. See Table 2.10 for full details on each regression model. This pattern of results suggests that almost a quarter of the variability in MAT Knowledge test scores is predicted by working with a provider who prescribes MAT medications. Previous training in pain management contributes modestly to that prediction; online MAT training environment adds no further prediction.

**Table 2.10**

*Hierarchical Multiple Regression Relationships Between MAT Knowledge Test Scores and Provider Demographics (N=57)*

| Variables | *b* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | *p* |
|---|---|---|---|---|---|---|---|
| Step 1 | | | | | | | |
| Constant | 50.32 | 3.70 | | 13.60 | | | .000 |
| Gender | 14.29 | 5.48 | .33 | 2.61 | .33 | .33 | .012 |
| Step 2 | | | | | | | |
| Constant | 58.65 | 3.69 | | 15.90 | | | .000 |
| Gender | 15.07 | 4.72 | .35 | 3.19 | .35 | .33 | .002 |
| Work with a provider who prescribes MAT medications | -21.51 | 4.79 | -.49 | -4.49 | -.49 | -.50 | .000 |
| Step 3 | | | | | | | |
| Constant | 62.38 | 3.98 | | 15.67 | | | .000 |
| Gender | 14.73 | 4.58 | .34 | 3.22 | .34 | .33 | .002 |
| Work with a provider who prescribes MAT medications | -18.45 | 4.86 | -.42 | -3.80 | -.40 | -.50 | .000 |
| Previous training in pain management | -10.16 | 4.78 | -.24 | -2.13 | -.23 | -.37 | .038 |

*Note.* $R^2$ = .11 for Step 1($p$ =.012); $\Delta R^2$ = .242 for Step 2 ($p$ = .000); $\Delta R^2$ = .051 for Step 3 ($p$ = .038)

Table 2.11 provides a summary of specific aim one's study findings related to hypotheses 1.1 through 1.9. After analysis, $H_{1.1}$ and $H_{1.9}$ were accepted, all other hypotheses were rejected.

**Table 2.11**

*Summary of Findings: Paper 1, Aim 1*

| Hypothesis | Conclusion |
|---|---|
| $H_{1.1}$ MAT knowledge test scores among primary care providers are not related to years of practice. | Accepted |
| $H_{1.2}$ Higher MAT knowledge test scores among primary care providers are related to having training in pain management. | Rejected |
| $H_{1.3}$ Higher MAT knowledge test scores among primary care providers are related to having training in addiction. | Rejected |
| $H_{1.4}$ Higher MAT knowledge test scores among primary care providers are related to having current or previous experience prescribing MAT medications. | Rejected |
| $H_{1.5}$ Higher MAT knowledge test scores among primary care providers are related to higher number of MAT training hours. | Rejected |
| $H_{1.6}$ Higher MAT knowledge test scores among primary care providers are related to having a X-waiver. | Rejected |
| $H_{1.7}$ Higher MAT knowledge test scores among primary care providers are related to in-person and hybrid MAT training environments. | Rejected |
| $H_{1.8}$ Higher MAT knowledge test scores among primary care providers are related to working with a provider who prescribes MAT medications. | Rejected |
| $H_{1.9}$ There is one best combination of predictors that predicts MAT knowledge test scores. | Accepted for having training in pain management and working with a provider who prescribes MAT medications. |

### *2.4.4 Specific Aim Two*

The second aim of the study was to identify the extent to which the current level of providers' MAT knowledge can predict the perceived level of appropriateness, management support, change efficacy, and personal valence towards integrating MAT in primary care by providers, after adjusting for whether they work with a provider who prescribes MAT medications, gender, and previous training in pain management. For all subsequent analyses, working with a provider who prescribes MAT medications, gender, and previous training in pain management were treated as covariates and not predictors.

$H_{2.1.}$ Perceived levels of appropriateness subscale scores among primary care providers are not related to MAT knowledge test scores.

A simple linear regression was run to understand the effect of current MAT knowledge, assessed by a MAT Knowledge Test score, on perceived level of appropriateness. To assess linearity, a scatterplot of perceived level of appropriateness against current level of MAT knowledge with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations were confirmed using the Durbin-Watson test which showed a statistic of 1.71. One provider was an outlier with a perceived Appropriateness Subscale score of 1.60. Due to limited sample size the provider was not removed from the analysis.

Table 2.12 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. After adjusting for whether participants work with a provider who

prescribes MAT medications, gender, and previous training in pain management, current level of providers MAT knowledge was statistically significantly and predicted perceived level of appropriateness, $F(1, 55) = 2.94$, $p = .029$, $R^2 = .18$.

**Table 2.12**

*Simple Linear Regression of MAT Knowledge Test Scores on Perceived Level of Appropriateness (N=57)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.18^{*}$ | $.11^{*}$ |
| Constant | $3.87^{***}$ | .48 | | 8.09 | | | | |
| Work with a provider who prescribes MAT medications | .07 | .28 | .04 | .26 | .03 | -.18 | | |
| Gender | .00 | .25 | .00 | .02 | .00 | .15 | | |
| Previous training in pain management | -.06 | .25 | -.04 | -.25 | -.03 | -.18 | | |
| MAT Knowledge Test score | $.02^{*}$ | .01 | .43 | 2.67 | .33 | .43 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

The MAT Knowledge Test score contributed 0.11 in shared variability. Altogether, 18.00% of the variation in perceived level of appropriateness was predicted by knowing the MAT Knowledge Test scores and provider demographics for the three covariates. As indicated by the squared semipartial correlations, MAT Knowledge Test scores are much more important than the covariates. A post hoc analysis with a Bonferroni adjustment revealed there was statistically significant difference between MAT Knowledge Test scores and perceived level of appropriateness. Therefore, we can reject the null hypothesis and accept the alternative hypothesis. As such, the positive standardized regression coefficient ($\beta = .43$) of the MAT

Knowledge Test scores variable indicates that higher MAT Knowledge Test scores had an increase in perceived level of appropriateness and leads to the rejection of hypothesis 2.1.

$H_{2.2.}$ Perceived levels of management support subscale scores among primary care providers are not related to MAT knowledge test scores.

A simple linear regression was run to understand the effect of current MAT knowledge, assessed by MAT Knowledge Test score, on perceived level of management support. To assess linearity a scatterplot of perceived level of management support against current level of MAT knowledge with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations were confirmed using the Durbin-Watson test which showed a statistic of 1.84. Cases were individually inspected for standard deviations greater than ±3, no outliers were observed (Tabachnick & Fidell, 2013).

Table 2.13 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. The regression was significantly different than zero, $F(1, 55) = 3.32$, $p = .017$, $R^2 = .20$.

**Table 2.13**

*Simple Linear Regression of MAT Knowledge Test Scores on Perceived Level of Management Support (N=57)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.20^{*}$ | .01 |
| Constant | $4.12^{***}$ | .51 | | 8.11 | | | | |
| work with a provider who prescribes MAT medications | $.84^{**}$ | .30 | .42 | 2.84 | .35 | .40 | | |
| Gender | -.90 | .27 | -.09 | -.69 | -.09 | -.10 | | |
| previous training in pain management | -.39 | .27 | -.19 | -1.44 | -.18 | -.04 | | |
| MAT Knowledge Test score | .00 | .01 | -.09 | -.55 | -.07 | -.25 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

The MAT Knowledge Test scores only contributed .01 in shared variability. Provider demographics comprised of the three covariates explained approximately 19.00% of the variation in perceived level of management support. As indicated by the squared semipartial correlations, MAT Knowledge Test scores was less important than the covariates. Also, the change in $F$=.30, $p$ =.587 was not statistically significant with the addition of MAT Knowledge Test score. A post hoc analysis with a Bonferroni adjustment revealed there was statistically significant difference between MAT Knowledge Test scores and perceived level of management support. Therefore, we can reject the null hypothesis and accept the alternative hypothesis. As a result, the standardized regression coefficient ($\beta$ = .00) of the MAT Knowledge Test scores variable did not have a statistically significant impact on perceived level of management support and supports hypothesis 2.2.

$H_{2.3.}$ Higher perceived levels of change efficacy subscale scores among primary care providers are related to higher MAT knowledge test scores.

A simple linear regression was run to understand the effect of current MAT knowledge, assessed by a MAT Knowledge Test score, on perceived level of change efficacy. To assess linearity, a scatterplot of perceived level of change efficacy against current level of MAT knowledge with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was confirmed using the Durbin-Watson test which showed a statistic of 1.55. One provider was an outlier with a perceived Change Efficacy Subscale score of 1.00. Due to limited sample size the provider was not removed from the analysis.

After adjusting for whether working with a provider who prescribes MAT medications, gender, and previous training in pain management, current level of providers' MAT knowledge was not significantly different than zero, $F(1, 55) = 1.03$, $p = .40$, $R^2 = .07$. MAT Knowledge Test scores variable did not have a statistically significant impact on perceived level of change efficacy and rejected hypothesis 2.3.

$H_{2.4.}$ Higher perceived levels of personal valence subscale scores among primary care providers are related to higher MAT knowledge test scores.

A simple linear regression was run to understand the effect of current MAT knowledge, assessed by MAT Knowledge Test score, on perceived level of personal valence. To assess linearity, a scatterplot of perceived level of personal valence against current level of MAT knowledge with a regression line was plotted. A visual inspection of the plots indicated a linear

relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations were confirmed using the Durbin-Watson test which showed a statistic of 2.67. Cases were individually inspected for standard deviations greater than ±3, no outliers were observed (Tabachnick & Fidell, 2013).

Table 2.14 displays the correlations between the variables, the unstandardized regression coefficients (*B*) and intercept, the standardized regression coefficients (β), the semipartial correlations ($sr_i^2$), and $R^2$. After adjusting for whether they work with a provider who prescribes MAT medications, gender, and previous training in pain management, current level of providers MAT knowledge was statistically significantly predicted perceived level of personal valence, $F(1, 55) = 9.85$, $p = .000$, $R^2 = .43$.

**Table 2.14**

*Simple Linear Regression of MAT Knowledge Test Scores on Perceived Level of Personal Valence (N=57)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.43^{***}$ | $.16^{***}$ |
| Constant | $3.76^{***}$ | .56 | | 6.74 | | | | |
| Work with a provider who prescribes MAT medications | $-.74^{*}$ | .32 | -.28 | -2.27 | -.24 | -.52 | | |
| Gender | -.34 | .30 | -.13 | -1.15 | -.12 | .25 | | |
| Previous training in pain management | .15 | .30 | .06 | .50 | .05 | .74 | | |
| MAT Knowledge Test score | $.03^{***}$ | .01 | .52 | 3.82 | .40 | .05 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

The MAT Knowledge Test score contributed .16 in shared variability. Altogether, 43.00% of the variation in perceived level of personal valence was predicted by knowing the MAT Knowledge Test scores and provider demographics for the three covariates. As indicated by the squared semipartial correlations, MAT Knowledge Test scores are much more important than the covariates. A post hoc analysis with a Bonferroni adjustment revealed there was statistically significant difference MAT Knowledge Test scores and perceived level of personal valence. Therefore, we can reject the null hypothesis and accept the alternative hypothesis. As such, the positive standardized regression coefficient ($\beta = .03$) of the MAT Knowledge Test scores variable indicates that higher MAT Knowledge Test scores had an increase in perceived level of personal valence and supports hypothesis 2.4.

## 2.5 Discussion

Overall, findings from this study helped us understand what might influence MAT knowledge for primary care providers, and how knowledge may influence their readiness to integrate MAT services in their practices.

Results from aim one indicated a relationship between primary care providers' level of MAT knowledge and certain provider characteristics. As we found, both working with a provider who prescribes MAT medications and having previous training in pain management were negative predictors of MAT knowledge, meaning the results identified two characteristics that would impact a primary care provider's level of MAT knowledge negatively. No other statistically significant relationships were found among this group of provider characteristic predictors.

For this study, we assessed the relationship between current knowledge levels based on the provider's education or work experience (Hiatt, 2006) and provider's required knowledge

assessed by the MAT Knowledge Test. We hypothesized that higher MAT knowledge test scores among primary care providers were related to having training in pain management and working with a provider who prescribes MAT medications. Our findings were contrary to the hypothesized association; working with a provider who prescribes MAT medications and having previous training in pain management training yielded lower MAT Knowledge Test scores. These results seemed to contradict the claims of Kirane et al., (2019) that providers trained in pain management were more confident in treating individuals with OUD and were more comfortable with management of an opioid taper than those who had not been trained. However, perceived confidence may not equate to knowledge. With only approximately 11% of the providers in this study at an institution that had implemented MAT services at some capacity, it is possible that without the opportunity to practice these skills regularly knowledge is lost. Hiatt (2006) posited retention of knowledge was decreased if implementation of the change was not immediate. The lack of ability for the providers to provide MAT services into clinical practice may have suggested to them that change was not imminent. Thus, despite having training, without consistent ability to practice their skills, MAT knowledge may have been lost. Our results suggest that those without training in pain management and who did not work with a provider who prescribes MAT medications would have higher MAT knowledge. However, based on the findings from Gordan et al. (2022) and Lanham et al. (2022), a more plausible explanation is that more than just training is needed to develop knowledgeable and confident providers who can treat individuals with OUD. Ongoing support and mentorship from knowledgeable clinical providers and staff is needed after training (Gordan et al., 2022; Lanham et al., 2022).

The second aim of the study was to describe the relationship between knowledge and primary care providers' readiness to integrate MAT services in their practice using the ADKAR

model. The study examined four areas of organizational readiness for integrating MAT into primary care: the perceived level of appropriateness, perceived level of personal valence, perceived level of confidence in knowledge and skills (change efficacy), and the perceived level of support from senior leadership (Holt et al., 2007). Our research demonstrated that MAT Knowledge test scores had a statistically significant impact on providers' perceived levels of appropriateness and personal valence. There was no relationship found between MAT Knowledge test scores and management support or change efficacy.

The research provides additional insight into the relationship between knowledge and appropriateness. Our results contradict the findings that MAT use in primary care was viewed as appropriate, regardless of training in MAT (Pytell et al., 2019). However, the sample in the Pytell, Buresh, and Gaddy (2019) was primarily internal medicine physicians whereas the sample in the current study was mainly family medicine providers, which might account for differences in findings. These results build upon existing research of Finell et al. (2017) that increased education and awareness increased confidence for treating patients with OUD. Increased confidence may be viewed as a beneficial change for the provider; thus, increasing their personal valence with increased knowledge. Furthermore, our results align with Kirane and colleagues' research that willingness to treat patients with OUD is not impacted by differing training levels provided there is support (Kirane et al., 2019). Our results yielded a provider's level of confidence in their training and their skills to implement MAT services was not impacted by their various levels of MAT knowledge.

Kirane and colleagues (2019) indicated support is a key part in providers' change efficacy. However, the construct of management support was the only area assessed by the Readiness for Change Questionnaire that had a mean score below the midpoint of the scale,

which indicated management support was a barrier to sustainable change and represented the reinforcement construct of the ADKAR model (Hiatt, 2006). It is possible that with low levels of perceived support, a provider's sense of self-efficacy to provide adequate OUD treatment may have been impacted. Others have found similar relationships, such as those by Haffajee (2018), that a provider's willingness to prescribe MAT medications was decreased by a lack of support by an institution and/or peers.

Although it was not the intended purpose of this study to explore the impact of the covariates (gender, provider who prescribes MAT medications, and having previous training in pain management training) on MAT Knowledge, it would be remiss to not discuss the potential impact they had on the study results. The covariates explained the vast majority of the shared variance in perceived level of personal valence. Although MAT Knowledge test scores were not shown to have a statistically significant impact on management support, this may be due to the covariates explaining nearly all the variance. It is possible, with a larger sample, this finding may have been different. Since the covariate working with a provider who prescribes MAT medications was the only covariate with a statistically significant standardized regression coefficient as it relates to personal valence and management support, it should be examined more closely.

### *2.5.1 Limitations*

There were several limitations to this study. The statistical choices of this study were constrained by the non-experimental, correlational design. Although this particular study design was used to make inferences and associations, it provided limited insight to causation (Polit & Beck, 2017). In addition, correlational designs have a level of inherent difficulty in deciphering relationships between variables that represent complex interactions between behaviors, attitudes,

and characteristics in the real world (Polit & Beck, 2017). We advise caution with regard to external validity of this study. The generalizability of the results was further limited as the study reflects the perceptions of primary care providers in a specific area and time. The study was limited to only primary care providers in the Hampton Roads area in Virginia. Since the research was conducted, the United States Congress passed the Consolidated Appropriations Act of 2023 which removed the requirement of a X-waiver for all providers (SAMSHA, 2023). As policy and practices of MAT treatment shifts across the United States, the generalizability of this study may be diminished. A nonprobability convenience sample was used. Nonprobability sampling is less likely to produce a representative sample (Hulley et al., 2013). As the data were self-reported, individual biases may have effected results. For instance, the study may have had extreme responses, where some participants may have been "yea-sayers" and agreed with survey items regardless of its content (or vice versa; Pilot & Beck; 2017), also bringing into question the validity of the conclusions gleaned from this study. The reliability of these data may have been further impacted by the small sample size. It is possible that with a larger sample of providers, the results may have been different.

### *2.5.2 Future Research and Recommendations*

As previously mentioned, our study had limitations, such as the fact that our research was only conducted in a select area of Virginia. However, in order to obtain a better understanding of how primary care providers' MAT knowledge impacts their readiness integrate MAT services in clinical practice and generalizability, it would be imperative to implement the same study across the United States. Future studies should consider expanding the survey participants to increase sample size.

Furthermore, this study used the ADKAR model as a framework to identify barriers and areas that may pose a threat to change readiness. Our results found the construct knowledge is impacted by an individual's training and that knowledge has a positive impact on one's perceived level of appropriateness and personal valence. According to Haitt (2006), knowledge can be developed through the use of effective training, which uses hands-on training and demonstrations. Lectures and assigned readings are used sparingly (Haitt, 2006). It was beyond the scope of the study to determine how providers received their pain management training. Furthermore, after training, the majority of people needed continued mentorship and support (Gordan et al., 2022; Haitt, 2006; Lanham et al., 2022). Our study did not consider if a provider working with another provider who prescribes MAT medications was receiving mentorship. Further research is needed to establish an intervention with effective training and a mentorship program to determine the impact this will have on MAT knowledge.

Lastly, our research identified management support as a barrier to readiness to integrate MAT services in clinical practice. Management support represented the ADKAR construct of reinforcement. Reinforcement is key to make change sustainable in an organization (Hiatt, 2006; Prosci Inc., n.d.a). In order to increase the construct of reinforcement, it is recommended that supervisors recognize employees, celebrate when key milestones have been achieved, provide incentives, obtain feedback from employees, develop a performance management system to track adoption rates, and main long-term change (Hiatt, 2006).

### *2.5.3 Conclusion*

This study provides evidence that primary care providers with more MAT knowledge have higher levels of perceived appropriateness and personal valence. Furthermore, providers' MAT knowledge may be impacted negatively by their experiences with pain management

training and working with providers who prescribes MAT medications. These findings help further assess an organization's readiness to integrate MAT services in their practice. Study findings also demonstrated how the ADKAR model may be used as a framework to identify barriers for providers in various stages of organizational change for integrating MAT services in clinical practice.

# 3. Research Paper 2: MAT Training is it Enough to Inspire Organizational Change in Primary Care?

## 3.1 Introduction

Since 2017, mortality due to opioids overdose has outpaced motor vehicle accidents as a leading cause of preventable deaths, accounting for nearly 17% of all deaths (National Institute on Drug Abuse, 2017; National Safety Council, 2018). In addition to increased mortality risk, individuals with opioid use disorder (OUD) are at increased risk for adverse health events. For example, individuals who use injectable drugs (e.g., heroin) have a higher risk of contracting viruses like hepatitis C (Center for Disease Control, 2024; Gonzalez & Trotter, 2018). It is estimated that 70% of those who inject drugs in the United States are positive with antibodies for hepatitis C (Nelson et al., 2011; Rotterman et al., 2013). High risk behavior like injecting leads to increased risks of infection, cirrhosis, carcinoma, and liver failure; these morbidities are often compounded by additional substance use such as alcohol (Dore et al., 2002; Gonzalez & Trotter, 2018; Herdener et al., 2017; National Cancer Institute, 2023). As a result, many individuals with opioid dependency experience higher rates of health disparities, infectious disease, suicide, and overdose deaths (Degenhardt et al., 2010; Herdener et al., 2017). The medical care needed to treat multiple conditions is not only a public health concern, but an economic one as well. There are additional societal outcomes associated with OUD to consider: 1) work loss resulting from incarceration, hospitalization, unemployment, and premature death; 2) criminal justice expenditures from legal and adjudication processes, property loss due to crimes, correctional facilities, and law enforcement; and 3) health care use for substance abuse treatment, prevention, and excess medical and prescription costs (Birnbaum et al., 2011; Florence et al., 2016; Hansen et al., 2011). The economic cost of the opioid crisis in 2018 was estimated at $696 billion or

3.4% of GDP. This estimate includes treatment for OUD, increased health care costs, crime related costs, loss of work productivity, and lost lives (Council of Economic Advisors, 2019). The economic burden from opioids has continued to rise with cost surmounting almost $1.5 trillion in 2020 (Joint Economic Committee, 2022).

According to the American Society of Addiction Medicine, addiction is a chronic disease, and like any other chronic disease it can be treated (ASAM, 2020). Medications for OUD combined with behavioral therapy is a well-established standard of care for treating patients with OUD; the treatment combination is known as medication-assisted treatment (MAT; SAMHSA, 2019c; Tsui et al., 2014). Prescribing medication specifically for OUD has been associated with a decrease in opioid use (Fiellin et al., 2014; Fudala et al., 2003; Krawczyk et al., 2020). Research shows that prescribing MAT medications like buprenorphine to patients in the emergency room leads to increased engagement in addiction treatment (Carroll et al., 2023), a decrease in weekly opioid use, and reduces emergency department utilization (Busch et al., 2017; D'Onofrio et al., 2015; D'Onofrio et al., 2017). Office-based treatment programs that use buprenorphine have been shown to be successful in treating OUD and more effective than medically supervised withdrawals or short-term tapering (Fiellin et al., 2014). Buprenorphine utilization in a primary care setting is also associated with long-term patient retention in treatment (Fiellin et al., 2008; Gibson et al., 2003; Weinstein, 2017).

Despite MAT being a more effective treatment option than behavioral treatment alone, the use of MAT for OUD remains low (Gordon et al., 2022; Nielsen, 2016; Nyaku et al., 2024). Currently, 48 states, including Virginia, lack the systemic capacity to provide sufficient MAT to individuals with OUD (Jones et al., 2015). Almost half of the counties in the United States do not have a physician with a Drug Enforcement Administration (DEA) Drug Addiction Treatment Act

(DATA) waiver, also known as an X-waiver, that allows them to prescribe buprenorphine, and only 10% of all primary care providers in the U.S. have obtained a X-waiver (McGinty et al., 2020). The DATA of 2000 allows physicians to obtain a X-waiver to prescribe buprenorphine initially to 30 patients by undergoing an 8-hour training and registering with the DEA (DEA, n.d.). In 2016, the Comprehensive Addiction and Recovery Act (CARA) allowed physician assistants and nurse practitioners to obtain buprenorphine X-waivers (CADCA, n.d.). In addition to the 8-hour DATA requirement, physician assistants and nurse practitioners must complete an additional 16 hours of training (ASAM, n.d.). To increase access to buprenorphine treatment, effective April 28, 2021, providers treating 30 patients or less no longer must complete training for an X-waiver (Practice Guidelines for the Administration of Buprenorphine for Treating Opioid Use Disorder, 2021).

Although increasing the ability for primary care practitioners to prescribe MAT could increase the capacity for patients to receive MAT, physicians' rates of MAT adoption and utilization have not matched the demand generated by the opioid crisis (Blum et al., 2016). Providers' willingness to prescribe MAT drugs like buprenorphine has been shown to increase when there are other providers prescribing in the organization (Hutchison et al., 2014). However, the largest barrier facing local communities is the availability of organizations that can and will provide MAT services. Primary care physicians in family and internal medicine are the largest prescribers of buprenorphine in an outpatient setting for Medicare, but only 2.7% and 2% of those providers are prescribing, respectively (Abraham et al., 2020). Some physicians perceive patients with addictions as "difficult," meaning they may be demanding, manipulative, display criminal behavior, or have co-morbidities in mental health (Andraka-Christou & Capone, 2018;

Haffajee et al., 2018). Negative perceptions by healthcare providers can lead to suboptimal care and a reluctance to treat patients with OUD (van Boekel, 2013).

Physicians have reported limited education, provider stigma, and a lack of institutional support as being barriers to implementing MAT into their practice (Andraka-Christou & Capone, 2018; Haffajee et al., 2018). Due to the insufficient training in this field, there is limited institutional and peer support to encourage the use of MAT (Haffajee et al., 2018). This suggests that the current X-waiver process being provided is just not enough. The purpose of this study was to examine the effects of X-waiver training and its environment on primary care providers' perceived level of stigma and readiness towards integrating MAT services in a primary care setting.

### 3.2 Theoretical Framework

ADKAR is a goal-oriented change management model that explains five stages in which an individual or group experiences change: awareness, desire, knowledge, ability, and reinforcement (Taylor, 2010). This change management model is used to guide activities throughout the change process and to ensure the individual (people-focused) aspect in the change initiative is not left out (Hiatt, 2006). The supporting or refuting attitudes of individuals towards an organizational change initiative should not be overlooked, as these attitudes are a first glimpse into how successful the adoption of the initiative will be (Dunham et al., 1989). ADKAR provides clear and concise language for all levels of employees. This allows for both staff members and administration/executives to be able to understand and implement the change strategies into their everyday routine (Wong et al., 2019). Secondly, ADKAR can be applied in large and diverse organizations. This is beneficial as organizational culture differs greatly and impacts management styles and processes used in an organization (Obonyo & Kerongo, 2015).

Since this study analyzed data from participants from multiple departments that had employees and students with various levels of roles and responsibilities within the organization, the ADKAR model was selected for its adaptability.

The first stage of the ADKAR model is awareness. Awareness is the understanding of why the change is needed and the risks associated with not changing (Hiatt, 2006). During this stage of the change process, communication about both internal and external drivers of change are explored, as well as key messages such as: the magnitude of change, who is impacted, and the change timeline (Hiatt, 2006). Once an individual is aware, they must next desire to participate in the change (Prosci Inc., n.d.a). Desire relates to the individual's willingness to participate and support the change. Desire is a "personal choice influenced by the nature of the change, by an individual's personal situation, as well as intrinsic motivators that are unique to each person" (Hiatt, 2006, p. 2). Providers' own personal beliefs and perceptions of stigma about the patient population have hindered the provisions of MAT medications (Haffajee et al., 2018). This study assessed the constructs of awareness and desire by: 1) evaluating the level in which primary care providers feel that integration of MAT services into primary care is legitimate and beneficial for the organization (appropriateness), 2) assessing stigma at two levels: a) primary care providers' awareness of stigma (stereotype awareness) toward patients with OUD; and b) primary care providers' individual level of stigma (stereotype agreement) toward patients with OUD; and 3) determining the level of perceived personal benefit from the adoption of MAT practices (personal valence; Holt et al., 2007).

The knowledge phase ensures that all parties understand how the change will be implemented and what their part is in the process. Knowledge includes: 1) training and education on skills and behaviors; 2) information needed to use new tools, processes, and systems; and 3)

understanding of any new scope and responsibilities related to the change (Hiatt, 2006). The fourth construct is ability, as knowledge on its own is often not enough to create successful change (Hiatt, 2006). Ability refers to a demonstration that the individual or group can implement the new skills and behaviors they acquired in the knowledge phase (Hiatt, 2006). This study evaluated the constructs of knowledge and ability by examining primary care providers' level of confidence in their training and their skills to implement MAT services (change efficacy). Providers' level of knowledge was determined by the number of training hours in MAT services (hours of MAT training) and where the individual provider received MAT training (MAT training environment).

Lastly, reinforcement refers to factors that sustain change. These factors may include rewards, recognition, compensation, and personal satisfaction (Hiatt, 2006). With so few primary care providers currently prescribing MAT medications, there is a lack of peer and leadership support that can provide MAT-related mentoring. A lack of support by an institution and/or peers decreases a provider's willingness to prescribe MAT medications (Haffajee et al., 2018). This lack of support may diminish a provider's sense of self-efficacy to provide adequate substance use disorder (SUD) and OUD treatment. Thus, this study identified the perceived level of support primary care providers feel that they have from management towards the integration of MAT services in primary care (management support) (Figure 3.1). Table 3.1 provides a summary of literature, research questions, and hypotheses for this study.

**Figure 3.1**

*Integration Stigma, MAT Training, and Readiness Components into the ADKAR Model*

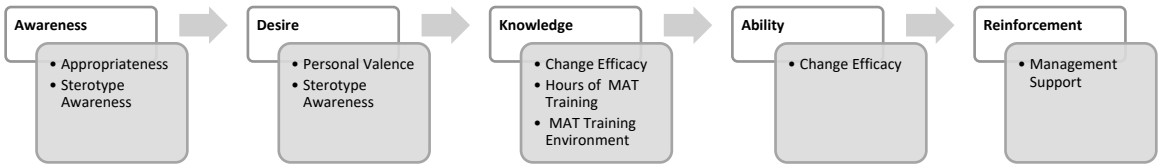



**Table 3.1**

*Literature, Research Questions, and Hypotheses*

| Literature | Research Questions | Hypotheses |
|---|---|---|
| Lack of training in MAT in early years of training/ practice can hinder providers from being able to see their scope of practice expanding to treating OUD (Andraka-Christou & Capone, 2017). (H1)<br><br>Lack of support with an institution/practice is a barrier regardless of whether a provider has completed training and received the X-waiver (Haffajee, Bohnert, & Lagisetty, 2018). (H2)<br><br>Effective training uses hands-on activities, demonstrations, and limits the use of lecture and reading (Hiatt, 2006). Retention is highest when new techniques can be discussed and applied during training (Hiatt, 2006). (H2-H6) | RQ1: Is primary care providers' perceived level of appropriateness to integrate MAT services into primary care clinical setting influenced by their hours of MAT training and MAT training environment? | H1a: Higher perceived levels of appropriateness subscale scores among primary care providers are related to higher number of MAT training hours.<br><br>H1b: Lower perceived levels of appropriateness subscale scores among primary care providers are related to having no MAT training environment.<br><br>H1c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of appropriateness. |
| | RQ2: Is primary care providers' perceived level of management support to integrate MAT services into primary care clinical setting influenced by hours of MAT training and MAT training environment? | H2a: Perceived levels of management support subscale scores among primary care providers are not related to hours of MAT training.<br><br>H2b: Lower perceived levels of management support subscale scores among primary care providers are related to no MAT training environment or access only.<br><br>H2c: MAT training environment is the best predictor of perceived level of support management. |
| | RQ3: Is primary care providers' perceived level of change efficacy to integrate MAT services into primary care clinical setting influenced by hours of MAT training and MAT training environment? | H3a: Higher perceived levels of change efficacy subscale scores among primary care providers are related to higher number of MAT training hours.<br><br>H3b: Lower perceived levels of change efficacy subscale scores among primary care providers are related to no MAT training environment or access only. |

| | | |
|---|---|---|
| Individuals with previous buprenorphine training are more likely to feel confident in treating OUD, treatment is within their scope of practice, comfortable managing opioid tapering, and less likely to refer patients for OUD treatment, than those without training (Kirane et al., 2019). (H3-6)<br><br>Education-based interventions are not as effective as interacting with groups that are highly stigmatized (Corrigan, 2012). (H5-H6) | | H3c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of change efficacy. |
| | RQ4: Is primary care providers' perceived level of personal valence to integrate MAT services into primary care clinical setting influenced by hours of MAT training and MAT training environment? | H4a: Higher perceived levels of personal valence subscale scores among primary care providers are related to higher number of MAT training hours.<br><br>H4b: Lower perceived levels of personal valence subscale scores among primary care providers are related to having no MAT training environment or access only.<br><br>H4c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of personal valence. |
| | RQ5: Is primary care providers' perceived level of stereotype awareness by primary care providers to integrate MAT services into primary care clinical setting influenced by hours of MAT training and MAT training environment? | H5a: Lower perceived levels of stereotype awareness subscale scores among primary care providers are related to having higher number of MAT training hours.<br><br>H5b: Higher perceived levels of stereotype awareness subscale scores among primary care providers are related to having no MAT training environment or access only.<br><br>H5c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of stereotype awareness. |
| | RQ6: Is primary care providers' perceived level of stereotype agreement to integrate MAT services into primary care clinical setting influenced by hours of MAT training and MAT training environment? | H6a: Lower perceived levels of stereotype agreement subscale scores among primary care providers are related to having higher number of MAT training hours.<br><br>H6b: Higher perceived levels of stereotype agreement subscale scores among primary care providers are related to having no MAT training environment or access only.<br><br>H6c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of stereotype agreement. |

*Note:* All research questions were adjusted for the following provider demographics if statistically significant: gender, years of practice, provider type previous training in pain management and addiction, obtained X-wavier, previously or currently prescribes MAT medications, and works with a provider that prescribes MAT medications.

## 3.3 Methods

### *3.3.1 Study Design*

A prospective cross-sectional descriptive study was conducted to explore differences between professions and training types in organizational readiness and stigma towards integrating MAT service in primary care. The primary source for all data was a single survey comprising the following sections: a modified version of the Readiness for Change Questionnaire (RFCQ; Holt et al., 2007), a modified version of the Brief Opioid Stigma Scale (Yang et al., 2019), and provider demographics. Data were collected using an anonymous self-administered online survey. The data collection period was March 2022-May 2022. The research protocol was submitted to the Virginia Commonwealth University Institutional Review Board and approved.

### *3.3.2 Setting and Participants*

This study was performed at two urban academic health profession training centers in Virginia. Primary care partnering sites in the Hampton Roads area (Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach) were included to capture the largest and most representative sample possible.

A nonprobability convenience sample was used. Although nonprobability sampling was less likely to produce a representative sample, it is commonly used because of its low cost and efficiency (Hulley et al., 2013). This study recruited primary care providers in family and internal medicine who work for the academic health profession training centers and/or its partnering clinical sites. Primary care providers for this study were defined as practicing physicians, physician assistants, nurse practitioners, residents, physician assistant students in

their clinical year, and nurse practitioner students in their clinical year. Screening and enrolling of participants was based on the following inclusion and exclusion criteria.

Inclusion Criteria:

1. The participant was a Drug Enforcement Administration licensed provider: physician, physician assistant, or nurse practitioner; or a resident; or physician assistant or nurse practitioner student in clinical rotations

2. Participant currently worked in a primary care setting: family practice or internal medicine

3. Participant's clinical practice was in one of the seven Hampton Roads cities of Virginia: Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, or Virginia Beach.

Exclusion Criteria:

1. Provider was no longer practicing at one of the clinical practice sites (e.g., retired).

Primary care providers were selected for this study because there is a growing push for these practitioners to be the first-line providers to identify and manage OUD due to their significant patient contact hours (Levin et al., 2016). However, the Hampton Roads area has limited providers who have obtained the X-waiver to treat patients with MAT medications. According to Health Resources and Services Administration (HRSA) 2017 data there were 1,058 primary care physicians and 1,029 nurse practitioners in the seven cities of Hampton Roads (HRSA, 2019). In 2018 there were a total of 680 physician assistants in Virginia Beach, Newport News, and Norfolk (Bureau of Labor Statistics, 2018). However, SAMHSA only had 132 providers listed who had obtained a X-waiver in the Hampton Roads area and only a third (approximately 45) of those providers worked in a primary care setting (SAMHSA, 2019b).

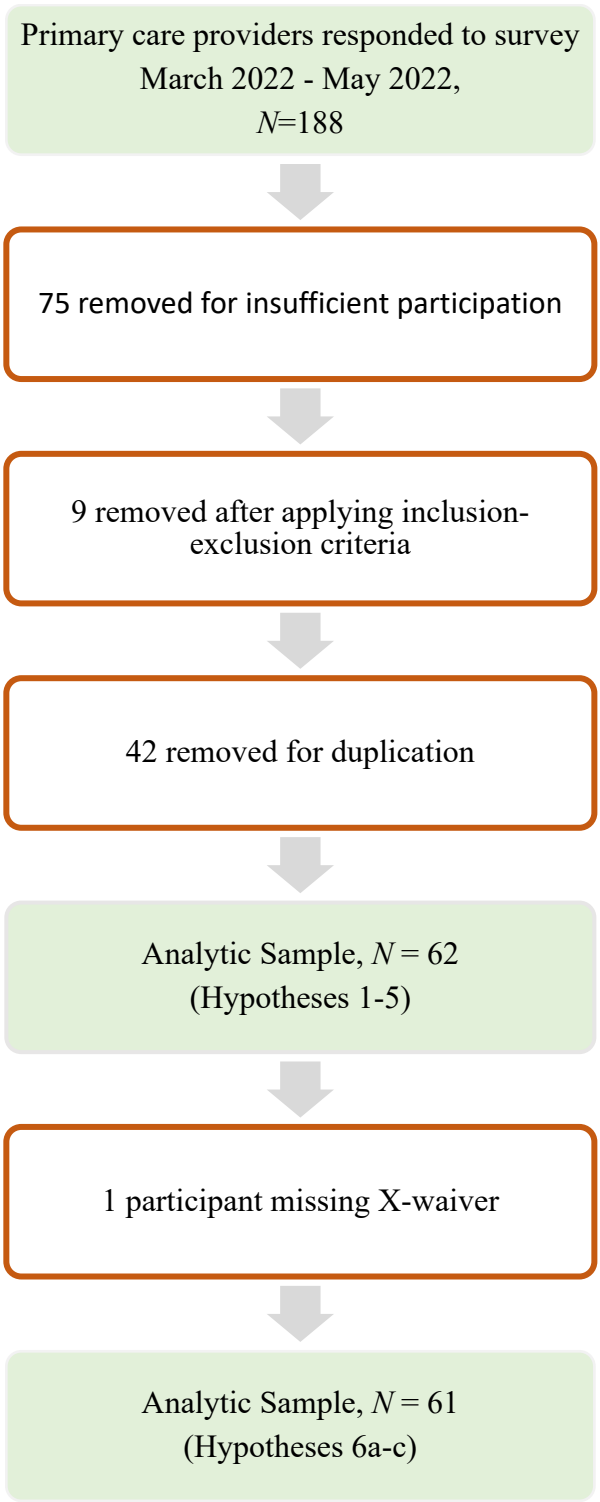
Although the number of primary care physicians has continued to rise in the Hampton Roads area (HRSA, 2023), those able to treat OUD with buprenorphine who have made themselves publicly accessible on SAMHSA's site has not increased (SAMHSA, 2024). With such low numbers of buprenorphine waivered providers, the Hampton Roads area could provide a greater understanding of factors that impede readiness to adopt MAT practices in primary care.

### *3.3.3 Participant Recruitment*

Participants were recruited through passive recruitment strategies due to the COVID-19 pandemic. Scripted emails (see Appendix B) about the study were sent out from the academic health profession training center to primary care providers both at the main institution and at clinical partner sites. These notifications included the purpose of the study, the estimated time requirement, and a data confidentiality statement. The academic health profession training centers had agreed to distribute an initial recruitment email and survey link. The online survey was available through QuestionPro®. Due to low initial response rates, the academic health profession training centers were approached to resend the prompt to complete the survey (Appendix C) three more times. Figure 3.2 depicts the process used to obtain the final sample of 62 providers after removing surveys with insufficient survey participation, duplicate surveys, and applying the inclusion and exclusion criteria.

**Figure 3.2**

*Application of inclusion and exclusion criteria to the study sample Paper 2*



### *3.3.4 Sample and Power Analysis*

An a priori power analysis was used to calculate the sufficient sample size needed to support the study's findings. According to Polit and Beck (2017), the number of predictors must be considered when calculating the appropriate sample size for a multiple linear regression analysis. With five predictors, a sample of 58 participants was needed to achieve a medium effect size $f^2 = 0.25$ and power of 0.80 when $\alpha = 0.05$, according to G*Power 3.1 software.

A post hoc power analysis was completed for hypotheses 1-5. With five predictors, a sample of 62 participants, and a medium effect size $f^2 = 0.25$ a power of .84 was achieved when $\alpha = 0.05$, according to G*Power 3.1 software. Hypotheses 6a-c only included data from 61 participants. A post hoc power analysis determined a power of .83 was achieved when $\alpha = 0.05$, according to G*Power 3.1 software.

### *3.3.5 Instruments*

**Readiness for Change Questionnaire.** There are three instruments being used for this study. The first instrument is the Readiness for Change Questionnaire (RFCQ), a reliable and validated 25-item Likert scale instrument designed to assess organizational change at the individual level. This study examined four factors (appropriateness, management support, change efficacy, and personal valence) that were measured using the validated RFCQ subscales. (Holt et al., 2007). Holt and colleagues (2007) tested the content validity through factor analysis and four factors emerged accounting for 67.20% of the variance, convergent validity (the readiness factors were correlated $r = .46$). Cronbach's alphas reflected the internal consistency for each subscale: ($\alpha = .94$ appropriateness, $\alpha = .87$ management support, $\alpha = .82$ change self-efficacy, and $\alpha = .66$ personal valence). Although the personal valence alpha coefficient was lower than the other subscales, the consistency measurement scores still demonstrated acceptable

reliability (Holt et al., 2007). Pilot testing was performed to test reliability and validity of the modified instrument items used in the current study (Appendix D). Questions were answered using a 7-point Likert scale ranging from strongly disagree (1) to strongly agree (7). Recorded answers for each of the 25 items were collected from the RFCQ and stored in QuestionPro®. Likert responses were coded into numerical variables so a single mean score could be ascertained for each individual.

**Brief Opioid Stigma Scale.** The second study instrument was the Brief Opioid Stigma Scale. This instrument was adapted from the 12-item Brief Opioid Stigma Scale designed to assess stereotype awareness, stereotype agreement, and self-esteem decrement surrounding OUD (Yang et al., 2019). The internal consistency for each subscale was measured; Cronbach's alphas were $\alpha = .72$ for stereotype awareness, $\alpha = .68$ for stereotype agreement, and for $\alpha = .70$ self-esteem decrement (Yang et al., 2019). The stereotype awareness subscale is a 4-item scale that measures the extent to which a person believes others in society believe OUD related stereotypes (Yang et al., 2019). This subscale's items do not use "I" statements as the use of more generic language can reduce the potential of self-stigma (Yang et al., 2019). By using a phrase that starts with "most people" versus "I", the statement goes from a personal point of view to a societal perspective (Corrigan & Watson, 2002). The use of a societal point of view diminishes the possibility that participants will internalize responses and form self-stigma, leading to harmful effects on the participant's self-esteem and self-efficacy (Corrigan & Watson, 2002). Two items in the subscales used the word "man". To avoid gender-related language bias, all items in both subscales were reworded to use the term "person" in place of "man" (see Table 3.2). The stereotype agreement subscale is a 4-item scale that measures the extent to which a person agrees with OUD related stereotypes. Although this subscale does use "I" statements, it is necessary to

understand the impact that individuals' stigma related to OUD has on organizational readiness at, which is consistent with the ADKAR model. This study did not use the self-esteem decrement subscale as it evaluates impact of stigma on an individual's self-esteem among individuals with OUD, which is outside of the scope of the current study (Yang et al., 2019). Additionally, to be more inclusive, two additional items were modified from "his or her" to include "their" (Table 3.2). Pilot testing was performed to test reliability and validity of the instrument due to the changes in wording and elimination of the self-esteem decrement subscale. Questions were answered using a 5-point Likert scale ranging from strongly disagree (5) to strongly agree (1). Recorded answers for each of the 8 items were collected from the Brief Opioid Stigma subscales and stored in QuestionPro®. Responses were coded into numerical variables so a single mean score could be ascertained for each individual.

**Table 3.2**

*Summary of Changes to Brief Opioid Stigma Scale*

| Stereotype Subscale | Original | Revised Version |
|---|---|---|
| Awareness | Most people believe that a man who is addicted to opioids is dangerous. | Most people believe that a **person** who is addicted to opioids is dangerous. |
| Agreement | I believe that a man who is addicted to opioids is dangerous. | I believe that a **person** who is addicted to opioids is dangerous. |
| Awareness | Most people believe that a person who is addicted to opioids is to blame for his or her own problems. | Most people believe that a person who is addicted to opioids is to blame for his or her or **their** own problems. |
| Agreement | I think that a person who is addicted to opioids is to blame for his or her own problems. | I think that a person who is addicted to opioids is to blame for his or her or **their** own problems. |

**Provider Demographic Form**. The third and final study instrument is the provider demographic form. The following data was collected through QuestionPro®: gender (male, female, transgender male, transgender female, gender variant/non-conforming, not listed, and prefer not to say), provider type (physician, physician assistant, nurse practitioner, resident, and physician assistant student), years of practice (in school, in residency, <3 years, 3-5 years, 6-10

years, and >10 years), previous training in pain management (yes, no), previous training in addiction (yes, no), previously/currently prescribes MAT medications (yes, no), works with a provider who prescribes MAT medications (yes, no), MAT hours of training and (<less than 8 hours of training, 8 hours of training, and 24 hours of training), training environment (in-person, online, hybrid, none), and obtained a X-waiver (yes, no).

### *3.3.6 Measures*

**Dependent Variables Measurements.** The primary outcomes consisted of four measures derived from the Readiness for Change Questionnaire (Holt et al., 2007), and two measures derived from the Brief Opioid Stigma Subscale (Yang et al., 2019). The six dependent variables were appropriateness, management support, change efficacy, personal valence, stereotype awareness, and stereotype agreement.

Appropriateness is the extent to which an individual feels the change is needed and it is beneficial to the organization (Holt et al., 2007). The score was the result of the mean of the ten subscale items. Management support is the extent to which an individual feels the change is supported by senior leadership. The score was the mean of the five items relative to level of Management support. Change efficacy is the extent to which an individual feels confident that they have the knowledge and skills needed to make the change successfully (Holt et al., 2007). Change efficacy scores were the result of the mean of the six construct-related items. Personal valence is the extent to which an individual feels the change will be personally beneficial (Holt et al., 2007). The valence score was the result of the mean of the three subscale items. For subscales that were not complete, the score was the result of the mean of the number of completed items. Each of the subscales used a 7-point Likert scale to measure all items. Questions for each subscale are listed in Table 3.3.

**Table 3.3**

*RFCQ Questions*

| Subscale | Questions |
|---|---|
| **Appropriateness** | 1. In the long run, I feel it will be worthwhile for me if MAT is integrated into primary care.<br>*2. It doesn't make much sense for us to initiate the integration of MAT into primary care.<br>3. I think that the primary care will benefit from integration of MAT.<br>4. Integrating MAT into primary care makes my job easier.<br>*5. When MAT integration into primary care is implemented, I don't believe there is anything for me to gain.<br>6. Integrating MAT into primary care will improve our clinic's/department's overall efficiency.<br>7. This MAT integration matches the priorities of our clinic/department.<br>*8. The time we are spending on this integration should be spent on something else.<br>9. There are legitimate reasons for us to make this change to MAT integration.<br>10. There are a number of rational reasons for the adoption of MAT into primary care. |
| **Management Support** | 1. Management has sent a clear signal that my clinic/department is going to change.<br>2. This clinic's/department's most senior leader is committed to the integration of MAT into primary care.<br>3. Our clinic's/department's top decision makers have put all their support behind this MAT integration.<br>*4. I think we are spending a lot of time on this MAT integration when the senior managers don't even want it implemented. (This item was deleted from final analysis.)<br>5. Every senior manager has stressed the importance of implementing MAT integration into primary care.<br>6. Our senior leaders have encouraged all of us to embrace this change to implementing MAT into primary care. |
| **Change Efficacy** | 1. My past experiences make me confident that I will be able to perform successfully after MAT is integrated into primary care.<br>*2. There are some tasks that will be required when we implement the integration of MAT into primary care that I don't think I can do well.<br>3. I do not anticipate any problems adjusting to the work I will have when MAT is integrated into primary care.<br>4. When I set my mind to it, I can learn everything that will be required when this integration of MAT into primary care is adopted.<br>5 I have the skills that are needed to make this MAT integration work.<br>6. When we implement this MAT integration, I feel I can handle it with ease. |
| **Personal Valence** | *1. My future in this job will be limited because of the integration of MAT into primary care.<br>*2. I am worried I will lose some of my status in the clinic/department when MAT is integrated into primary care.<br>*3. Implementing MAT integration into primary care will disrupt many of the personal relationships I have developed. |

*Note.* Responses are 1= strongly disagree, 2=disagree, 3=somewhat disagree, 4=neither agree or disagree, 5=somewhat agree, 6= agree, 7= strongly agree

* item was reverse coded

Stereotype awareness is the extent to which an individual believes others in society believe OUD related stereotypes (Yang et al., 2019). Stereotype agreement is the extent to which an individual agrees with OUD related stereotypes (Yang et al., 2019). The scores for each subscale were the result of the mean of the four subscale items using a 5-point Likert scale. Reverse coding was used to keep scoring consistent among scales, where higher scores represent positive viewpoints. For subscales that were not complete, the score was the result of the mean of the number of completed items. Stereotype awareness and agreement questions are listed in Table 3.4.

**Table 3.4**

*Questions Measuring Stereotype Awareness and Stereotype Agreement*

| | |
|---|---|
| **Stereotype Awareness** | 1. Most people believe that a person who is addicted to opioids cannot be trusted.<br>2. Most people believe that a person who is addicted to opioids is dangerous.<br>3. Most people believe that a person who is addicted to opioids is to blame for his or her or their own problems.<br>4. Most people believe that a person who is addicted to opioids is lazy. |
| **Stereotype Agreement** | 1. I believe that a person who is addicted to opioids cannot be trusted.<br>2. I believe that a person who is addicted to opioids is dangerous<br>3. I think that a person who is addicted to opioids is to blame for his or her or their own problems.<br>4. I believe that a person who is addicted to opioids is lazy. |

*Note.* Responses are 5= strongly disagree, 4=somewhat disagree, 3=unsure, 2=somewhat agree, 1= strongly agree

**Independent Variables Measurements.** This study explored the differences in levels of organizational readiness and stigma based on training and the environment in which training is presented. The independent variables for this study were hours of MAT training and MAT training environment. Hours of MAT training was measured in three provider groups who: 1) has completed less than 8 hours of X-waiver training, 2) has completed 8 hours of the X-waiver training; and 3) had received 24 hours of the X-waiver training. Since knowledge can be influenced by the availability of educational and training resources (Hiatt, 2006), the different modalities in which MAT training can be delivered was explored by examining the MAT

training environment. There were four MAT training delivery modes: 1) completely in-person, 2) completely online, 3) a combination of both in-person and online (hybrid), and 4) none.

**Covariates.** Several control variables were considered in this analysis: gender, provider type, years of practice, previous training in pain management, previous training in addiction, previous or currently prescribes MAT medications, works with a provider who prescribes MAT medications, provider types, and obtained a X-waiver (Kirane et al., 2019). Table 3.5 displays the study variables.

**Table 3.5**

*Study Variables*

| **Independent Variables** | **Description and Measurement** | **Data Source** |
|---|---|---|
| Hours of MAT training (was represented by 2 dummy variables) | Ordinal: < less than 8 hours of training, 8-hour training, and 24-hour training | Provider demographics form |
| MAT training environment (was represented by 3 dummy variables) | Nominal: in-person, online, hybrid, none | |
| **Dependent Variables** | **Description and Measurement** | **Data Source** |
| Appropriateness score | Continuous: Mean of the ten 5-point Likert scale items | RFCQ: Appropriateness Subscale (10 items) |
| Management support score | Continuous: Mean of the six 5-point Likert scale items | RFCQ: Management Support Subscale (6 items) |
| Change efficacy score | Continuous: Mean of the six 5-point Likert scale items | RFCQ: Change Efficacy Subscale (6 items) |
| Personal valence score | Continuous: Mean of the three 5-point Likert scale items | RFCQ: Personally Beneficial Subscale (3 items) |
| Stereotype awareness score | Continuous: Total score of four 5-point Likert scale items | Brief Opioid Stigma Scale: Stereotype Awareness Subscale (4 items) |
| Stereotype agreement score | Continuous: Total score of four 5-point Likert scale items | Brief Opioid Stigma Scale: Stereotype Agreement Subscale (4 items) |
| **Control Variables** | **Description and Measurement** | **Data Source** |
| *Gender | Nominal:<br>• Male<br>• Female<br>• Transgender male<br>• Transgender female<br>• Gender variant/non-conforming<br>• Not listed<br>• Prefer Not to Say | Provider demographics form |
| *Years of practice | Ordinal:<br>In school | |

| | | |
|---|---|---|
| | In residency<br><3 years<br>3-5 years<br>6-10 years<br>>10 years | |
| Previous training in pain Management | Dichotomous: Yes, No | |
| Previous training in addiction | Dichotomous: Yes, No | |
| Previously/currently prescribes MAT medications | Dichotomous: Yes, No | |
| Works with a provider who prescribes MAT medications | Dichotomous: Yes, No | |
| Obtained X-waiver | Dichotomous: Yes, No | |
| *Provider type | Nominal<br>• Physician (MD/DO)<br>• Physician Assistant (PA)<br>• Nurse Practitioner (NP)<br>• Resident<br>• PA Student<br>• NP Student | |

*Note.* Variables marked with an * were collapsed. See section 3.4.1 for further details.

### *3.3.7 Statistical Analyses*

This prospective cross-sectional study used SPSS v.26 to conduct all analyses. Before transferring data from QuestionPro® into SPSS, a codebook was developed in Microsoft Excel™. The codebook had a listing of all variables, their corresponding values, and their relationship to the study. The codebook also detailed transformations, modifications, and deletions of any variables (Polit & Beck, 2017).

**Descriptive Statistics.** Upon completion of recruitment and enrollment of a sufficient number of study participants to power the study and data collection, descriptive statistics were calculated analyzing participants' gender, provider type, years of practice, previous training in pain management, previous training in addiction, previously or currently prescribing MAT medications, and whether participants work with a provider who prescribes MAT medications,

hours of MAT training, MAT training environment, and obtaining a X-waiver. Frequencies, percentages, means, standard deviations and ranges were determined, as appropriate. Descriptive analyses were used to assess the distribution of the data to compare baseline characteristics to assess comparability.

**Multivariate Analysis Techniques.** A multiple linear regression analysis determined a model of the relationship between providers' perceived levels of stigma and readiness for change and multiple MAT training variables. The dependent variables were represented by the following four constructs: appropriateness, management support, change efficacy, personal valence, and stigma (stereotype Awareness and stereotype agreement). The independent variables were hours of MAT training (represented by 2 dummy variables) and MAT training environment (represented by 3 dummy variables). Linear regression was useful for this research study because it determines the relationship of the continuous dependent variables, readiness for change and stigma, based on multiple predictors. Furthermore, this technique allows for the overall fit of the model to be determined, as well as the total variance explained by each predictor (Laerd, 2017). Prior to the multiple linear regression analysis, a test of assumptions for multiple linear regression was performed, as outlined in Table 3.6 (Laerd, 2017; Tabachnick & Fidell, 2013). If any cases were modified to meet assumptions, transformations were reported in the results.

The multiple linear regression was used to: 1) establish the proportion of variation in MAT knowledge test scores explained by the independent variables; 2) predict MAT knowledge test scores based on the new values of the independent variables; and 3) determine how much MAT knowledge test scores changed per one unit of change in the independent variables (Laerd, 2017). Six multiple linear regressions were run to adjust for any potential confounders on each dependent variable separately. Each dependent variable (appropriateness, management support,

change efficacy, personal valence, stereotype awareness, and stereotype agreement) has been assessed through factor analysis to adequately measure each of the readiness for change and stigma constructs (Holt et al., 2007; Yang et al., 2019). Before the multiple linear regression analysis, data coding was completed. Data coding was examined with a case processing summary table, which was used to check for missing cases. The dependent variable was double checked for correct coding by inspecting the dependent variable encoding table; low counts among predictors were determined through a review of the categorical variables codings table (Laerd, 2017). To assess the fit of the model the coefficients of determination, $R^2$ values were used to determine the amount of variation explained by the model. *F*-statistic and the degrees of freedom are reported, and statistical significance of the overall model is represented by the *p* value. A $p < .05$ was considered statistically significant. Standardized coefficients (Beta) were reported to represent the change in each dependent variable caused by a) hours of MAT training and b) MAT training environment. A range of possible values for the standardized coefficients was determined by using the 95% confidence interval, and *p* values of < .05 were used to assess for statistical significance of the standardized coefficients (Tabachnick & Fidell, 2013).

**Table 3.6**

*Multiple Linear Regression Assumptions*

| Assumption | Assessment |
|---|---|
| One continuous dependent variable | Each subscale was analyzed independently |
| Two or more independent variables | 5 independent variables used |
| Independence of observations | All categories for both the dependent variable and the independent variables are mutually exclusive. |
| Linearity | 1. Examined scatterplots for linear relationship between dependent variable and independent variables collectively.<br>2. Examined partial regression plots were examined between the dependent variable and each independent variable separately.<br>3. If data were not linear than deletion occurred and was reported. |
| Homoscedasticity | Examined plots of the studentized residuals against the unstandardized predicted values. |
| Absence of multicollinearity | Correlation coefficients >.70, and Tolerance value <.10 were used as criteria for deletion of variables |
| No significant outliers | Cases with standard deviations greater than ±3 were inspected individually, and the variable was modified through transformation or score alternation. If modification was not appropriate than either deletion occurred, or case was kept and was reported. |
| Normality | Scatterplots were examined for skewness and kurtosis. If the assumption of normality was violated, a regression that did not rely on normally distribution of data was run, or deletion occurred and was reported. |

*Note.* Adapted from Using Multivariate Statistics by B.G. Tabachnick and L.S. Fidell, (6th edition), 2013, Boston, MA: Pearson and Laerd Statistics (2017).

## 3.4 Results

### *3.4.1 Provider Descriptive Statistics*

Data from 62 participants were analyzed in the final dataset (see Table 3.7). The participants had various backgrounds and worked in various locations. The perceived extent to which each organization incorporated MAT services varied greatly. Table 3.8 summarizes the

demographic characteristics of the respondents. Years of practice categories <3 years and 3-5 years after completing residency were collapsed into <5 years due to the low numbers of providers in these categories. Due to the limited number of NPs coupled with the fact NPs and PAs would have to complete the same 24 hours of MAT trainer in order to receive a X-waiver (SAMHSA, 2021), PA and NP providers were collapsed into an "other" category. Four participants preferred not to provide their gender and one participant's gender was not listed, so these were treated as missing. As all other gender categories (e.g., transgender male) had no participants, gender was collapsed and treated as binary. Most primary care providers were MD/DOs (*n* = 46, 74.20%), still in residency (*n* = 23, 37.10%), had no pain management training (*n* = 34, 54.80%), had no addiction training (*n* = 34, 54.80%), had never prescribed MAT medications (*n* = 48, 77.40%), never worked with a provider who prescribed MAT medications (*n* = 38, 61.30%), received less than 8 hours of MAT training (*n* = 37, 59.70%), never been in a MAT training environment (*n* = 32, 51.60%), had no X-waiver (*n* = 41, 66.10%), and female *(n* = 31, 50.00%).

**Table 3.7**

*A Summary of the Extent of Organizations' Integration of MAT Services Paper 2 (N=62)*

| Extent | Frequency (*n*) | Percentage |
|---|---|---|
| MAT has not been discussed | 7 | 11.30 |
| It has been discussed but decided not to move forward | 7 | 11.30 |
| MAT is part of clinical practice | 5 | 8.10 |
| Unsure | 28 | 45.20 |
| Currently discussing | 13 | 21.00 |
| Currently piloting | 2 | 3.20 |

**Table 3.8**

*Primary Care Providers' Characteristics Paper 2 (N=62)*

| Provider Characteristics | Frequency (*n*) | Percentage |
|---|---|---|
| Provider Type | | |
| MD/DO | 46 | 74.20 |
| Other (PA/NP) | 16 | 25.80 |
| Years of Practice | | |
| In School | 10 | 16.10 |
| In Residency | 23 | 37.10 |
| 5 or less years | 8 | 12.90 |
| 6-10 years | 5 | 8.10 |
| >10 years | 16 | 25.80 |
| Previous training in pain management | | |
| Yes | 28 | 45.20 |
| No | 34 | 54.80 |
| Previous training in addiction | | |
| Yes | 28 | 45.20 |
| No | 34 | 54.80 |
| Previously/currently prescribes MAT medications | | |
| Yes | 14 | 22.60 |
| No | 48 | 77.40 |
| Works with a provider who prescribes MAT medications | | |
| Yes | 24 | 38.70 |
| No | 38 | 61.30 |
| Hours of MAT training | | |
| <8 hours | 37 | 59.70 |
| 8 hours | 15 | 24.20 |
| 24 hours | 10 | 16.10 |
| MAT training environment | | |
| In-person | 9 | 14.50 |
| Online | 15 | 24.20 |
| Hybrid | 6 | 9.70 |
| None | 32 | 51.60 |
| Obtained X-waiver | | |
| Yes | 20 | 32.30 |
| No | 41 | 66.10 |
| Missing | 1 | 1.60 |
| Gender | | |
| Female | 31 | 50.00 |
| Male | 26 | 41.90 |
| Missing | 5 | 8.10 |

### *3.4.2 Instrument Descriptive Statistics*

**Readiness for Change Questionnaire.** Reliability analyses were performed to test internal consistency of the RFCQ and its subscales. Cronbach's alpha for the overall RFCQ, which measures organizational change at the individual, was α = .91. The Appropriateness Subscale consisted of ten items from the RFCQ (α = .85) and had an average score of 4.76 (*SD* = ± 1.07). The Management Support Subscale originally consisted of six items from the RFCQ. The fourth item of the subscale, "I think we are spending a lot of time on this MAT integration when the senior managers don't even want it implemented," was removed to increase reliability. The Cronbach's alpha improved from .75 to .84 with the five-item subscale that had an average score of 3.84 (*SD* = ± 1.09). The Change Efficacy Subscale consisted of six items from the RFCQ (α = .77) and had an average score of 4.54 (*SD* = ± 1.05). The Personal Valence Subscale consisted of three items from the RFCQ (α = .78) and had an average score of 5.07 (*SD* = ± 1.36). Although the Personal Valence and Change Efficacy alpha coefficient were lower than .80, the consistency measurement scores still demonstrate acceptable reliability (Holt et al., 2007). See Table 3.9 for a summary of descriptive statistics. All Likert response options were used for the RFCQ survey except items 10 and 24. For a summary of individual item response frequencies see Table 3.10.

**Table 3.9**

*Readiness for Change Questionnaire Descriptive Statistics (N= 62)*

| | Appropriateness Subscale Score | Personal Valence Subscale Score | Change Efficacy Subscale Score | Management Support Subscale Score |
|---|---|---|---|---|
| Mean | 4.76 | 5.07 | 4.54 | 3.84 |
| Std. Error of Mean | .14 | .17 | .13 | .14 |
| Median | 4.80 | 5.33 | 4.55 | 4.00 |
| Mode | 4.40 | 6.67 | 4.17 | 4.00 |
| Std. Deviation | 1.07 | 1.36 | 1.05 | 1.09 |
| Variance | 1.14 | 1.85 | 1.10 | 1.19 |
| Skewness | -.80 | -.60 | -.62 | -.34 |
| Std. Error of Skewness | .30 | .30 | .30 | .30 |
| Kurtosis | .67 | -.14 | 1.22 | 1.17 |
| Std. Error of Kurtosis | .60 | .60 | .60 | .60 |
| Minimum | 1.60 | 1.00 | 1.00 | 1.00 |
| Maximum | 6.50 | 7.00 | 6.67 | 6.60 |

**Table 3.10**

*Frequencies and Percentages of Responses to Readiness for Change Questionnaire Items (N=62)*

| Item | Frequency (Percentage) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |
| **Appropriateness Subscale** (α = .85) | | | | | | | |
| 1. In the long run, I feel it will be worthwhile for me if MAT is integrated into primary care. | 4 (6.50) | 4 (6.50) | 5 (8.10) | 5 (8.10) | 7 (11.30) | 21 (33.90) | 16 (25.80) |
| 2. It doesn't make much sense for us to initiate the integration of MAT into primary care. | 16 (25.80) | 14 (22.60) | 12 (19.40) | 6 (9.70) | 7 (11.30) | 4 (6.50) | 3 (4.80) |
| 3. I think that the primary care will benefit from integration of MAT. | 2 (3.20) | 5 (8.10) | 3 (4.80) | 7 (11.30) | 13 (21.00) | 18 (29.00) | 14 (22.60) |
| **4. Integrating MAT into primary care makes my job easier. | 3 (4.80) | 7 (11.30) | 13 (21.00) | 17 (27.40) | 10 (16.10) | 10 (16.10) | 1 (1.60) |
| 5. When MAT integration into primary care is implemented, I don't believe there is anything for me to gain. | 7 (11.30) | 21 (33.90) | 7 (11.30) | 8 (12.90) | 7 (11.30) | 9 (14.50) | 3 (4.80) |
| 6. Integrating MAT into primary care will improve our clinic's/department's overall efficiency. | 4 (6.50) | 8 (12.90) | 8 (12.90) | 12 (19.40) | 12 (19.40) | 15 (24.20) | 3 (4.80) |
| 7. This MAT integration matches the priorities of our clinic/department. | 2 (3.20) | 4 (6.50) | 5 (8.10) | 21 (33.90) | 15 (24.20) | 11 (17.70) | 4 (6.50) |
| 8. The time we are spending on this integration should be spent on something else. | 4 (6.50) | 17 (27.40) | 11 (17.70) | 12 (19.40) | 10 (16.10) | 5 (8.10) | 3 (4.80) |
| 9. There are legitimate reasons for us to make this change to MAT integration. | 3 (4.80) | 1 (1.60) | 2 (3.20) | 10 (16.10) | 13 (21.00) | 23 (37.10) | 10 (16.10) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 10. There are a number of rational reasons for the adoption of MAT into primary care. | 2 (1.60) | 0 (0.00) | 1 (1.60) | 12 (19.40) | 19 (30.60) | 19 (30.60) | 9 (14.50) |
| **Management Support Subscale** (α = .84) | | | | | | | |
| 11. Management has sent a clear signal that my clinic/department is going to change. | 6 (9.70) | 10 (16.10) | 5 (8.10) | 26 (41.90) | 7 (11.30) | 6 (9.70) | 2 (3.20) |
| 12. This clinic's/department's most senior leader is committed to the integration of MAT into primary care. | 5 (8.10) | 4 (6.50) | 2 (3.20) | 30 (48.40) | 10 (16.10) | 7 (11.30) | 4 (6.50) |
| 13. Our clinic's/department's top decision makers have put all their support behind this MAT integration. | 4 (6.50) | 3 (4.80) | 5 (8.10) | 35 (56.50) | 8 (12.90) | 6 (9.70) | 1 (1.60) |
| *14. I think we are spending a lot of time on this MAT integration when the senior managers don't even want it implemented. | 3 (4.80) | 8 (12.90) | 6 (9.70) | 32 (51.60) | 7 (11.30) | 5 (8.10) | 1 (1.60) |
| 15. Every senior manager has stressed the importance of implementing MAT integration into primary care. | 8 (12.90) | 7 (11.30) | 7 (11.30) | 29 (46.80) | 7 (11.30) | 2 (3.20) | 2 (3.20) |
| 16. Our senior leaders have encouraged all of us to embrace this change to implementing MAT into primary care. | 5 (8.10) | 7 (11.30) | 3 (4.80) | 36 (58.10) | 7 (11.30) | 3 (4.80) | 1 (1.60) |
| **Change Efficacy Subscale** (α = .77) | | | | | | | |
| 17. My past experiences make me confident that I will be able to perform successfully after MAT is integrated into primary care. | 4 (6.50) | 5 (8.10) | 3 (4.80) | 12 (19.40) | 16 (25.80) | 18 (29.00) | 4 (6.50) |
| 18. There are some tasks that will be required when we implement the integration of MAT into primary care that I don't think I can do well. | 2 (3.20) | 18 (29.00) | 8 (12.90) | 13 (21.00) | 12 (19.40) | 4 (6.50) | 5 (8.10) |
| **19. I do not anticipate any problems adjusting to the work I will have when MAT is integrated into primary care. | 2 (3.20) | 14 (22.60) | 19 (30.60) | 4 (6.50) | 8 (12.90) | 12 (19.40) | 2 (3.20) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 20. When I set my mind to it, I can learn everything that will be required when this integration of MAT into primary care is adopted. | 3 (4.80) | 2 (3.20) | 2 (3.20) | 6 (9.70) | 13 (21.00) | 28 (45.20) | 8 (12.90) |
| **21. I have the skills that are needed to make this MAT integration work. | 1 (1.60) | 3 (4.80) | 5 (8.10) | 11 (17.70) | 15 (24.20) | 19 (30.60) | 7 (11.30) |
| **22. When we implement this MAT integration, I feel I can handle it with ease. | 2 (3.20) | 5 (8.10) | 10 (16.10) | 13 (21.00) | 15 (24.20) | 14 (22.60) | 2 (3.20) |
| **Personal Valence Subscale** (α = .78) | | | | | | | |
| 23. My future in this job will be limited because of the integration of MAT into primary care. | 13 (21.00) | 18 (29.00) | 9 (14.50) | 10 (16.10) | 5 (8.10) | 5 (8.10) | 2 (3.20) |
| 24. I am worried I will lose some of my status in the clinic/department when MAT is integrated into primary care. | 14 (22.60) | 17 (27.40) | 9 (14.50) | 14 (22.60) | 5 (8.10) | 0 (0.00) | 3 (4.80) |
| 25. Implementing MAT integration into primary care will disrupt many of the personal relationships I have developed. | 9 (14.50) | 22 (35.50) | 11 (17.70) | 11 (17.70) | 4 (6.50) | 1 (1.60) | 4 (6.50) |

*Note.* Item marked with an * was not included in subsequent analyses. Items marked with ** had missing data

**Brief Opioid Stigma Scale.** Reliability analyses were performed to test internal consistency of the Brief Opioid Stigma Scale and its subscales. Cronbach's alpha for the overall scale, which measures perceived stereotype awareness and stereotype agreement surrounding OUD (Yang et al., 2019) was α = .83. The internal consistency for each 4-item subscale was also measured; Cronbach's alpha was α = .73 for stereotype awareness and α = .83 for stereotype agreement. Stereotype Awareness Subscale average score was 3.01 (*SD* = ± .73) and Stereotype Agreement Subscale average score was 3.59 (*SD* = ± .84). See Table 3.11 for a summary of descriptive statistics. All Likert response options were used except for item 1. For a summary of individual item response frequencies see Table 3.12.

**Table 3.11**

*Brief Opioid Stigma Scale Descriptive Statistics (N=62)*

| | Stereotype Awareness Subscale Score | Stereotype Agreement Subscale Score |
|---|---|---|
| Mean | 3.01 | 3.59 |
| Std. Error of Mean | .09 | .11 |
| Median | 3.00 | 4.00 |
| Mode | 3.00 | 4.00 |
| Std. Deviation | .73 | .84 |
| Variance | .53 | .70 |
| Skewness | -.51 | -1.04 |
| Std. Error of Skewness | .30 | .30 |
| Kurtosis | -.22 | .99 |
| Std. Error of Kurtosis | .60 | .60 |
| Minimum | 1.00 | 1.00 |
| Maximum | 4.00 | 5.00 |

**Table 3.12**

*Frequencies and Percentages of Responses to Brief Opioid Stigma Scale (N= 62)*

| Item | Strongly Disagree | Disagree | Unsure | Agree | Strongly Agree |
|---|---|---|---|---|---|
| **Stereotype Awareness Subscale** (α=.73) | | | | | |
| *1. Most people believe that a person who is addicted to opioids cannot be trusted. | 0 (0.00) | 13 (21.00) | 16 (25.80) | 28 (45.20) | 4 (6.50) |
| 2. Most people believe that a person who is addicted to opioids is dangerous. | 1 (1.60) | 30 (48.40) | 12 (19.4) | 13 (21.00) | 6 (9.70) |
| 3. Most people believe that a person who is addicted to opioids is to blame for his or her or their own problems. | 2 (3.20) | 17 (27.40) | 22 (35.5) | 19 (30.60) | 2 (22.60) |
| 4. Most people believe that a person who is addicted to opioids is lazy. | 3 (4.80) | 31 (50.00) | 14 (22.60) | 10 (16.10) | 4 (6.50) |
| **Stereotype Agreement Subscale** (α=.83) | | | | | |
| 5. I believe that a person who is addicted to opioids cannot be trusted. | 6 (9.70) | 32 (51.60) | 14 (22.60) | 5 (8.10) | 5 (8.10) |
| *6. I believe that a person who is addicted to opioids is dangerous | 6 (9.70) | 38 (61.30) | 9 (14.50) | 6 (9.70) | 2 (3.20) |
| *7. I think that a person who is addicted to opioids is to blame for his or her or their own problems. | 8 (12.90) | 31 (50.00) | 12 (19.40) | 6 (9.70) | 4 (6.50) |
| *8. I believe that a person who is addicted to opioids is lazy. | 11 (17.70) | 35 (56.50) | 4 (6.50) | 7 (11.30) | 4 (6.50) |

*Note.* Item marked with an * was missing data.

### *3.4.3 Data Analysis: Hypothesis Testing*

Hypotheses 1 through 6 explored the impact of providers' demographics on providers' readiness and stigma. The initial statistical regression model for all multiple linear regressions included all provider demographic variables excluding predictor variables. Statistically significant variables with $p < .05$ were entered at the first step of the regression model as covariates. Covariates were not treated as predictors for analyses.

**Appropriateness Subscale Hypothesis Testing.** A multiple linear regression was run to understand how MAT training hours and MAT training environment impacts primary care providers perceived level of appropriateness, after adjusting for 5 or less years of practice after completing school/residency and 6-10 years after completing school/residency. To assess linearity, a scatterplot of observed Appropriateness Subscale scores against predicted Appropriateness Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.65. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). Cases were individually inspected for standard deviations greater than ±3 and no outliers were observed (Tabachnick & Fidell, 2013).

After adjusting for 5 or less years after completing school/residency and 6-10 years after completing school/residency, primary care providers' perceived level of appropriateness was not significantly different than zero, $F(5, 56) = 1.24$, $p = .299$, $R^2 = .14$. MAT training hours and

training environment variables did not have a statistically significant impact on perceived level appropriateness and all hypotheses ($H1_a$-$H1_c$) were rejected.

**Management Support Subscale Hypothesis Testing.** A multiple linear regression was run to understand how MAT training hours and its training environment impacts primary care providers' perceived level of management support, after adjusting for working with a provider who prescribes MAT medications. To assess linearity, a scatterplot of observed Management Support Subscale scores against predicted Management Support Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.68. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). Cases were individually inspected for standard deviations greater than ±3, no outliers were observed (Tabachnick & Fidell, 2013).

Table 3.13 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. After adjusting for whether participants work with a provider who prescribes MAT medications, MAT training hours and training environment were statistically significant and predicted perceived level of management support, $F(5, 56) = 2.87$ $p = .017$, $R^2 = .24$.

**Table 3.13**

*Multiple Linear Regression of MAT Training Hours and MAT Training Environment on Perceived Level of Management Support (N=62)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | .24* | .13 |
| Constant | 3.60*** | .19 | | 19.14 | | | | |
| work with a provider who prescribes MAT medications | .56 | .29 | .25 | 1.91 | .23 | .34 | | |
| 8 hours of MAT training | -1.28* | .54 | -.51 | -2.39 | -.28 | -.17 | | |
| 24 hours of MAT training | -.66 | .58 | -.23 | -1.15 | -.14 | .17 | | |
| online training environment | .57 | .50 | .22 | 1.14 | .13 | -.10 | | |
| in-person training environment | 1.45* | .62 | .47 | 2.34 | .28 | .27 | | |
| hybrid training environment | .89 | .69 | -.24 | 1.29 | .15 | -.01 | | |

*Note.* *p < .05 **p < .01 ***p < .001

The MAT training hours and training environment contributed .13 in shared variability. The covariate, working with a provider who prescribes MAT medication, explained approximately 11.00% of the variation in perceived level of management support by itself. As indicated by the squared semipartial correlations, the majority of MAT training hours and training environment were less important than the covariate. Also the change in $F = 1.82$ was not statistically significant with the addition of MAT training hours and training environment, $p = .125$. As a result, the standardized regression coefficients for all MAT training hours and training environment variables did not have a statistically significant impact on perceived level of management support, except for 8 hours of MAT training and in-person training environment. A post hoc analysis with a Bonferroni adjustment revealed there was not statistically significant

difference. Therefore, we can accept the null hypothesis. Hypotheses $H2_a$ was accepted, and $H2_{b-c}$ were rejected.

**Change Efficacy Subscale Hypothesis Testing.** A multiple linear regression was run to understand how MAT training hours and MAT training environment impacts primary care providers' perceived level of change efficacy, after adjusting for being in school. To assess linearity, a scatterplot of observed Change Efficacy Subscale scores against predicted Change Efficacy Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.83. Cases were individually inspected for standard deviations greater than ±3 (Tabachnick & Fidell, 2013). One provider was an outlier with a perceived Change Efficacy Subscale score of 1.00. Due to limited sample size the provider was not removed from the analysis.

After adjusting for being in school, primary care providers' perceived level change efficacy was not significantly different than zero, $F(5, 56) = 1.47$, $p = .207$, $R^2 = .14$. MAT training hours and training environment variables did not have a statistically significant impact on perceived level of change efficacy and all hypotheses ($H3_a$-$H3_c$) were rejected.

**Personal Valence Subscale Hypothesis Testing.** A multiple linear regression was run to understand how MAT training hours and MAT training environment impacts primary care providers' perceived level of personal valence, after adjusting for working with a provider who prescribes MAT medications and previously or currently prescribes MAT medications. To assess linearity, a scatterplot of observed Personal Valence Subscale scores against predicted Personal

Valence Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 2.33. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). Cases were individually inspected for standard deviations greater than ±3 (Tabachnick & Fidell, 2013). One provider was an outlier with a perceived Personal Valence Subscale score of 1.00. Due to limited sample size the provider was not removed from the analysis.

Table 3.14 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. After adjusting for whether they work with a provider who prescribes MAT medications and previously or currently prescribes MAT medications, MAT training hours and training environment were statistically significant and predicted perceived level of personal valence, $F(5, 56) = 4.49$ $p = .001$, $R^2 = .37$.

**Table 3.14**

*Multiple Linear Regression of MAT Training Hours and MAT Training Environment on Perceived Level of Personal Valence (N=62)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | .37** | .06 |
| Constant | 5.50*** | .22 | | 25.48 | | | | |
| Work with a provider who prescribes MAT medications | -1.04** | .37 | -.38 | -2.80 | -.30 | -.51 | | |
| Previously or currently prescribes MAT medications | -.95 | .48 | -.29 | -1.99 | -.22 | -.46 | | |
| 8 hours of MAT training | .64 | .65 | .20 | .98 | .11 | -.02 | | |
| 24 hours of MAT training | .66 | .68 | .18 | .97 | .11 | -.10 | | |
| Online training environment | .15 | .58 | .05 | .80 | .09 | .16 | | |
| In-person training environment | -.63 | .71 | -.16 | .38 | -.10 | -.33 | | |
| Hybrid training environment | -.21 | .79 | -.05 | .80 | -.03 | -.03 | | |

*Note.* *p < .05 **p < .01 ***p < .001

A post hoc analysis with a Bonferroni adjustment revealed there was a statistically significant difference. Therefore, we can reject the null hypothesis. The MAT training hours and training environment contributed .06 in shared variability. Provider demographics comprised the two covariates and explained approximately 31.00% of the variation in perceived level of personal valence. As indicated by the squared semipartial correlations, MAT training hours and training environment were less important than the covariates. Also, the change in $F = .97$ was not statistically significant with the addition of the MAT training hours and training environment, $p = .447$. As a result, the standardized regression coefficients for MAT training hours and training

environment variables did not have a statistically significant impact on perceived level of personal valence and all hypotheses ($H4_a$-$H4_c$) were rejected.

**Stereotype Awareness Subscale Hypothesis Testing.** A multiple linear regression was run to understand how MAT training hours and MAT training environment impact primary care providers' perceived level of stereotype awareness, after adjusting for previous training in addiction. To assess linearity, a scatterplot of observed Stereotype Awareness Subscale scores against predicted Stereotype Awareness Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.84. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). Cases were individually inspected for standard deviations greater than ±3 and no outliers were observed (Tabachnick & Fidell, 2013).

After adjusting for previous training in addiction, primary care providers' perceived level of stereotype awareness was not significantly different than zero, $F(5, 56) = 2.11$, $p = .067$, $R^2 = .19$. MAT training hours and training environment variables did not have a statistically significant impact on perceived levels of stereotype awareness and all hypotheses ($H5_a$-$H5_c$) were rejected.

**Stereotype Agreement Subscale Hypotheses Testing.** A multiple linear regression was run to understand how MAT training hours and MAT training environment impact primary care providers' perceived level of stereotype agreement, after adjusting for previously or currently prescribing medication, working with a provider that prescribes MAT medications, and obtaining

a X-waiver (one data point was missing). To assess linearity, a scatterplot of observed Stereotype Agreement Subscale scores against predicted Stereotype Agreement Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 2.34. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). Cases were individually inspected for standard deviations greater than ±3, no outliers were observed (Tabachnick & Fidell, 2013).

Table 3.15 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. After adjusting for whether they work with a provider who prescribes MAT medications and previously or currently prescribes MAT medications, MAT training hours and training environment were statistically significant and predicted perceived level of stereotype agreement, $F(5, 55) = 6.47$ $p = .000$, $R^2 = .50$.

**Table 3.15**

*Multiple Linear Regression of MAT Training Hours and MAT Training Environment on Perceived Level of Stereotype Agreement (N=61)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | .50*** | .10 |
| Constant | 3.97*** | .12 | | 33.95 | | | | |
| Work with a provider who prescribes MAT medications | -.31 | .20 | -.19 | -1.53 | -.15 | -.49 | | |
| Obtained a X-waiver | -1.04** | .32 | -.61 | -3.29 | -.32 | -.52 | | |
| Previously or currently prescribes MAT medications | -.61* | .27 | -.31 | -2.21 | -.22 | -.54 | | |
| 8 hours of MAT training | .97* | .40 | .51 | 2.45 | .24 | -.20 | | |
| 24 hours of MAT training | 1.03* | .38 | .47 | 2.67 | .26 | -.10 | | |
| Online training environment | -.30 | .32 | -.16 | -.95 | -.09 | -.05 | | |
| In-person training environment | -.39 | .39 | -.17 | -.99 | -.10 | -.32 | | |
| Hybrid training environment | -.18 | .43 | -.07 | -.40 | -.04 | -.07 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

A post hoc analysis with a Bonferroni adjustment revealed there was a statistically significant difference. Therefore, we rejected the null hypothesis. The MAT training hours and training environment contributed .10 in shared variability. Provider demographics the comprised the three covariates explained approximately 40.00% of the variation in perceived level of stereotype awareness. As indicated by the squared semipartial correlations, MAT training environment is less important than the covariates. MAT training hours were more important than all covariates except obtaining a X-waiver. Also, the change in $F = 6.47$ was not statistically

significant with the addition of the MAT training hours and training environment, $p = .094$. As a result, the standardized regression coefficients for MAT training environment variables did not have a statistically significant impact on perceived level of stereotype agreement and hypothesis $H6_b$ was rejected. The standardized regression coefficients for MAT training hours variables did have a statistically significant impact on perceived level of stereotype agreement and accepting hypothesis $H6_a$ and accepting $H6_c$. See Table 3.16 for a summary of findings.

**Table 3.16**

*Paper Two: Summary of Findings*

| Hypothesis | Conclusion |
|---|---|
| H1a: Higher perceived levels of appropriateness subscale scores among primary care providers are related to higher number of MAT training hours. | Rejected |
| H1b: Lower perceived levels of appropriateness subscale scores among primary care providers are related to having no MAT training environment. | Rejected |
| H1c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of appropriateness. | Rejected |
| H2a: Perceived levels of management support subscale scores among primary care providers are not related to hours of MAT training. | Accepted |
| H2b: Lower perceived levels of management support subscale scores among primary care providers are related to no MAT training environment or online access only. | Rejected |
| H2c: MAT training environment is the best predictor of perceived level of support management. | Rejected |
| H3a: Higher perceived levels of change efficacy subscale scores among primary care providers are related to higher number of MAT training hours. | Rejected |
| H3b: Lower perceived levels of change efficacy subscale scores among primary care providers are related to no MAT training environment or only access only. | Rejected |
| H3c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of change efficacy. | Rejected |
| H4a: Higher perceived levels of personal valence subscale scores among primary care providers are related to higher number of MAT training hours. | Rejected |

| | |
|---|---|
| | Rejected |
| H4b: Lower perceived levels of personal valence subscale scores among primary care providers are related to having no MAT training environment or only access only. | |
| H4c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of personal valence. | Rejected |
| H5a: Lower perceived levels of stereotype awareness subscale scores among primary care providers are related to having higher number of MAT training hours. | Rejected |
| H5b: Higher perceived levels of stereotype awareness subscale scores among primary care providers are related to having no MAT training environment or only access only. | Rejected |
| H5c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of stereotype awareness. | Rejected |
| H6a: Lower perceived levels of stereotype agreement subscale scores among primary care providers are related to having higher number of MAT training hours. | Accepted |
| H6b: Higher perceived levels of stereotype agreement subscale scores among primary care providers are related to having no MAT training environment or only access only. | Rejected |
| H6c: There is one best combination of hours of MAT training and MAT training environment to predict the perceived level of stereotype agreement. | Accepted |

## 3.5 Discussion

The study results demonstrated no correlation between primary care providers' readiness to integrate MAT services into clinical practice and the number of training hours providers have or the environment in which their MAT training was conducted. However, our study results did reveal a relationship between stigma and the length of MAT training.

Contrary to the hypothesized associations, there was no statistically significant relationship between primary care providers' MAT training hours and training environment and perceived levels of appropriateness, change efficacy, management support and personal valence as it relates to integrating MAT services into clinical practice. In concurrence with our findings, Haffajee and colleagues (2018) found a lack of organizational support was not related to completing MAT training. However, our study differed from the findings of previous literature (Andraka-Christou & Capone, 2017; Hiatt, 2006; Kirane et al., 2019). For example, Andraka-Christou and Capone (2017) found a lack of MAT training could hinder providers from perceiving treating individuals with OUD as appropriate. While our findings found no impact on one's ability to be successful (change efficacy) or to gain a benefit (personal valence) from MAT training, Kirane and colleagues (2019) found those with MAT training were more confident and more likely to treat patients with OUD. According to Hiatt, (2006) effective training leads to higher retention of new techniques (change efficacy). Perhaps our study findings suggest that MAT training is not an effective tool for promoting change to integrate MAT services in primary care.

More recent studies found there was a need for a removal of specialized MAT training as a requirement to treat individuals with OUD in order to expand treatment, promote health equity, and decrease stigma (Haber et al., 2023; Jones et al., 2022; Jones et al., 2023b). In line with this

push for change, the United States Congress passed the Consolidated Appropriations Act (CAA) in 2023, which removed the requirement of a X-waiver for all providers (SAMSHA, 2023). Effective June 27, 2023, the CAA mandated new or renewing Drug Enforcement Administration registrants must complete eight hours of opioid or other substance use disorder training to receive their federal licensure (SAMSHA, 2023). The eight hours of training are not required to be specific to buprenorphine or OUD and may be satisfied through past trainings (DEA, n.d.b). The training requirements are automatically fulfilled for board certified practitioners in addiction medicine or addiction psychiatry as well as for providers who graduated within five years of the June 27, 2023, whose curriculum included at least eight hours of training on treating and managing patients with OUD or other substance use disorders (DEA, n.d.b). CAA has clearly increased the number of providers eligible to treat patients with OUD in primary care. However, it remains to be seen if eliminating this barrier will be enough to change adoption rates of MAT services among primary care providers. Further research is needed to study the effects of the CAA policy on primary care providers' readiness to implement MAT services.

Despite the multiple changes in legislation to improve access to care, OUD continues to be a complex problem that plagues the United States (CADCA, n.d.; DEA, n.d.; Practice Guidelines for the Administration of Buprenorphine for Treating Opioid Use Disorder, 2021; SAMSHA, 2023; SUPPORT for Patients and Communities Act, 2018). Although many agree that removal of the X-waiver is an important first step to address OUD treatment, research indicates it may not be enough (Franz et al., 2023; Gordon et al., 2022; Krupp et al., 2023; Nyaku et al., 2024). Gordon and colleagues (2022) found only a third of those with a X-waiver were prescribing MAT medications, suggesting removal of the DATA 2000 waiver requirement may not increase the access to care that so many people with OUD need. A similar study found

more than half of the providers who completed DEA registration and 10 hours of training were not prescribing buprenorphine (Nyaku et al., 2024). Both of these studies, along with others, found a lack of institutional support as a key barrier to increasing access to OUD treatment (Gordon et al., 2022; Haffajee et al., 2018; Krupp et al., 2023; Lai et al., 2022; Nyaku et al., 2024). In accordance with these findings, findings from both Paper 1 and this study (Paper 2) identified management support as an area of concern. Our study adds to current literature that removal of the X-waiver requirement alone may not be sufficient in increasing providers' readiness to implement MAT services. Institutional support from leadership is needed (Gordon et al., 2022; Krupp et al., 2023). Future studies should explore the impact of management support on providers' readiness to treat individuals with OUD in primary care.

Franz and colleagues (2023) found in addition to the removal of the X-waiver, the specialized training that was required to obtain a X-waiver was associated with increased empathy and decreased explicit bias towards patients with OUD. We found something similar; our results revealed primary care providers with 8 or more hours of MAT training had lower individual levels of stigma toward patients with OUD when compared to providers with less than 8 hours of training. It is possible that with a larger sample, our findings may have aligned with results from Chung and colleagues (2024). Their study revealed that receiving as little as 4 hours of training related to stigmatizing attitudes, behavioral therapy options, and appropriate use of opioid medications diminished stigma amongst medical students towards patients with OUD (Chung et al., 2024). These results suggest MAT-related trainings may be necessary for decreasing stigma-related barriers to providing healthcare to those with OUD despite changes to regulations to remove X-waiver training requirements.

Contrary to our hypothesis, MAT training hours did not have an impact on providers' level of stereotype awareness. The construct of stereotype awareness had a mean score of 3 out of 5 teetering along midpoint of the scale. This indicates stereotype awareness might be an area of concern. It is possible that participants in this research study have overestimated societal perceptions of OUD and its treatment. Only approximately a third of United States citizens do not believe OUD may be treated long-term (Harvard School of Public Health, 2018). However, it is more likely that public opinion related to those with OUD needs to change. Many perceive individuals with OUD as manipulative, displaying criminal behavior (Andraka-Christou & Capone, 2018; Haffajee et al., 2018), dangerousness, unpredictable, irresponsible, and to blame for their condition (Corrigan et al., 2017; Kulesza et al., 2013; Schomerus et al., 2011; Yang et al., 2017). These results provide further insight into the relationship between MAT training and stigma towards individuals with OUD. It is important to understand what stigmas people hold and how that may affect people getting OUD care as negative perceptions by providers can become a barrier to quality care (Becker et al., 2023; van Boekel, 2013). Avenues for future research include exploring the differences between societal and individual stigma towards patients being treated for OUD and how societal viewpoints influence primary care organizational readiness to implement MAT services in clinical practice.

### *3.5.1 Limitations*

The generalizability of these results may be impacted due to the limited sample size, use of non-probability sampling, as well as the fact that this study was limited to only primary care providers in the Hampton Roads area of Virginia. Additionally, our research relied on a self-report online survey. Although this method is cost effective and convenient, it does have several disadvantages, including response bias (Pilot & Beck, 2017). For instance, since this study

addressed the sensitive topic of provider stigma towards treating patients with OUD in primary care, some participants may not have felt comfortable completing the survey due to fear of judgment by others. In efforts to encourage participation with unbiased responses, all survey data were collected anonymously. Despite this, the reliability of these results may be impacted by social desirability response bias. Participants may misrepresent their answers to fit with social norms related to stigma (Pilot & Beck, 2017). Furthermore, regressions were used to analyze the results. Regression analyses are used to determine relationships thus, causality must not be implied (Tabachnick & Fidell, 2013).

### *3.5.2 Future Research and Recommendations*

Policy surrounding the X-waiver has changed (SAMSHA, 2023). Policies will narrow gateway for access to quality care for an extremely vulnerable population if they are not designed to decrease stigma, increase motivations, and increase the perception and confidence of the providers that they have the ability to treat individuals with OUD. However, if legislators can find ways for policy to increase providers' confidence and reduce stigma then we open the gates to new paths that will allow access to care at a level that has yet to be seen for individuals with OUD. Future studies should consider the timeframe in which our study was conducted and evaluate whether the CAA has diminished barriers to improve adoption rates of MAT services among primary care providers by decreasing stigmatization and increasing readiness to implement MAT services in primary care.

As suggested by Franz and colleagues (2023), variations in policies and trainings can open or shut the gates to care for those with OUD, as these policies and availability of training can impact providers' stigma towards providing OUD treatment. Without improvement to empathy and biases towards the OUD population, little will change in regard to increased

accessibility to quality care. Further study is needed pertaining to the impact assessment of MAT training on stigma and received differing results between stereotype awareness and stereotype agreement. The utilization of qualitative research methodology is essential for future research in order to increase our understanding of providers' societal perceptions and individual stigmas towards patients being treated for OUD and how societal viewpoints may influence primary care organizational readiness to implement MAT services in clinical practice.

Our research identified stereotype awareness as a potential barrier for primary care providers to integrate MAT services in clinical practice. Stereotype awareness in this study was the level in which providers believed others in society believed OUD related stereotypes (Yang et al., 2019), and stereotype awareness represented the ADKAR construct of awareness. Awareness can be impacted by several factors including an individual's views of the current state, perceptions of problems related to MAT services, misinformation, and contestability to the reasons for changes (Hiatt, 2006). Misinformation diminishes willingness to treat patients with OUD and prescribe buprenorphine (Franz et al., 2024). Haffajee and colleagues (2018) found personal beliefs and stigma are a barrier to the providing MAT medications. Organizations with providers with low levels of awareness may experience more resistance to change and delayed implementation of the change (Hiatt, 2006; Prosci Inc., n.d.b). In order to build awareness in an organization, it is recommended to develop clear effective communication from leadership that discusses the need for MAT services, how the change aligns with organizational goals, how the change will happen, empower management to be mentors to employees throughout the transition period, and dispel misinformation (Hiatt, 2006). Additionally, the development of effective trainings that address stigmatization of individuals with OUD and MAT medication are needed (Chung et al., 2024; Franz et al., 2024).

Additional avenues for future research include replication of this study in similar settings across Virginia and other states to increase generalizability (Pilot & Beck, 2017) and developing a strategy to increase consistent management support for primary care providers (see Paper 1 for further details).

### *3.5.3 Conclusion*

In the context of the above limitations, the results provide further insight into the effects of X-waiver training and its environment on primary care providers' perceived level of stigma and readiness towards integrating MAT services in a primary care setting. Although our study did not reveal any correlations between primary care providers' readiness to integrate MAT services and the number of training hours providers have or the environment in which their MAT training was conducted, management support was still identified as an area that primary care organizations should address to increase organizational change readiness. These results indicate MAT training may not be the most effective tool for promoting change to integrate MAT services in primary care. However, we did find that MAT training is associated with lower individual levels of stigma toward patients with OUD. Furthermore, this study was able to utilize the ADKAR Model to identify perceived societal viewpoints towards individuals with OUD as a potential barrier for providers. Although OUD treatment policies have changed, our study demonstrates the issues surrounding primary care providers' perceptions of treating OUD and their readiness to implement MAT services remains a complex problem and needs further research.

# 4. Research Paper 3: ADKAR Model and the Impact of Primary Care Providers' Scope of Practice on Readiness to Implement MAT Services

## 4.1 Introduction

Opioid dependence in the United States is a growing public health concern. In 2019, an estimated 1.6 million individuals in the United States had opioid use disorder (OUD; O'Donnell et al., 2020), and had increased by almost a million people in 2021 (Jones et al., 2023a). Nearly 47,000 people died from opioid overdose in a 12-month period ending in July 2019 (Ahmad et al., 2020) and in 2021, opioids accounted for 80,411 deaths (CDC, 2023). Significant gaps in care for the increasing numbers of individuals with OUD are created by a traditionally siloed U.S. health care system with limited numbers of addiction medicine specialists (Donroe & Tetrault, 2018; Lipari et al., 2016). The COVID-19 pandemic exacerbated treatment access. For example, many patients with OUD experienced disruption in outpatient treatment and inadequate access to treatment for OUD. This, combined with social isolation, increased the risk for relapse and overdose (Boa et al., 2020; D'Onofrio et al., 2020). Since the pandemic, mortality from OUD continues to plague tens of thousands in the United States (Ahmad et al., 2024). To address barriers to appropriate care access, there is a growing effort to integrate OUD treatment into primary care (Edelman et al., 2018; Franz et al., 2024; Levin et al., 2016).

Diagnosing and treating OUD in a primary care setting has multiple advantages over specialty sites. First, primary care sites are more accessible and have the ability to treat multiple conditions. Primary care is often the first point of patient contact in the healthcare system due to its ability to diagnose and treat many morbidities. The ability for primary care providers to properly diagnose patients with OUD is important for this population, as most people with OUD do not perceive the need to seek treatment for this disorder (Lipari et al., 2016). Second, primary

care practitioners also have a high number of contact hours with their patients. This capacity for longitudinal care provides a better understanding of factors that may influence a patient's health through building rapport and establishing relationships with their patients (Donroe et al., 2020). With a better understanding of what uniquely influences their patients' health, primary care providers can tailor health care services to their individual patients' needs (Edelman et al., 2018). Third, as primary care is not the traditional setting for OUD treatment, it has the potential to decrease stigma associated with OUD treatment access (Donroe et al., 2020; Edelman et al., 2018). Finally, providing preventative services such as screening and brief counseling for other substance use disorders (e.g., alcohol and tobacco) is already common practice in primary care settings (Maciosek et al., 2017). Furthermore, policies such as the Drug Addiction Treatment Act (DATA) of 2020 and Comprehensive Addiction and Recovery Act (CARA) of 2016 have expanded the ability for primary care providers to treat OUD by allowing providers to prescribe buprenorphine in an outpatient setting (CADCA, n.d.; DEA, n.d.a).

Despite policy expansion, there is still a low adoption rate to provide Medication Assisted Treatment (MAT) in primary care (Blum et al., 2016; Franz et al., 2024; McGinty et al., 2020). Barriers related to a provider's scope of practice are common factors for resistance to integrate MAT (Foti et al., 2021; Haffajee et al., 2018; Huhn & Dunn, 2017; Jones et al., 2020). According to the National Conference of State Legislatures (2017), scope of practice is a combination of a provider's education, training, and experience. Andraka-Christou and Capone (2017) found that a lack of training and experience in MAT hinders a provider's ability to see their scope of practice expanding to treat OUD. This lack of awareness to see primary care expansion as inclusive of OUD treatment can lead to a negative impact on a provider's desire to support the adoption of new practices, thus causing resistance to change (Hiatt, 2006).

Resistance to change is a normal part of the change process and is a common explanation for why organizations' change initiatives are unsuccessful (Hiatt & Creasey, 2012; Oreg, 2006; Smollan, 2011). Change initiatives, such as integrating MAT into primary care, can bring forth feelings of uncertainty, causing individuals to feel ambivalent towards adopting new practices (Oreg & Sverdlik, 2011). This ambivalence over the impact of the change can evoke strong emotions of fear and anxiety causing resistance to change (Dent & Goldberg, 1999; Hiatt & Creasey, 2012). Thus, it is important for senior leaders to understand what factors are important to increase readiness for change (Cummings & Worley, 2009).

"Readiness is the cognitive precursor to the behaviors of either resistance to, or support for a change effort" (Armenakis et al., 1993, p. 681). An organization's readiness for change can be impacted by individuals' attitudes, beliefs, and intentions toward the change (Armenakis et al., 1993; Shah et al., 2017). Whether an individual is supportive or opposed to the change is a strong indicator of whether adoption of the new practices will be successful (Dunham et al., 1989). During the change process, attitudes are better indicators of future behaviors than past behaviors (Ajzen & Fishhein, 1980; Lamm & Gordon, 2010). With organizational change rarely being sustained and often not achieving the desired goals (Beer & Nohria, 2000; Looney et al., 2011), it is important to understand these attitudes to better plan and execute successful organizational change.

In order for the adoption of MAT in primary care to be successful, the providers must not only have the skills and knowledge, but also be open to and supportive of change. As attitudes, skills, motivations, and knowledge are all key components that are impacted by change (Smith, 2005), the primary purpose of this study was to understand how primary care providers' scope of practice influences their attitudes towards change readiness to integrate MAT services into the

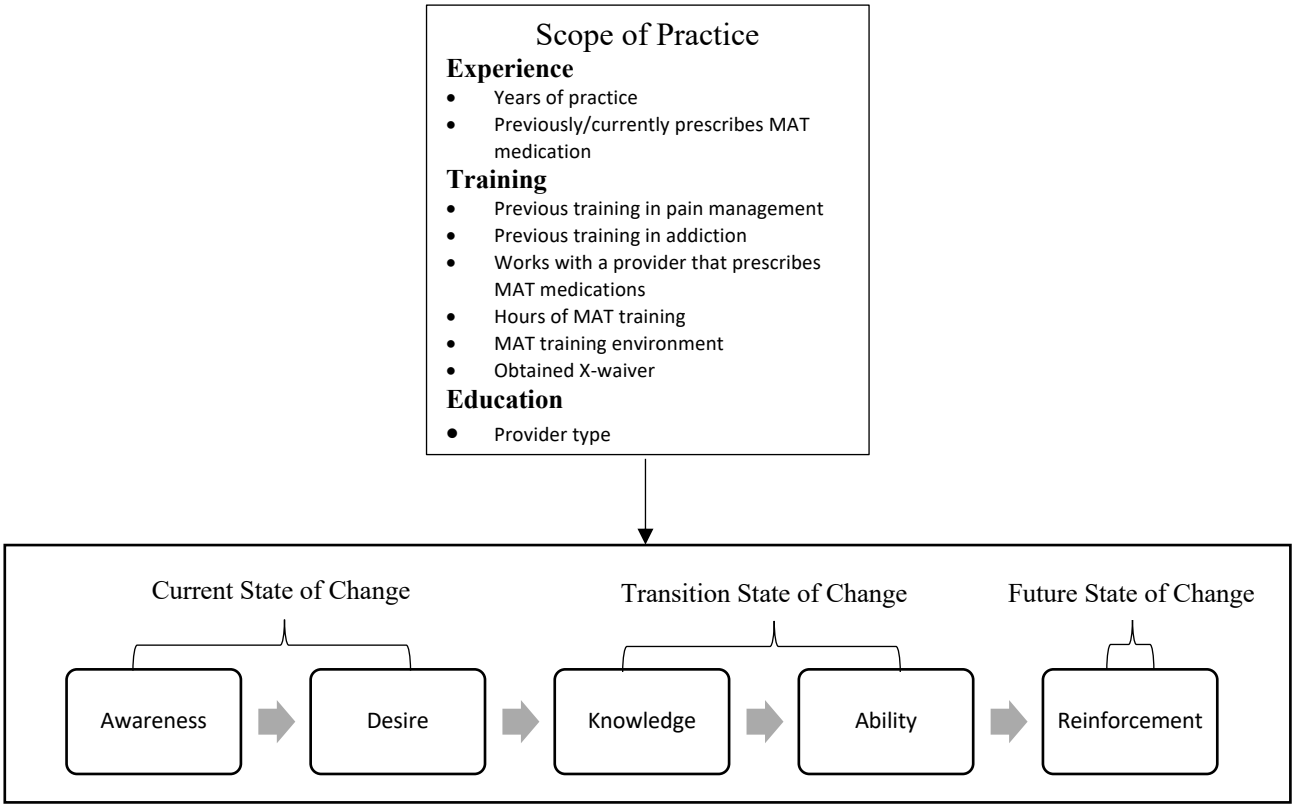
primary care clinical setting. This study constructed a multidimensional measure of scope of practice from primary care providers' education, training, and experience.

## 4.2 Theoretical Framework

The ADKAR Model is a conceptual framework for change management that connects individual level of change and organizational change. All individuals in a group or organization must change for the group or organization to change as a whole (Prosci Inc., n.d.b). The ADKAR model is used to ensure that the people aspect in the change process is not forgotten; the model takes into consideration individuals' varying circumstances and focuses on multiple factors that must be addressed to implement the desired change successfully (Hiatt & Creasey, 2012). For a person to be successful in change during organizational change, five factors must be addressed: awareness, desire, knowledge, ability, and reinforcement. These five elements are the building blocks for change and follow the natural process through which an individual experiences change, as depicted in Figure 4.1 (Prosci, 2012). This model is effective for gaining a better understanding of individuals' transition through the change process, identifying areas of resistance to change, and developing strategies that positively influence achievement of organizational change (Hiatt, 2006). The aim of this study is to apply the ADKAR model to understand how individual providers' scope of practice influences primary care's change readiness to integrate MAT services in their practice. The study used the model constructs to identify areas of weakness that could impede successful organizational change.

**Figure 4.1**

*Integration of Providers' Scope of Practice into the ADKAR Model*




The ADKAR Model can be broken down into three states of change: current, transition, and future (Prosci Inc., n.d.a). The current state is the present processes, behaviors, organizational structures, and roles that are familiar and comfortable (Prosci Inc., n.d.a). For an individual to move from the current state, awareness of the need for change must first occur and then the individual must have a desire to participate and support the change (Hiatt, 2006; Prosci Inc., n.d.a). In the absence of awareness and desire, an organization may experience more resistance to change, decreased productivity, increased turnover, and delayed implementation of the change (Hiatt, 2006; Prosci Inc., n.d.b). An individual's level of awareness and desire can be impacted by their personal situation and view of the current state and these factors are influenced by a person's experiences and education (Hiatt, 2006). Since the current state examines roles and

processes that are presently happening, this study investigated multiple provider characteristics to gain a better understanding of how a person's current level of experience and education impacts their overall readiness. This study examined the constructs of experience and education by: 1) examining the years of practice a provider has and whether a provider previously or currently prescribes MAT medications (experience); and 2) identifying the individual's provider type (education).

Unlike the current state, the transition state can be unpredictable, constantly changing, and can be perceived as disorganized and chaotic (Prosci Inc., n.d.a). This state requires a new way of thinking and the learning of new behaviors, skills, and processes all while maintaining and meeting current work demands (Hiatt, 2006). The transition state informs stakeholders how the change will be made. For an individual to successfully move through the transition state, both knowledge of how to change and the ability to implement new skills and behaviors are necessary to achieve the change (Hiatt, 2006; Prosci Inc., n.d.a). If individuals in an organization do not have the requisite knowledge and ability to change, the organization may encounter: low utilization or incorrect use or adoption of desired behaviors, skills, and processes; productivity decline; increased impact on clients and partners; and/or an increase in employees' worries regarding their future success using the change (Hiatt, 2006; Prosci, 2012). Resources available to provide education and training, along with an individual's current knowledge base, factor into a person's level of knowledge and desire. These factors can be influenced by education, training, and experience (Hiatt, 2006). In this study, the construct of training examined previous training in pain management, previous training in addiction, the number of hours of MAT training, the MAT training environment, whether an individual works with a provider that prescribes MAT medications, and if the individual has obtained a X-waiver. As described previously, the

constructs of experience and education were represented by an individual's years of practice, whether they previously or currently prescribed MAT medications, and provider type.

Lastly, the future state in the AKDAR model is what will be done. The future state is unknown and may not be well defined, as the end goal(s) may change during the transition state (Prosci Inc., n.d.a). This state may be troubling for some, as the future of the organization may not align with an individual's personal and/or professional goals (Prosci Inc., n.d.a). For organizations to maintain successful change, their employees need reinforcement to maintain the desired change in the future state (Hiatt, 2006; Prosci Inc., n.d.a). Organizations should be mindful that without reinforcement employees could revert to old processes, causing a decline in utilization of the new change (Hiatt, 2006). The reinforcements should be meaningful and associated with success. Previous experiences of an individual not being recognized for successful change can become a major barrier to sustaining change (Hiatt, 2006). Examining providers' years of practice and whether they have a history of prescribing MAT medications provided important insight into understanding how experience may impact an individual's perceived level of reinforcement. The study research question, aims, and hypotheses are summarized in Table 4.1.

**Table 4.1**

*Paper 3: Research Question, Aims, and Hypotheses*

| Main Research Question: Is providers' change readiness to implement MAT services influenced by their scope of practice (based on the ADKAR model constructs) after adjusting for gender? | |
|---|---|
| Aim 1: To construct a latent variable that represents scope of practice derived from input variables representing experience, training, and education. | H1: Each construct of scope of practice (experience, training, and education) will contribute to the ability to predict scope of practice. |
| Aim 2: To determine if primary care providers' change readiness is influenced by their scope of practice. | H1a: Higher perceived levels of awareness subscale scores among primary care providers are related to higher experience scores.<br>H1b: Higher perceived levels of awareness subscale scores among primary care providers are related to higher training scores.<br>H1c: Higher perceived levels of awareness subscale scores among primary care providers are related to higher education scores.<br>H1d: There is one best combination of experience, training, and education to predict levels of perceived awareness.<br>Note: H1s adjusted for gender.<br><br>H2a: Higher perceived levels of desire subscale scores among primary care providers are related to higher experience scores.<br>H2b: Higher perceived levels of desire subscale scores among primary care providers are related to higher training scores.<br>H2c: Higher perceived levels of desire subscale scores among primary care providers are related to higher education scores.<br>H2d: There is one best combination of experience, training, and education to predict levels of perceived desire.<br>Note. H2s adjusted for gender first, and then adjusted for awareness.<br><br>H3a: Higher perceived levels of knowledge subscale scores among primary care providers are related to higher experience scores.<br>H3b: Higher perceived levels of knowledge subscale scores among primary care providers are related to higher training scores.<br>H3c: Higher perceived levels of knowledge subscale scores among primary care providers are related to higher education scores.<br>H3d: There is one best combination of experience, training, and education to predict levels of perceived knowledge.<br>Note. H3s adjusted for gender first, and then adjusted for awareness, and desire. |

| | |
|---|---|
| | H4a: Higher perceived levels of ability subscale scores among primary care providers are related to higher experience scores.<br>H4b: Higher perceived levels of ability subscale scores among primary care providers are related to higher training scores.<br>H4c: Higher perceived levels of ability subscale scores among primary care providers are related to higher education scores.<br>H4d: There is one best combination of experience, training, and education to predict levels of perceived ability.<br>Note. H4s adjusted for gender first, and then adjusted for awareness, desire, and knowledge.<br><br>H5a: Higher perceived levels of reinforcement subscale scores among primary care providers are related to higher experience scores.<br>H5b: Higher perceived levels of reinforcement subscale scores among primary care providers are related to higher training scores.<br>H5c: Higher perceived levels of reinforcement subscale scores among primary care providers are related to higher education scores.<br>H5d: There is one best combination of experience, training, and education to predict levels of perceived reinforcement.<br>Note. H5s adjusted of gender first, and then adjusted for awareness, desire, knowledge, and ability. |

## 4.3 Methods

### *4.3.1 Study Design*

A prospective cross-sectional descriptive study conducted at an academic health profession training center in Virginia examined differences in providers' readiness to implement MAT services into primary care based on the constructs of the ADKAR model. The primary source for study data was a single survey comprising two sections: the ADKAR model questionnaire (Kachian et al., 2018) and provider demographics. Data was collected using an anonymous self-administered online survey. The data collection period was March 2022-May 2022. The research protocol was submitted to the Virginia Commonwealth University Institutional Review Board and approved.

### *4.3.2 Setting and Participants*

This study recruited primary care providers in family and internal medicine who work for the academic health profession training centers and/or their partnering clinical sites in the Hampton Roads area of Virginia (Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach). Primary care providers for this study were defined as practicing physicians, physician assistants, nurse practitioners, residents, physician assistant students in their clinical year, and nurse practitioner students in their clinical year. Screening and enrolling of participants was based on the following inclusion and exclusion criteria.

Inclusion Criteria:

1. The participant is a Drug Enforcement Administration licensed provider: physician, physician assistant, or nurse practitioner; or a resident; or a physician assistant student in clinical rotations; or a nurse practitioner student in clinical rotations
2. Participant currently works in a primary care setting: family practice or internal medicine
3. Participant's clinical practice is in one of the seven Hampton Roads cities of Virginia: Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, or Virginia Beach.

Exclusion Criteria:

1. Provider is no longer practicing at one of the clinical practice sites (e.g., retired).

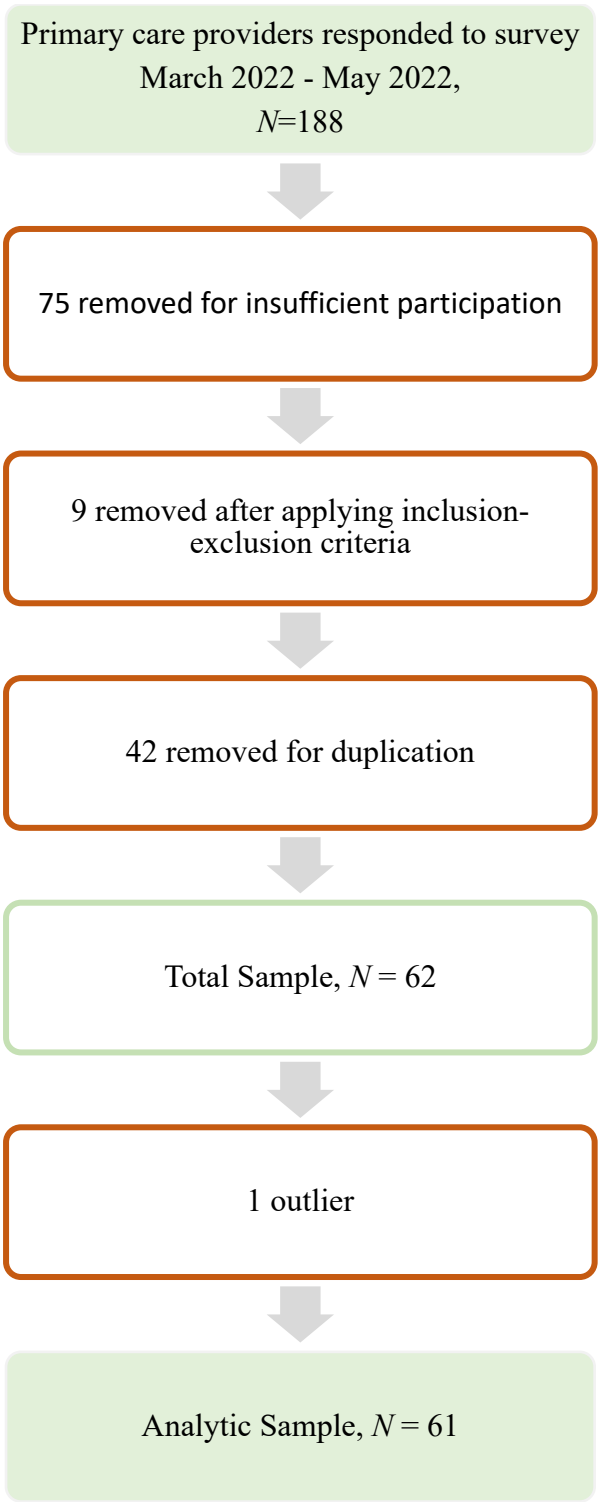
### *4.3.3 Participant Recruitment*

Participants were recruited using passive recruiting strategies due to the COVID-19 pandemic. Scripted emails (see Appendix B) about the study were sent out from the academic health profession training center to primary care providers both at the institution and at clinical

partner sites. These notifications included the purpose of the study, estimated time requirement, and a data confidentiality statement. The academic health profession training center distributed the initial recruiting email and survey link. The online survey was available through QuestionPro®. Due to low participation, the academic health profession training centers were approached to resend survey link (Appendix C) as a reminder three times. Figure 4.2 follows the final sample of 62 providers after removing surveys with insufficient survey participation, duplicate surveys, and applying the inclusion and exclusion criteria.

**Figure 4.2**

*Application of inclusion and exclusion criteria to the study sample Paper 3*



### *4.3.4 Power Analysis*

An a priori power analysis was used to calculate the sufficient sample size to power the study. According to Polit and Beck (2017), when hierarchical multiple linear regression is used the number of predictors must be considered when calculating the sample size. With three predictors, a sample of 48 participants were needed to achieve a medium effect size $f^2 = 0.25$ and power of 0.80 when $\alpha = 0.05$, according to G*Power 3.1 software.

A post hoc power analysis was completed for hypotheses 1 and 3 through 5. With 1 predictor, a sample of 61 participants, and a medium effect size $f^2 = 0.25$ a power of .97 was achieved when $\alpha = 0.05$, according to G*Power 3.1 software. Hypotheses 2a-c had 3 predictors. A post hoc power analysis determined a power of .90 was achieved when $\alpha = 0.05$, according to G*Power 3.1 software.

### *4.3.5 Instruments*

**ADKAR Model Questionnaire.** Two instruments were used for this study. The first instrument is the ADKAR model questionnaire. This instrument was adapted from the 20-item Likert scale ADKAR model questionnaire that is designed to measure the individual's level of readiness based on the ADKAR model (Kachian et al., 2018). Kachian and colleagues (2018) tested both content and face validity, as well as the internal consistency for each subscale. Cronbach's alphas were $\alpha = .86$ awareness, $\alpha = .82$ desire, $\alpha = .87$ knowledge, $\alpha = .86$ ability, $\alpha = .86$ reinforcement, with $\alpha = .93$ for the total instrument; values >0.80 indicate acceptable internal consistency (Polit & Beck, 2017). However, changes to the original instrument were needed as the questionnaire was designed to evaluate the readiness of nurses to use a specific nursing process (Nursing Process Kardex). Survey items mentioning the nursing protocol have been modified to fit the needs of this study. Modifications are shown in Table 4.2. Pilot testing was

performed to test reliability and validity of the instrument changes. Questions were answered using a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Recorded answers for each of the 20 items were collected from the ADKAR Model Questionnaire subscales and stored in QuestionPro®. Responses were coded into numerical variables so a single mean score could be ascertained for each individual.

**Table 4.2**

*Summary of Changes to the ADKAR model questionnaire*

| Subscales | Original | Revised Version |
|---|---|---|
| **Awareness** | I understand the reasons for changing in the Nursing Process Kardex. | I understand the reasons for **integrating MAT services into primary care**. |
| | I understand the difficulties in changing in the Nursing Process Kardex. | I understand the difficulties in **integrating MAT services into primary care**. |
| | I know how effective changing in the Nursing Process Kardex. | I know how effective **integrating MAT services into primary care**. |
| | I am aware of the goals of the changing in the Nursing Process Kardex. | I am aware of the goals of **integrating MAT services into primary care**. |
| **Desire** | I support the implementation of the change (using the Nursing Process Kardex). | I support the implementation of the change (**integrating MAT services into primary care**). |
| | I benefit from the change (using the Nursing Process Kardex). | I benefit from the change (**integrating MAT services into primary care**). |

**Provider Characteristics Form**. The second instrument was the provider characteristics form. The following data were collected and entered into QuestionPro®: gender (male, female, transgender male, transgender female, gender variant/non-conforming, not listed, and prefer not to say), provider type (physician, physician assistant, nurse practitioner, resident, and physician assistant student), years of practice (<3 years, 3-5 years, 6-10 years, and >10 years), previous training in pain management (yes, no), previous training in addiction (yes, no), previously/currently prescribes MAT medications (yes, no), works with a provider who prescribes MAT medications (yes, no), MAT hours of training and (none, 8 hours of training,

and 24 hours of training), training environment (none, in-person, online, and hybrid), and obtained a X-waiver (yes, no).

### *4.3.6 Measures*

**Dependent Variables Measurements.** The type of services a provider is allowed to administer is limited by their scope of practice. Scope of practice is a combination of a provider's education, training, and experience (National Conference of State Legislatures, 2017). The goal of Aim 1 was to produce three components that represent education, training, and experience. Each of these components is represented by a continuous score.

The primary outcomes for Aim 2 are five measures derived from the ADKAR model questionnaire (Kachian et al., 2018). The dependent variables were awareness, desire, knowledge, ability, and reinforcement. Each dependent variable score was the mean of the four relevant items. For subscales that were not complete, the score was the result of the mean of the number of completed items. All subscales' items are measured using a 5-point Likert scale. Questions for each subscale are listed in Table 4.3.

**Table 4.3**

*Questions Measuring Awareness, Desire, Knowledge, Ability, and Reinforcement*

| | |
|---|---|
| **Awareness** | 1. I understand the reasons for integrating MAT services into primary care.<br>2. I understand the difficulties in integrating MAT services into primary care.<br>3. I know how effective integrating MAT services into primary care.<br>4. I am aware of the goals of integrating MAT services into primary care. |
| **Desire** | 1. To be part of these changes makes me feel excited.<br>2. This change will provide me a lot of opportunities.<br>3. I support the implementation of the change (integrating MAT services into primary care).<br>4. I benefit from the change (integrating MAT services into primary care). |
| **Knowledge** | 1. I have the required skills to adapt to the changes.<br>2. I understand how my work is related to change.<br>3. Change is clear to me.<br>4. I have the knowledge to adapt to the changes. |
| **Ability** | 1. I can adapt to change.<br>2. I can positively help change.<br>3. I can do better due to changes.<br>4. I have the ability to do things at a level that is needed for the changes. |
| **Reinforcement** | 1. Our members of the group support this change.<br>2. My manager supports this change.<br>3. My uncertainty has been resolved.<br>4. I personally develop with this change. (This item was deleted from final analysis.) |

*Note.* Responses are 1= strongly disagree, 2=somewhat disagree, 3=unsure, 4=somewhat agree, 5=strongly agree

**Observed and Independent Variables Measurements.** For Aim 1, the observed variables were years of practice, previous training in pain management, previous training in addiction, previously or currently prescribes MAT medications, works with a provider who prescribes MAT medications, hours of MAT training, MAT training environment, obtained a X-waiver, and provider type. Study variables were derived from literature and specific aspects of the ADKAR model. Table 4.4 displays the observed variables.

**Table 4.4**

*Variables of Interest for Proposed Study Aim 1*

| **Observed Variables** | **Construct** | **Description and Measurement** | **Data Source** |
|---|---|---|---|
| *Years of practice | Experience | Ordinal:<br><3 years<br>3-6 years<br>5-10 years<br>>10 years | Provider demographics form |
| Previous training in pain management | Training | Dichotomous: Yes, No | |
| Previous training in addiction | Training | Dichotomous: Yes, No | |
| Previously/currently prescribes MAT medications | Experience | Dichotomous: Yes, No | |
| Works with a provider who prescribes MAT medications | Training | Dichotomous: Yes, No | |
| *Hours of MAT Training | Training | Ordinal: < less than 8 hours of training, 8-hour training, and 24-hour training | |
| MAT training environment (represented by 3 dummy variables) | Training | Nominal: in-person, online, hybrid, none | |
| Obtained X-waiver | Training | Dichotomous: Yes, No | |
| *Provider type | Education | Nominal:<br>• Physician (MD/DO)<br>• Physician Assistant (PA)<br>• Nurse Practitioner (NP)<br>• Resident<br>• PA Student<br>• NP Student | |
| **Dependent Variables** | **Construct** | **Description and Measurement** | **Data Source** |
| Experience | | Continuous | |

| | | | |
|---|---|---|---|
| Training<br>Education | Scope of practice was the sum of the components | | Principal Component Analysis |
| **Control Variables** | | **Description and Measurement** | **Data Source** |
| *Gender | | Nominal:<br>• Male<br>• Female<br>• Transgender male<br>• Transgender female<br>• Gender variant/non-conforming<br>• Not listed<br>• Prefer Not to Say | Provider demographics form |

*Note.* Variables marked with an * were collapsed. See section 4.4.1 for further details.

For Aim 2, the independent variables were the components determined from aim 1. It was anticipated that at least three components from aim 1 would describe scope of practice and that those components would be experience, training, and education. Any other components identified in aim 1 were also used as independent variables in aim 2 and each variable was represented by a score. Table 4.5 displays the independent variables.

**Covariate.** Gender was controlled for in both aims (Kirane et al., 2019).

**Table 4.5**

*Variables of Interest for Proposed Study Aim 2*

| **Independent Variables** | **Description and Measurement** | **Data Source** |
|---|---|---|
| Experience | Continuous | Derived from Aim 1 |
| Training | | |
| Education | | |
| **Dependent Variables** | **Description and Measurement** | **Data Source** |
| Awareness score | Continuous: Mean of the four 5-point Likert scale items | The ADKAR Model Questionnaire: Awareness Subscale (4 items) |
| Desire score | | The ADKAR Model Questionnaire: Desire Subscale (4 items) |
| Knowledge score | | The ADKAR Model Questionnaire: Knowledge Subscale (4 items) |
| Ability score | | The ADKAR Model Questionnaire: Ability Subscale (4 items) |
| Reinforcement score | | The ADKAR Model Questionnaire: Reinforcement Subscale (4 items) |
| **Control Variables** | **Description and Measurement** | **Data Source** |
| *Gender | Nominal:<br>• Male<br>• Female<br>• Transgender male<br>• Transgender female<br>• Gender variant/non-conforming<br>• Not listed<br>• Prefer Not to Say | Provider demographics form |

*Note.* Variable marked with an * was collapsed. See section 4.4.1 for further details.

### *4.3.7 Statistical Analyses*

This prospective, cross-sectional study used SPSS v.26 to conduct all analyses. Before transferring data from QuestionPro® into SPSS, a codebook was developed in Microsoft

Excel™. The codebook included a listing of all variables, their corresponding values, and their relationship to the study. The codebook also contained details of any data transformations, modifications, and deletions of any variables (Polit & Beck, 2017).

**Descriptive Statistics.** Upon completion of recruitment and enrollment of a sufficient number of study participants to power the study, descriptive statistics were calculated analyzing participants' gender, provider type, years of practice, previous training in pain management, previous training in addiction, previously or currently prescribes MAT medications, whether participants work with a provider who prescribes MAT medications, hours of MAT training, MAT training environment, and obtained a X-waiver. Frequencies, percentages, means, standard deviations, and ranges were determined, as appropriate. Descriptive analyses were used to assess the distribution of the data and compare baseline characteristics.

**Multivariate Analysis Techniques.** Aim 1 was evaluated using a principal components analysis (PCA). PCA is a variable reduction technique used to reduce a large set of variables into a smaller set of variables (components) that explains most of the variance (Laerd, 2017). This aim focused on removing unrelated variables, eliminating redundancy of variables, and removing multicollinearity to identify components that best represented the desired latent variable: scope of practice. PCA was chosen to assess this outcome because it can reduce the number of variables representing the constructs of experience, training, and education into a smaller number of components (Laerd, 2017). Prior to the PCA, a test of assumptions was performed, as outlined in Table 4.6 (Laerd, 2017; Tabachnick & Fidell, 2013).

**Table 4.6**

*Principal Components Analysis Assumptions*

| Assumption | Assessment |
|---|---|
| Sampling adequacy | Bartlett's test of sphericity was used to test the hypothesis that the correlations in a matrix are 0. If *p* is > .05, then observed variables were used. |
| Correlation size | R was examined for correlations. If correlations are not >.30 than the variable was be removed. |
| Linearity | Scatterplots were examined for linear relationship between dependent variable and independent variables collectively. |
| Absence of multicollinearity | Correlation coefficients >.70, and Tolerance value <.10 were used as criteria for deletion of variables. |
| No significant outliers | Cases with standard deviations greater than ±3 were inspected individually, and the variable was modified through transformation or score alternation. If modification is not appropriate than deletion occurred and was reported. |
| Normality | Scatterplots were examined for skewness and kurtosis. If the assumption of normality was violated, then deletion occurred and was reported. |

*Note.* Adapted from *Using Multivariate Statistics* by B.G. Tabachnick and L.S. Fidell, (6th edition), 2013, Boston, MA: Pearson and Laerd Statistics, 2017 (https://statistics.laerd.com).

The PCA: 1) determined patterns of correlations among observed variables; 2) reduced the number of observed variables into a smaller number of components; and 3) produced a regression equation for the underlying process (scope of practice) by using the fourteen observed variables (Tabachnick, 2013). The observed variables that represented the constructs of experience (years of practice and previously or currently prescribes MAT medications), training (previous training in pain management, previous training in addiction, hours of MAT training, participant works with a provider who prescribes MAT medications, MAT training environment, and obtained a X-waiver), and education (provider type) were run in a PCA after adjusting for

gender. A correlation matrix was produced to assess linearity between variables. The communalities were reviewed to understand the proportion of variance that was accounted for by each variable in the analysis (Laerd, 2017). All components were extracted, and the eigenvalue-one criterion was used to select components for rotation (i.e., the total variance explained must be >1; Tabachnick, 2013). A varimax orthogonal rotation was performed to increase interpretability by maximizing the variance of loadings on each component (Tabachnick, 2013). Components with loadings < 0.3 were not included in the interpretation of analysis results (Laerd, 2017).

Hierarchal multiple linear regression analyses (Aim 2) were performed to determine a model of the relationship between providers' scope of practice, as determined by these three components: experience, training, and education (independent variables) and five dependent variables representing change readiness constructs of the ADKAR model (awareness, desire, knowledge, ability, and reinforcement). This statistical technique was useful for this research study because it determined the relationship of change readiness constructs separately based on multiple predictors. Furthermore, this technique allowed for the overall fit of the model to be determined, and the total variance explained by each predictor (Laerd, 2017). Prior to the hierarchical multiple linear regression analysis, a test of assumptions for multiple linear regression was performed, as outlined in Table 4.7 (Laerd, 2017; Tabachnick & Fidell, 2013). If any cases were modified to meet assumptions, those modifications were reported in the results.

**Table 4.7**

*Hierarchical Multiple Linear Regression Assumptions*

| Assumption | Assessment |
|---|---|
| One continuous dependent variable | Each subscale was analyzed independently |
| Two or more independent variables | 3 independent variables were used |
| Independence of observations | All categories for both the dependent variable and the independent variables are mutually exclusive. |
| Linearity | 1. Examined scatterplots for linear relationship between dependent variable and independent variables collectively.<br>2. Examined partial regression plots between the dependent variable and each independent variable separately.<br>3. If data is not linear, then deletion occurred and was reported. |
| Homoscedasticity | Examined plots of the studentized residuals against the unstandardized predicted values. |
| Absence of multicollinearity | Correlation coefficients >.7, and Tolerance value <.1 were used as criteria for deletion of variables |
| No significant outliers | Cases with standard deviations greater than ±3 were inspected individually, and the variable was modified through transformation or score alternation. If modification was not appropriate than either deletion occurred, or case was kept and was reported. |
| Normality | Scatterplots were examined for skewness and kurtosis. If the assumption of normality was violated, then deletion occurred and was reported. |

*Note.* Adapted from *Using Multivariate Statistics* by B.G. Tabachnick and L.S. Fidell, (6th edition), 2013, Boston, MA: Pearson and Laerd Statistics, 2017 (https://statistics.laerd.com).

The hierarchical multiple linear regression analyses: 1) determined the proportion of variation in the level of awareness, desire, knowledge, ability, and reinforcement explained by the independent variables; 2) predicted the level of awareness, desire, knowledge, ability, and reinforcement based on the new values of the independent variables; and 3) determined how much the level of awareness, desire, knowledge, ability, and reinforcement was changed per one

unit of change in the independent variables (Laerd, 2017). The literature suggested that there was a logical linear order to the ADKAR model's constructs which were independent of one another (Prosci, 2012). A series of competing regression models were developed, informed by the literature. Five hierarchical multiple linear regressions were run to adjust for any potential confounders from both demographics and the previous dependent variable(s) separately. Prior to hierarchical multiple linear regression analysis, data coding was completed and examined with a case processing summary table, which was used to check for missing cases. The dependent variable was double checked for correct coding by inspecting the dependent variable encoding table; low counts among predictors were determined through a review of the categorical variables codings table (Laerd, 2017). To assess the fit of the model the coefficients of determination, $R^2$ values, were used to determine the amount of variation that is explained by the model. $F$-statistic and the degrees of freedom are reported, and statistical significance of the overall model is represented by the $p$ value. A $p < .05$ is considered statistically significant. Standardized coefficients (Beta) were analyzed to represent the change in each dependent variable caused by in each experience, training, and education. A range of possible values of the standardized coefficients was determined by using the 95% confidence interval, and $p$ values of $< .05$ were used to assess for statistical significance for the standardized coefficients (Tabachnick & Fidell, 2013).

## 4.4 Results

### *4.4.1 Specific Aim One*

The first aim of the study was to construct a latent variable that represented scope of practice derived from input variables representing experience, training, and education.

A PCA was run on 15 provider demographic characteristics. See Table 4.8 for summary of provider descriptive statistics. The suitability of PCA was assessed prior to analysis. Inspection of the correlation matrix showed that all variables had at least one correlation coefficient greater than 0.30. The overall Kaiser-Meyer-Olkin (KMO) measure was 0.66 with individual KMO measures greater than or equal to .60 and less than .70 having the classification of mediocre according to Kaiser (1974). Bartlett's test of sphericity was statistically significant ($p$ = .000), indicating that the data was likely to produce unique components. One case was deleted from analysis, as the provider's scores identified them as an outlier.

**Table 4.8**

*Primary Care Providers' Characteristics Paper 3 (N=62)*

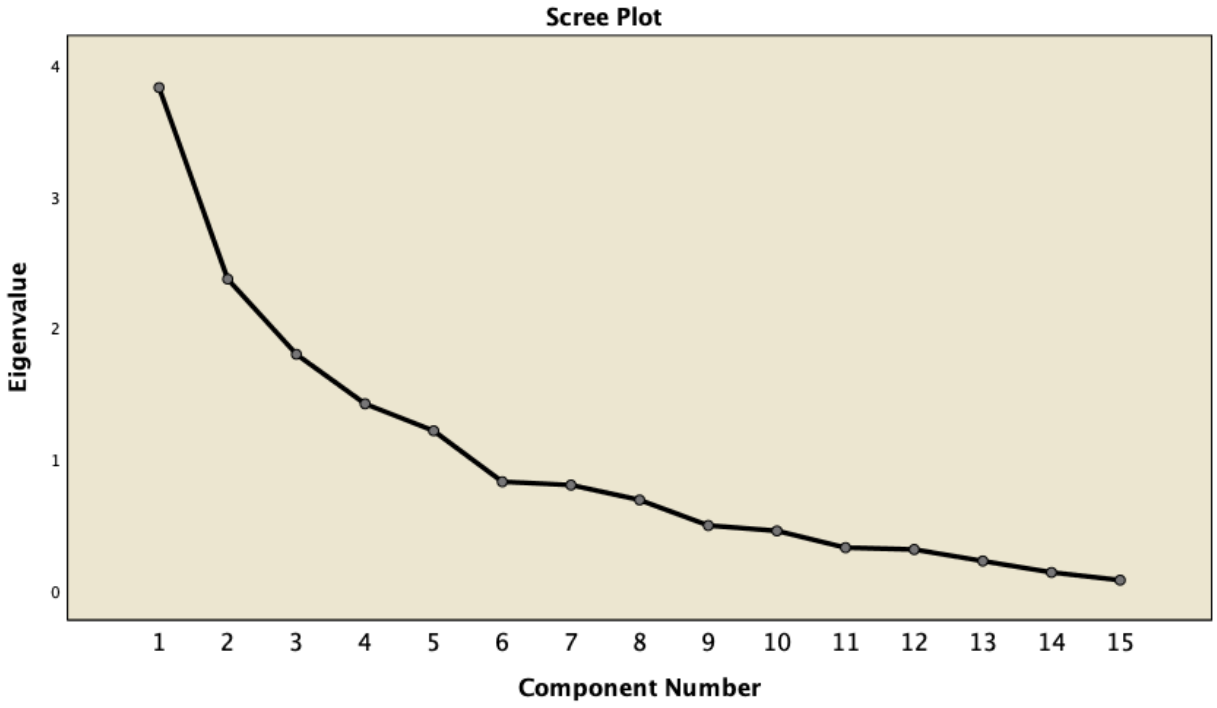
| Provider Characteristics | Frequency (*n*) | Percentage |
|---|---|---|
| Provider Type | | |
| MD/DO | 46 | 74.20 |
| Other (PA/NP) | 16 | 25.80 |
| Years of Practice | | |
| In School | 10 | 16.10 |
| In Residency | 23 | 37.10 |
| 5 or less years | 8 | 12.90 |
| 6-10 years | 5 | 8.10 |
| >10 years | 16 | 25.80 |
| Previous training in pain management | | |
| Yes | 28 | 45.20 |
| No | 34 | 54.80 |
| Previous training in addiction | | |
| Yes | 28 | 45.20 |
| No | 34 | 54.80 |
| Previously/currently prescribes MAT medications | | |
| Yes | 14 | 22.60 |
| No | 48 | 77.40 |
| Works with a provider who prescribes MAT medications | | |
| Yes | 24 | 38.70 |
| No | 38 | 61.30 |
| Hours of MAT training | | |
| <8 hours | 37 | 59.70 |
| 8 hours | 15 | 24.20 |
| 24 hours | 10 | 16.10 |
| MAT training environment | | |
| In-person | 9 | 14.50 |
| Online | 15 | 24.20 |
| Hybrid | 6 | 9.70 |
| None | 32 | 51.60 |
| Obtained X-waiver | | |
| Yes | 20 | 32.30 |
| No | 41 | 66.10 |
| Missing | 1 | 1.60 |
| Gender | | |
| Female | 31 | 50.00 |
| Male | 26 | 41.90 |
| Missing | 5 | 8.10 |

*Note.* Gender was used in hypothesis testing only.

The PCA revealed five components that had eigenvalues greater than one that explained 25.50%, 15.80%, 12.00%, 9.50% and 8.10% of the total variance, respectively. Visual inspection of the scree plot (see Figure 4.3) indicated that four components should be retained (Cattell, 1966). The variable >10 years after completing school/residency was removed from final analyses because it only had a correlation coefficient greater than 0.30 in the fifth component. In addition, a four-component solution met the interpretability criterion. As such, four components were retained.

**Figure 4.3**

*Initial Scree Plot of Provider Demographic Characteristics*




The four-component solution initially explained 66.50% of the total variance. A Varimax orthogonal rotation was employed to aid interpretability. The variable 24 hours of MAT training had correlation coefficients greater than 0.30 in three of the four components. To increase

interpretability, the variable 24 hours of MAT training was removed from analyses. The final four-component solution initially explained 67.90% of the total variance. A visual inspection of the scree plot (see Figure 4.4) indicated that four components should be retained (Cattell, 1966). The remaining 13 provider demographic characteristics' component loadings of the rotational solution were reviewed (see Table 4.9). The rotated matrix revealed seven items loaded onto Component 1, three items onto Component 2, four items onto Component 3, and three items onto Component 4. Although having five or less years after completing school/residency and in-person MAT training environment loaded into Component 3, their loadings were stronger in Component 1. Variables 6-10 years after completing school/residency and hybrid MAT training environment did not have correlation coefficients greater than 0.30 to load outside of Component 3. The normality of the latent variable created for Component 3 was checked using skewness and kurtosis and was not found to be within the required threshold of ±3 (George & Mallery, 2010). Component 3 was removed from further analyses.

**Figure 4.4**

*Final Scree Plot of Provider Demographic Characteristics*

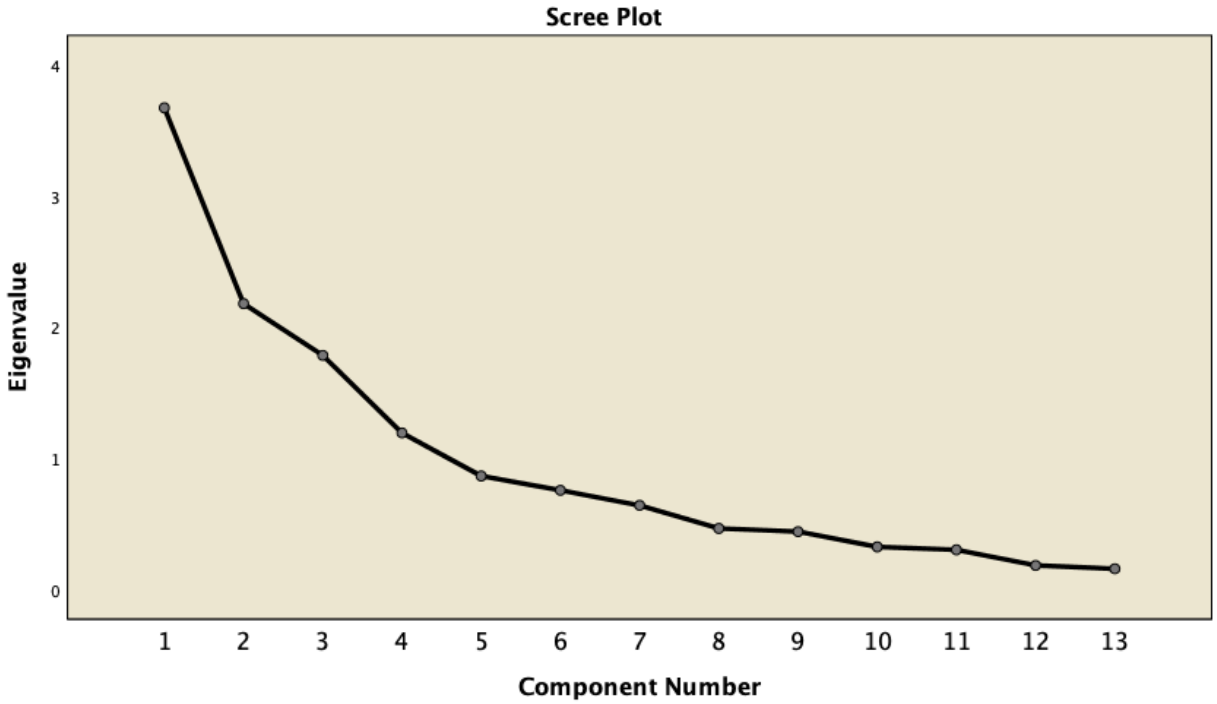


**Table 4.9**

*Rotated Structure Matrix of Provider Demographic Characteristics (N=61)*

| | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | Communalities |
| 5 or less years after completing school/residency | **.48** | .28 | -.41 | .15 | .49 |
| Previous training in pain management | **.62** | -.05 | .07 | .20 | .42 |
| Previous training in addiction | **.69** | -.17 | .18 | .20 | .57 |
| Working with a provider that prescribes MAT medications | **.72** | -.23 | .02 | -.15 | .59 |
| In-Person MAT Training Environment | **.67** | .27 | -.32 | .03 | .63 |
| Obtained X-waiver | **.65** | .00 | .29 | .55 | .81 |
| Previously or are you currently prescribing MAT medications | **.81** | .18 | .12 | .03 | .70 |
| Profession MD/DO | -.12 | **.86** | .02 | -.03 | .75 |
| In School | -.05 | **-.92** | -.10 | .00 | .85 |
| Online MAT Training Environment | -.10 | **-.47** | -.14 | .74 | .80 |
| 5 or less years after completing school/residency | .48 | .28 | **-.41** | .15 | .49 |
| 6-10 years after completing school/residency | .01 | .10 | **.78** | .18 | .65 |
| In-Person MAT Training Environment | .67 | .27 | **-.32** | .03 | .63 |
| Hybrid MAT Training Environment | .19 | .09 | **.89** | -.03 | .78 |
| 8 hours of MAT Training Hours | .29 | .25 | .19 | **.77** | .78 |
| Online MAT Training Environment | -.10 | -.47 | -.14 | **.74** | .80 |
| Obtained X-waiver | .65 | .00 | .29 | **.55** | .81 |
| Percent of Variance | 25.12 | 16.51 | 13.93 | 12.38 | |
| Percent of Covariance | 36.97 | 24.30 | 20.51 | 18.21 | |

The interpretation of the data was consistent with scope of practice attributes. The three components on provider demographic characteristics for this group of providers were experience and training items on Component 1, educational learning environment items on Component 2, and MAT training on Component 4. Component loadings of the rotated solution are presented in Table 4.9.

### *4.4.2 Specific Aim Two*

The second aim of the study was to determine if primary care providers' change readiness was influenced by their scope of practice.

**Scope of Practice Latent Variable.** Four components were initially created to measure a provider's scope of practice. As a result of the PCA, the resulting component measures have Z-scores with means of .00 and standard deviations (*SD*) of ± 1.00. Although Component 3 had an average .00 (*SD* = ± 1.00), it was removed from analysis for kurtosis (4.95). See Table 4.10 for a summary of descriptive statistics.

**Table 4.10**

*Scope of Practice Latent Variable Descriptive Statistics (N=61)*

| | Experience and Training | Educational Learning Environment | Component 3 | MAT Training |
|---|---|---|---|---|
| Mean | .00 | .00 | .00 | .00 |
| Std. Error of Mean | .13 | .13 | .13 | .13 |
| Median | -.32 | .36 | -.20 | -.46 |
| Mode | -.91 | .57 | -.21 | -.47 |
| Std. Deviation | 1.00 | 1.00 | 1.00 | 1.00 |
| Variance | 1.00 | 1.00 | 1.00 | 1.00 |
| Skewness | 1.26 | -1.41 | 2.18 | 1.25 |
| Std. Error of Skewness | .31 | .31 | .31 | .31 |
| Kurtosis | .60 | .83 | 4.95 | .91 |
| Std. Error of Kurtosis | .60 | .60 | .60 | .60 |
| Minimum | -.98 | -2.54 | -1.31 | -1.18 |
| Maximum | 2.51 | 1.24 | 3.45 | 2.79 |

**ADKAR Model Questionnaire.** Reliability analyses were performed to test internal consistency of the ADKAR model questionnaire and its subscales. Cronbach's alpha for the overall ADKAR model questionnaire, which measures the individual's level of readiness based on the ADKAR model (Kachian et al., 2018), was α = .91. The Awareness Subscale consisted of four items from the ADKAR model questionnaire (α = .63) and had an average score of 3.54 (*SD* = ± .68). The Desire Subscale consisted of four items from the ADKAR model questionnaire (α = .86) and had an average score of 3.45 (*SD* = ± .88). The Knowledge Subscale consisted of four items from the ADKAR model questionnaire (α = .77) and had an average score of 3.63 (*SD* = ± .68). The Ability Subscale consisted of four items from the ADKAR model questionnaire (α = .68) and had an average score of 3.78 (*SD* = ± .60). The Reinforcement Subscale originally consisted of four items from the ADKAR model questionnaire. The fourth item of the subscale,

"I personally develop with this change," was removed to increase reliability. The Cronbach's alpha improved from .63 to .73 with the three-item subscale that had an average score of 3.14 (*SD* = ± .70). Although the Awareness and Ability alpha coefficients were lower than .8, the consistency measurement scores still demonstrated acceptable reliability (Holt et al., 2007). See Table 4.11 for a summary of descriptive statistics. All Likert response options were used except for items 11 and 13. For a summary of individual item response frequencies see Table 4.12.

**Table 4.11**

*ADKAR Model Questionnaire Descriptive Statistics (N=62)*

| | Awareness Subscale Score | Desire Subscale Score | Knowledge Subscale Score | Ability Subscale Score | Reinforcement Subscale Score |
|---|---|---|---|---|---|
| Mean | 3.54 | 3.45 | 3.63 | 3.78 | 3.14 |
| Std. Error of Mean | .09 | .11 | .09 | .08 | .09 |
| Median | 3.63 | 3.50 | 3.75 | 4.00 | 3.00 |
| Mode | 4.00 | 4.00 | 4.00 | 4.00 | 3.00 |
| Std. Deviation | .68 | .88 | .68 | .60 | .70 |
| Variance | .46 | .77 | .46 | .37 | .49 |
| Skewness | -.67 | -.87 | -.48 | -.47 | -.19 |
| Std. Error of Skewness | .30 | .30 | .30 | .30 | .30 |
| Kurtosis | .65 | .87 | .41 | .43 | .72 |
| Std. Error of Kurtosis | .60 | .60 | .60 | .60 | .60 |
| Minimum | 1.75 | 1.00 | 1.75 | 2.25 | 1.00 |
| Maximum | 5.00 | 5.00 | 5.00 | 5.00 | 4.67 |

**Table 4.12**

*Frequencies and Percentages of Responses to ADKAR Items (N=62)*

| Item | Strongly Disagree | Disagree | Unsure | Agree | Strongly Agree |
|---|---|---|---|---|---|
| **Awareness Subscale** (α = .63) | | | | | |
| 1. I understand the reasons for integrating MAT services into primary care. | 3 (4.80) | 3 (4.80) | 12 (19.40) | 31 (50.00) | 13 (21.00) |
| 2. I understand the difficulties in integrating MAT services into primary care. | 2 (3.20) | 4 (6.50) | 11 (17.70) | 41 (66.10) | 4 (6.50) |
| 3. I know how effective integrating MAT services into primary care. | 3 (4.80) | 7 (11.30) | 24 (38.70) | 22 (35.50) | 6 (9.70) |
| **4. I am aware of the goals of integrating MAT services into primary care. | 5 (8.10) | 8 (12.90) | 15 (24.20) | 25 (40.30) | 1 (1.60) |
| **Desire Subscale** (α = .86) | | | | | |
| **5. To be part of these changes makes me feel excited. | 3 (4.80) | 10 (16.10) | 15 (24.20) | 25 (40.30) | 8 (12.90) |
| 6. This change will provide me a lot of opportunities. | 2 (3.20) | 8 (12.90) | 22 (35.50) | 23 (37.10) | 7 (11.30) |
| 7. I support the implementation of the change (integrating MAT services into primary care). | 6 (9.70) | 4 (6.50) | 10 (16.10) | 34 (54.08) | 8 (12.90) |
| **8. I benefit from the change (integrating MAT services into primary care). | 3 (4.80) | 7 (11.30) | 20 (32.30) | 24 (38.70) | 7 (11.30) |
| **Knowledge Subscale** (α = .77) | | | | | |
| **9. I have the required skills to adapt to the changes. | 4 (6.50) | 3 (4.80) | 12 (19.40) | 33 (53.20) | 8 (12.90) |
| 10. I understand how my work is related to change. | 1 (1.60) | 1 (1.60) | 21 (33.90) | 30 (48.40) | 9 (14.50) |
| **11. Change is clear to me. | 0 (0.00) | 5 (8.10) | 23 (37.10) | 26 (41.90) | 6 (9.70) |

| | | | | | |
|---|---|---|---|---|---|
| **12. I have the knowledge to adapt to the changes. | 2 (3.20) | 6 (9.70) | 12 (19.40) | 33 (53.20) | 7 (11.30) |
| **Ability Subscale** (α = .68) | | | | | |
| **13. I can adapt to change. | 1 (1.60) | 0 (0.00) | 8 (12.90) | 35 (56.50) | 17 (27.40) |
| **14. I can positively help change. | 2 (3.20) | 2 (3.20) | 11 (17.70) | 34 (54.80) | 12 (19.40) |
| 15. I can do better due to changes. | 1 (1.60) | 7 (11.30) | 20 (32.30) | 29 (46.80) | 5 (8.10) |
| **16. I have the ability to do things at a level that is needed for the changes. | 2 (3.20) | 3 (4.80) | 13 (21.00) | 36 (58.10) | 7 (11.30) |
| **Reinforcement Subscale** (α = .73) | | | | | |
| 17. Our members of the group support this change. | 1 (1.60) | 4 (6.50) | 33 (53.20) | 20 (32.30) | 4 (6.50) |
| 18. My manager supports this change. | 4 (6.50) | 2 (3.20) | 39 (62.90) | 15 (24.20) | 2 (3.20) |
| 19. My uncertainty has been resolved. | 7 (11.30) | 11 (17.70) | 26 (41.90) | 16 (25.80) | 2 (3.20) |
| *20. I personally develop with this change. | 3 (4.80) | 5 (8.10) | 11 (17.70) | 32 (51.60) | 10 (16.10) |

*Note.* Item marked with an * was not included in subsequent analyses. Items marked with ** had missing data.

### *4.4.3 Data Analysis: Hypothesis Testing*

Hypotheses 1 through 5 explored the impact of providers' scope of practice on the ADKAR model after adjusting for gender and the previous dependent variable(s). The ADKAR model constructs have a logical linear order (Prosci, 2012), and the five hierarchical multiple linear regressions were based on the dependent variables in the following order: Awareness Subscale scores, Desire Subscale scores, Knowledge Subscale scores, Ability Subscale scores, and Reinforcement Subscale scores. The initial statistical regression model for all multiple linear regressions included gender and the previous dependent variable(s). If gender and/or the previous dependent variable(s) were statistically significant with $p < .05$ they were entered at the first step of the regression model as a covariate. Covariates were not treated as predictors for analyses.

**Awareness Subscale Hypothesis Testing** A hierarchical multiple linear regression was conducted to understand how scope of practice impacts primary care providers' perceived level of awareness. To assess linearity, a scatterplot of observed Awareness Subscale scores against predicted Awareness Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.82. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). Cases were individually inspected for standard deviations greater than ±3, no outliers were observed (Tabachnick & Fidell, 2013).

Hypotheses $H1_a$ through $H1_d$ explored the impact of the three scope of practice constructs. MAT training was the only statistically significant independent variable. There were no statistically significant covariates to enter into the regression. Table 4.13 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. Primary care providers' perceived level awareness was significantly different than zero, $F(1, 59) = 4.15$, $p = .046$, $R^2 = .07$.

**Table 4.13**

*Hierarchical Multiple Linear Regression of MAT Training on Perceived Level of Awareness (N=61)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.34^{***}$ | .04 |
| Constant | 3.56 | .08 | | 43.11 | | | | |
| MAT Training | $.17^{*}$ | .08 | .26 | 2.04 | .26 | .26 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

A post hoc analysis with a Bonferroni adjustment revealed there was a statistically significant difference. Therefore, we can reject the null hypothesis. The MAT training explained approximately 7.00% of the variation in perceived level of awareness. Also, the change in $F = 4.15$ was statistically significant, $p = .046$. As a result, the positive standardized regression coefficients ($\beta = .26$) of the MAT training variable indicates that higher MAT training scores increase perceived level of awareness. Hypotheses $H1_b$ and $H1_d$ were accepted and $H1_a$ and $H1_c$ were rejected.

**Desire Subscale Hypothesis Testing.** A hierarchical multiple linear regression was run to understand how scope of practice impacts primary care providers' perceived level of desire. To assess linearity, a scatterplot of observed Desire Subscale scores against predicted Desire

Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.84. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field, 2013). Cases were individually inspected for standard deviations greater than ±3, and no outliers were observed (Tabachnick & Fidell, 2013).

Hypotheses $H2_a$ through $H2_d$ explored the impact of the three scope of practice constructs on providers' perceived desire to implement MAT. Table 4.14 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. After adjusting Awareness Subscale scores, MAT training, training and experience, and educational learning environment was statistically significantly and predicted perceived level of desire, $F(3, 57) = 8.77$ $p = .000$, $R^2 = .39$.

**Table 4.14**

*Hierarchal Multiple Linear Regression of Scope of Practice on Perceived Level of Desire (N=61)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.39^{***}$ | .04 |
| Constant | .48 | .55 | | .89 | | | | |
| Awareness Subscale Score | $.83^{***}$ | .15 | .629 | 5.48 | .57 | .59 | | |
| Experience and Training | .13 | .09 | .151 | 1.40 | .15 | .01 | | |
| Educational Learning Environment | -.07 | .09 | -.085 | -.79 | -.08 | -.22 | | |
| MAT Training | -.08 | .10 | -.09 | -.80 | -.08 | .07 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

A post hoc analysis with a Bonferroni adjustment revealed there was a statistically significant difference. Therefore, we can reject the null hypothesis. The scope of practice constructs contributed .04 in shared variability. The covariate, Awareness Subscale scores, explained approximately 35.00% of the variation in perceived level of desire by itself. As indicated by the squared semipartial correlations, scope of practice constructs were less important than the covariate. Also, the change in $F = 1.10$ was not statistically significant with the scope of practice constructs, $p = .358$. As a result, the standardized regression coefficients for all the scope of practice constructs did not have a statistically significant impact on perceived level of desire and all hypotheses ($H2_a$-$H2_d$) were rejected.

**Knowledge Subscale Hypothesis Testing.** A hierarchical multiple linear regression was run to understand how scope of practice impacts primary care providers' perceived level of knowledge. To assess linearity, a scatterplot of observed Knowledge Subscale scores against predicted Knowledge Subscale scores with a regression line was plotted. A visual inspection of

the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 2.20. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). One provider was an outlier with a perceived Knowledge Subscale score of 4.50. Due to limited sample size the provider was not removed from the analysis.

Hypotheses $H3_a$ through $H3_d$ explored the impact of the three scope of practice constructs on providers' perceived desire to implement MAT. After adjusting for Awareness and Desire Subscale scores, educational learning environment was the only statistically significant independent variable. Table 4.15 displays the correlations between the variables, the unstandardized regression coefficients (*B*) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. Primary care providers perceived level knowledge was significantly different than zero, $F(1, 59) = 13.87$, $p = .000$, $R^2 = .42$.

**Table 4.15**

*Hierarchal Multiple Linear Regression of Educational Learning Environment on Perceived Level of Knowledge (N=61)*

| Variables | *B* | *SE B* | $\beta$ | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.42^{***}$ | $.05^{*}$ |
| Constant | $1.93^{***}$ | .38 | | 5.11 | | | | |
| Awareness Subscale Score | .15 | .13 | .15 | 1.20 | .12 | .47 | | |
| Desire Subscale Score | $.34^{***}$ | .10 | .46 | 3.62 | .37 | .60 | | |
| Educational Learning Environment | $-.15^{*}$ | .07 | -.22 | -2.15 | -.22 | -.36 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

Educational learning environment contributed .05 in shared variability. The covariates, Awareness and Desire Subscale scores, explained approximately 37.00% of the variation in perceived level of knowledge. As indicated by the squared semipartial correlations, educational learning environment was less important than the covariate, Desire Subscale scores. The change in $F = 4.62$ was statistically significant with the addition of educational learning environment, $p = .036$. A post hoc analysis with a Bonferroni adjustment revealed there was statistically significant difference. Therefore, we can reject the null hypothesis and accept the alternative hypothesis. As such, the negative standardized regression coefficients ($\beta = -.22$) of the educational learning environment variable indicates that higher educational learning environment score decreases perceived level of knowledge. Hypotheses $H3_d$ was accepted, and $H3_a$ through $H3_c$ were rejected.

**Ability Subscale Hypothesis Testing.** A hierarchical multiple linear regression was run to understand how scope of practice impacts primary care providers' perceived level of ability. To assess linearity, a scatterplot of observed Ability Subscale scores against predicted Ability Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 2.02. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field, 2013). One provider was an outlier with a perceived Ability Subscale score of 5.00. Due to limited sample size the provider was not removed from the analysis.

Hypotheses $H4_a$ through $H4_d$ explored the impact of the three scope of practice constructs on providers' perceived ability to implement MAT. After adjusting for Awareness and Desire Subscale scores, educational learning environment was the only statistically significant independent variable. Table 4.16 displays the correlations between the variables, the unstandardized regression coefficients (*B*) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. Primary care providers' perceived level ability was significantly different than zero, $F(1, 59) = 14.71$, $p = .000$, $R^2 = .44$.

**Table 4.16**

*Hierarchal Multiple Linear Regression of Educational Learning Environment on Perceived Level of Ability (N=61)*

| Variables | *B* | *SE B* | $\beta$ | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.44^{***}$ | $.06^{*}$ |
| Constant | $2.00^{***}$ | .35 | | 5.81 | | | | |
| Awareness Subscale Score | $.32^{**}$ | .11 | .35 | 2.84 | .28 | .56 | | |
| Desire Subscale Score | $.18^{*}$ | .09 | .26 | 2.12 | .21 | .53 | | |
| Educational Learning Environment | $-.15^{*}$ | .06 | -.25 | -2.47 | -.25 | -.39 | | |

*Note*. $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

Educational learning environment contributed .06 in shared variability. Covariates, Awareness and Desire Subscale scores, explained approximately 38.00% of the variation in perceived level of knowledge. As indicated by the squared semipartial correlations, educational learning environment was less important than the covariate, Awareness Subscale scores. The change in $F = 6.12$ was statistically significant with the addition of educational learning environment, $p = .016$. A post hoc analysis with a Bonferroni adjustment revealed there was statistically significant difference. Therefore, we can reject the null hypothesis and accept the

alternative hypothesis. As such, the negative standardized regression coefficient ($\beta$ = -.25) of the educational learning environment variable indicates that higher educational learning environment score decreases perceived level of ability. Hypotheses $H4_d$ was accepted, and $H4_a$ through $H4_c$ were rejected.

**Reinforcement Subscale Hypothesis Testing.** A hierarchical multiple linear regression was run to understand how scope of practice impacts primary care providers' perceived level of reinforcement. To assess linearity, a scatterplot of observed Reinforcement Subscale scores against predicted Reinforcement Subscale scores with a regression line was plotted. A visual inspection of the plots indicated a linear relationship between the variables. There was homoscedasticity and normality of the residuals. The normality of the data was checked using skewness and kurtosis and found to be within the required threshold of ±3 (George & Mallery, 2010). Independence of observations was assessed using the Durbin-Watson test which showed a statistic of 1.81. Values between 1.50 and 2.50 are considered normal for the Durbin-Watson Statistic (Field 2013). Cases were individually inspected for standard deviations greater than ±3 and no outliers were observed (Tabachnick & Fidell, 2013).

Hypotheses $H5_a$ through $H5_d$ explored the impact of the three scope of practice constructs on providers' perceived level of MAT reinforcement. After adjusting for Desire Subscale scores, MAT training was the only statistically significant independent variable. Table 4.17 displays the correlations between the variables, the unstandardized regression coefficients ($B$) and intercept, the standardized regression coefficients ($\beta$), the semipartial correlations ($sr_i^2$), and $R^2$. Primary care providers perceived level reinforcement was significantly different than zero, $F(1, 59) = 20.75$, $p = .000$, $R^2 = .42$.

**Table 4.17**

*Hierarchal Multiple Linear Regression of Educational Learning Environment on Perceived Level of Reinforcement (N=61)*

| Variables | *B* | *SE B* | *β* | *t* | $sr_i^2$ | Zero-order | $R^2$ | $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|
| Model | | | | | | | $.42^{***}$ | $.04^{*}$ |
| Constant | $1.39^{***}$ | .29 | | 4.86 | | | | |
| Desire Subscale Score | $.51^{***}$ | .08 | .63 | 6.25 | .63 | .61 | | |
| MAT Training | $-.14^{*}$ | .07 | -.20 | -2.03 | -.20 | -.16 | | |

*Note.* $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$

The MAT training explained approximately 4.00% of the variation in perceived level of awareness. The covariate, Desire Subscale scores, explained approximately 38.00% of the variation in perceived level of reinforcement. As indicated by the squared semipartial correlations, MAT training was less important than the covariate, Desire Subscale scores. The change in $F = 4.10$ was statistically significant, $p = .047$. A post hoc analysis with a Bonferroni adjustment revealed there was a statistically significant difference. Therefore, we can reject the null hypothesis. As a result, the negative standardized regression coefficients ($\beta = -.20$) of the MAT training variable indicates that higher MAT training scores decrease perceived level of reinforcement. Hypotheses $H5_d$ was accepted, and $H5_a$ through $H5_c$ were rejected. See Table 4.18 for a summary of study findings.

**Table 4.18**

*Summary of Findings Paper 3*

| Hypothesis | Results |
|---|---|
| **Aim 1: To construct a latent variable that represents scope of practice derived from input variables representing experience, training, and education.** | |
| H1: Each construct of scope of practice (experience, training, and education) will contribute to the ability to predict scope of practice. | Accepted |

| **Aim 2: To determine if primary care providers' change readiness is influenced by their scope of practice.** | |
|---|---|
| H1a: Higher perceived levels of awareness subscale scores among primary care providers are related to higher experience scores. | Rejected |
| H1b: Higher perceived levels of awareness subscale scores among primary care providers are related to higher training scores. | Accepted |
| H1c: Higher perceived levels of awareness subscale scores among primary care providers are related to higher education scores. | Rejected |
| H1d: There is one best combination of experience, training, and education to predict levels of perceived awareness. | Accepted |
| H2a: Higher perceived levels of desire subscale scores among primary care providers are related to higher experience scores. | Rejected |
| H2b: Higher perceived levels of desire subscale scores among primary care providers are related to higher training scores. | Rejected |
| H2c: Higher perceived levels of desire subscale scores among primary care providers are related to higher education scores. | Rejected |
| H2d: There is one best combination of experience, training, and education to predict levels of perceived desire.<br>Note. H2s adjusted for awareness. | Rejected |
| H3a: Higher perceived levels of knowledge subscale scores among primary care providers are related to higher experience scores. | Rejected |
| H3b: Higher perceived levels of knowledge subscale scores among primary care providers are related to higher training scores. | Rejected |
| H3c: Higher perceived levels of knowledge subscale scores among primary care providers are related to higher education scores. | Rejected |
| H3d: There is one best combination of experience, training, and education to predict levels of perceived knowledge.<br>Note. H3s adjusted for awareness, and desire. | Accepted |

| | |
|---|---|
| H4a: Higher perceived levels of ability subscale scores among primary care providers are related to higher experience scores. | Rejected |
| H4b: Higher perceived levels of ability subscale scores among primary care providers are related to higher training scores. | Rejected |
| H4c: Higher perceived levels of ability subscale scores among primary care providers are related to higher education scores. | Rejected |
| H4d: There is one best combination of experience, training, and education to predict levels of perceived ability. Note. H4s adjusted for awareness and desire | Accepted |
| H5a: Higher perceived levels of reinforcement subscale scores among primary care providers are related to higher experience scores. | Rejected |
| H5b: Higher perceived levels of reinforcement subscale scores among primary care providers are related to higher training scores. | Rejected |
| H5c: Higher perceived levels of reinforcement subscale scores among primary care providers are related to higher education scores. | Rejected |
| H5d: There is one best combination of experience, training, and education to predict levels of perceived reinforcement. Note. H5s adjusted for desire. | Accepted |

## 4.5 Discussion

This study attempted to understand how primary care providers' scope of practice influenced their attitudes towards change readiness to integrate MAT services into the primary care clinical setting. The study demonstrated correlations between a provider's scope of practice and their perceived levels of awareness, knowledge, ability, and reinforcement related to MAT services in primary care. The were no associations found between scope of practice and individual levels of desire to implement MAT service into primary care.

The present study sought to develop a variable that represented a primary care provider's scope of practice comprised of items that represented provider's experience, training, and

education. The analysis indicated a four-component solution was needed to describe the items that composed a provider's scope of practice. As we found, the different aspects of a provider's scope of practice were illustrated by four components (experience and training, educational learning environment, Component 3, and MAT training). However, Component 3 was not normally distributed and two of the items in Component 3 loaded more strongly onto another component. Additionally, this component was also difficult to name as it had similar loadings to the experience and training component and was ultimately removed from the final analysis. With the elimination of this component, a provider's years of experience was limited to five or less years after completing school/residency and being in school. The impact of having limited years of practice incorporated into the scope of practice construct is unknown and should be further explored.

The study demonstrated a positive correlation between the component MAT training and a provider's level of awareness related to the integration of MAT services into primary care. These results build on the existing evidence of Kirane et al., (2019) who found providers who had previous buprenorphine training were more likely to view treatment of individuals with OUD as being within their scope of practice. As awareness represents an individual's understanding of the nature of the change, why the change is being made, and the risk of not changing (Hiatt, 2006), it is important that training addresses all of these factors to avoid resistance to change. Despite the changes to recent legislation to remove the X-waiver requirement (SAMSHA, 2023) (For further discussion see Paper 2.), our findings indicate MAT training that was required to obtain a X-waiver plays a vital role in the development of providers' awareness, which is the initial stage for organizational change to treat patients with OUD.

Contrary to our hypothesized associations, higher component scores from educational learning environment and MAT training posed a negative impact on perceived levels of knowledge, ability, and reinforcement. It is interesting to note that the scope of practice components negatively impacted two of the three states of change: transitional and future states. The transitional state of change may be perceived as chaotic (Prosci Inc., n.d.a) as organizations try to shift mindsets and behaviors in the midst of meeting current workload demands (Hiatt, 2006). Although there may be providers that have the knowledge needed to shift to providing MAT services in a primary care setting, there may be a disparity between their current level of knowledge and what they desire their level of knowledge to be in order to implement change successfully (Shonhe & Grand, 2019). We pose that not only is this a plausible explanation for what we found for knowledge but for ability as well. Clearly a deeper understanding of current knowledge and ability versus desired knowledge and ability is needed.

The future state of change brings about discomfort for some as the end goals may be obscure, and the organizational goals may not correspond with an in individual's personal and/or professional goals (Prosci Inc., n.d.a). High failure rates for successful change are associated with an increased level of uncertainty surrounding change (Umble & Umble, 2014). This uncertainty can elicit feelings of fear and anxiety that then cause resistance to change (Dent & Goldberg, 1999; Hiatt & Creasey, 2012). Although it was beyond the scope of this study to explore the impact of the perceived extent to which each organization has incorporated MAT services, it is important to note that over half of the participants were uncertain where their organization stood in integrating MAT services in primary care, either because the participant was unsure or the organization had not discussed this issue. With reinforcement having the

lowest average scores amongst the ADKAR model subscales, it highlights an area in which uncertainty may have influence.

The experience and training component had no impact on these phases of the ADKAR model. However, the same cannot be said for perceived levels of awareness and desire. This analysis supports the theoretical framework of the ADKAR model as it poses a logical linear order that builds upon the previous stages (Prosci, 2012). The constructs of awareness and desire are the first two stages of the ADKAR model, respectively, and make up the current state of change in the ADKAR model. This state of change provides insight into the existing processes, behaviors, organizational structures, and roles familiar to the individual (Prosci Inc., n.d.a). The transition from awareness to desire is considered the most difficult part of the change model as it relies on individual motivations and acceptance (Hiatt, 2006; Kaminski, 2022). The challenge for leaders is creating a desire for change in the organization on a construct that relies on the internal change of the individual (Kaminski, 2022). As a person's unique individual and social factors influence their desire to change (Karambelkar & Bhattacharya, 2017; Yang et al., 218). The results indicated higher perceived awareness increased providers' perceived desire and ability scores as it related to the integration of MAT services in primary care, while higher perceived desire boosted perceived levels of knowledge, ability, and reinforcement. As discussed earlier, awareness may be increased through training; however, desire is a bit more complicated and may pose more difficulty for an organization to acquire as it is intrinsically based.

Our study highlighted the importance of the components of current state of change in the ADKAR model impact on the transitional and future states of change, which selectively focused on the impact of scope of practice. Deficiency in awareness and desire makes an organization more apt to experience resistance to change, decreased productivity, increased turnover, and

delayed implementation of the change (Hiatt, 2006; Prosci Inc., n.d.b). Individuals with OUD disorder have a need to be treated now and cannot afford delayed implementation for change. Organizational leaders in primary care facilities must take into account differing motivations and individualized situations when creating a strategy for change (Galli, 2018; Hiatt & Creasey, 2012).

### *4.5.1 Limitations*

The generalizability of this study was limited by the source of the data. While nonprobability convenience sampling is commonly used because of its low cost and efficiency (Hulley et al., 2013), the efficiency of this sampling method makes it susceptible to biases (Polit & Beck, 2017). This sampling technique is contingent on volunteers and the response of those that volunteer may differ from those who would not normally participate (Polit & Beck, 2017). Our study had a limited sample size and did not use probability sampling. Furthermore, all responses were derived from providers from just a few academic health centers in a small region of Virginia and the findings of this research may not be generalizable outside of this setting.

Cronbach's alpha was used as a measure of internal consistency. Values 0.70 or greater are generally considered acceptable (Taber, 2017). In an effort to understand individuals' level of readiness based on the ADKAR model the ADKAR Questionnaire was used (Kachian et al., 2018). While the overall questionnaire and the majority of the subscales had alphas that were above 0.70, the awareness and ability subscales did not meet this threshold. Taber (2017) found the range of acceptable Cronbach's alpha scores among researchers to be extremely varied. Cronbach's alpha of 0.60 was deemed acceptable by several (Hair et al., 2010; Holt et al., 2007; Taber, 2017). Furthermore, PCA was conducted to provide an operational definition for scope of practice. The KMO test was used to measure sampling adequacy of each variable (Laerd

Statistics, 2017). The results were considered mediocre (Kaiser, 1974) even though it was above the suggested minimum of 0.6 (Tabachnick & Fidell, 2013); this may have been due to a small sample size. MacCalllum et al., (1999) suggest 100-200 participants are needed for well-defined components. However, MacCallum et al., (1999) also suggested studies should identify variables with at least average 0.7 level of communalities using only three to five components. The level of communalities for this study was negligibly below this mark with a mean of 0.68.

### *4.5.2 Future Research and Recommendations*

This study used the ADKAR model because it allows for consideration of individuals' differing circumstances to be considered during the organizational change (Hiatt & Creasey, 2012). Individuals' readiness "reflects the extent to which...individuals are cognitively and emotionally inclined to accept, embrace, and adopt a particular plan to purposefully alter the status quo" (Holt et al., 2007, p. 235). As indicated by Christersson et al., (2017), these individual differences should be accounted for. Further research is needed to explore the differences between providers' current level of knowledge and ability related to implementing MAT services and their individual desired level of knowledge and ability to treat patients with OUD, and how these differences impact an individual's readiness. Furthermore, this study identified awareness and desire as potential constructs that influence the transition and future states of changes. Utilizing a qualitative study to gain further insight on understanding individuals current state of change and how it impacts organizational transitions is critical to developing a plan during the future state of change to enable long-term success for implementing OUD treatment in primary care.

To maintain change, reinforcement is needed (Hiatt, 2006; Prosci Inc., n.d.a) and uncertainty poses a threat to sustainable change (Umble & Umble, 2014). Further avenues of

research should investigate how providers' uncertainty impacts the stages of the ADKAR Model. Future studies should also investigate how the reinforcement stage of the ADKAR model and management support are affected by the extent in which an organization has incorporated MAT services into clinical practice.

In an effort to capture a more diverse population and increase the generalizability of the study, replication of this study should be completed in academic health centers outside of the Hampton Roads area (Pilot & Beck, 2017). Upon expansion of the study and obtaining a more robust dataset, reliability of each subscale should be retested. It is our hope that with a larger sample the internal consistency will improve; with an increased dataset, the representation on years of experience could be explored by future researchers.

### *4.5.3 Conclusion*

In summary, an operational variable was created to represent primary care providers' scope of practice, which provided insight into organizational readiness to change and implement MAT services in primary care based on the stages of the ADKAR model. While providers' scope of practice seemed to be a protective factor as it relates to perceived levels of awareness, our study revealed providers' perceived level of knowledge, ability, and reinforcement were negatively impacted by their scope of practice. Although our study did not reveal any correlations between primary care providers' scope of practice and desire, the ADKAR constructs of awareness and desire appeared to have a significant impact on the subsequent stages of the ADKAR model. These findings indicated the current state of change constructs in the ADKAR model should be taken into consideration when trying to bolster the success of the transition and future states of change. Furthermore, the study highlighted the importance for organizations desiring to implement MAT services in primary care to understand their providers'

individual experiences and motivations in order to develop successful reinforcement strategies to ensure long-term change.

# 5. Conclusion

The purpose of these studies was to identify factors that influence primary care providers' readiness to integrate MAT services into primary care. This chapter includes a discussion on the connection between the three studies and the theoretical framework of the ADKAR model. Also included are studies' limitations, potential for future research, and a brief summary will conclude this chapter.

This chapter includes discussion to aid in answering the following research questions:

- What is the relationship between provider knowledge and readiness to integrate MAT services into primary care?
- Is there an association between primary care professionals' readiness and stigma in relation to hours of MAT training (<8 hr, 8 hr, and 24 hr) and MAT training environment (none, in-person, online, and hybrid)?
- Is providers' change readiness to implement MAT services influenced by their scope of practice based on the ADKAR model?

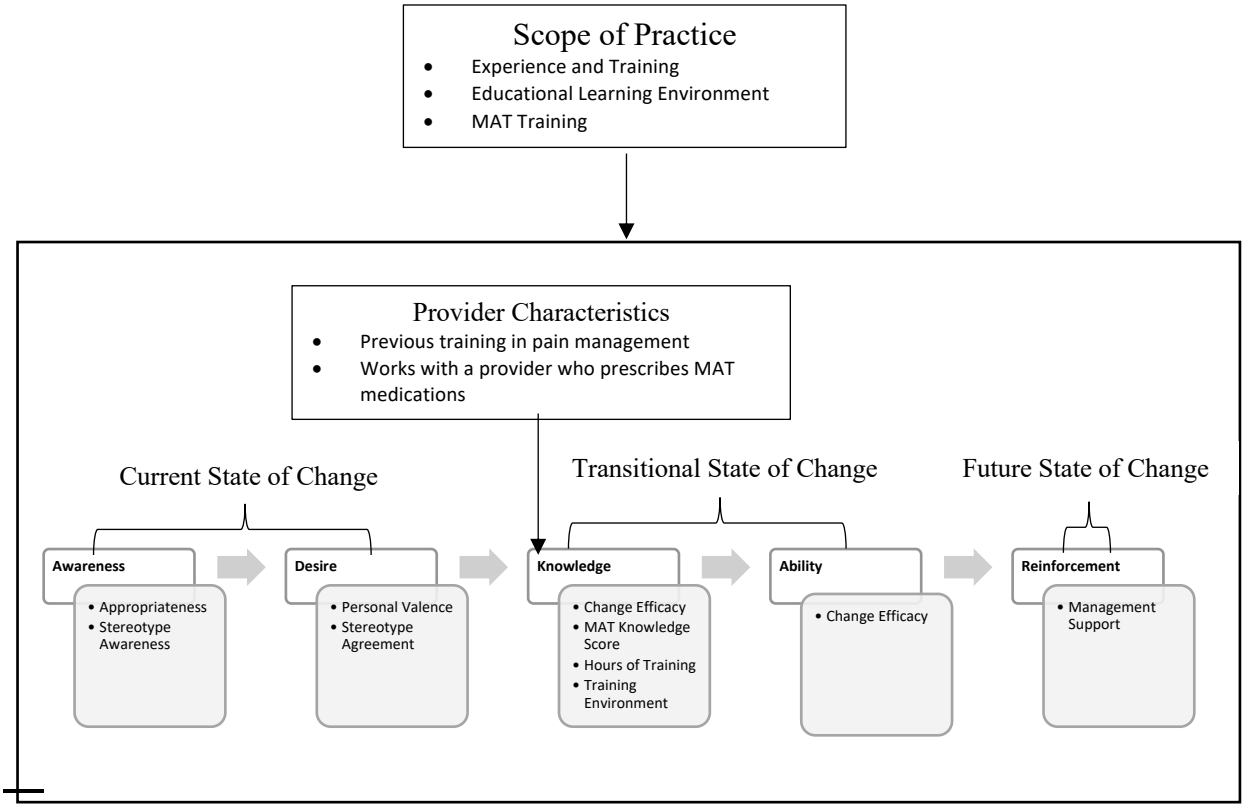
## 5.1 Connections between Papers 1, 2, and 3

The ADKAR model served as theoretical framework that connected all three papers (Figure 5.1). The ADKAR model is used to manage organizational change (Hiatt, 2006) and aid leaders in determining obstacles and developing next steps to assist individuals to successfully acclimate through the change process (Kaminski, 2022). In order for an organization to implement successful change the in individuals the organization must address the five constructs that comprise the ADKAR model: awareness, desire, knowledge, ability, and reinforcement (Prosci, 2012). The papers in this dissertation examined the constructs of the ADKAR Model to determine barriers related to readiness to integrate MAT services into primary care.

Paper 1 examined the interaction between provider's characteristics and MAT Knowledge scores (knowledge). Papers 1 and 2 examined how readiness for change elements, indicated by appropriateness (awareness), personal valence (desire), change efficacy (knowledge and ability), and management support (reinforcement), were influenced by MAT Knowledge scores (Paper 1), hours of MAT training (Paper 2), and MAT training environment (Paper 2). Paper 2 also evaluated the effects of X-waiver training and its environment on primary care providers' perceived levels of stereotype awareness (awareness) and agreement (desire). Lastly, Paper 3 examined the impact of a provider's scope of practice on the five elements of the ADKAR model. The ADKAR model ensures the personal aspect in the change process is not forgotten by taking into consideration the varying circumstances of the individuals in the organization (Hiatt & Creasey, 2012). Healthcare organizations depend upon the individuals in the organizations to successfully implement change in order for change initiatives to be successful; this makes the ADKAR model a good fit for the healthcare industry to utilize to support organizational change (Kaminski, 2022). By using the theoretical framework of the ADKAR model, further insight into primary care providers' readiness to implement MAT services into clinical practice was obtained over the course of the three research studies in this dissertation. Specifically, the ADKAR model aided in identifying facilitators associated with providers' change readiness to integrate MAT services and barriers that could impede successful organizational change.

**Figure 5.1**

*Integration of ADKAR Model Papers 1, 2, and 3*




The three papers were also connected in their results. Papers 1-3 found previous training either had a negative association or no impact on knowledge. Paper 1 also demonstrated there was no relationship between a providers' level of MAT knowledge and their change efficacy and management support. Additionally, results from Paper 2 revealed that regardless of the number or location of MAT training hours there was no impact on providers' readiness to change. Furthermore, Paper 3 found educational learning environment and MAT training components posed a negative impact not only on knowledge, but ability and reinforcement as well. This posits that more than training is needed to develop primary care providers who are ready, able, and willing to integrate MAT services into clinical practice.

In Paper 3 the current state of change in the ADKAR model, consisting of awareness and desire, had positive correlations on the latter stages of the ADKAR model. These first steps of the ADKAR process are crucial in reducing resistance to change. A void of awareness or desire for the need to implement MAT services into primary care facilities could lead to increases in resistance to change, decreased productivity, increased turnover, and delayed implementation of the change (Hiatt, 2006; Prosci Inc., n.d.b). It is important for leaders of primary care organizations implementing MAT services to identify factors that can encourage the growth of awareness and desire to foster favorable environment for a successful organizational change.

The studies conducted in this dissertation highlight the significance of MAT knowledge and training in increasing providers' levels of awareness and desire. Paper 1 suggested an increase in MAT knowledge would increase providers' perceived level or appropriateness and personal valence for integrating MAT services. Paper 2 posit that having eight or more hours of MAT specific training diminished stereotype agreement stigma. Additionally, Paper 3 found providers with higher MAT training component scores had higher levels of perceived awareness. When undergoing the process of change, leaders should consider integrating MAT specific training to aid their providers to progress from the current state to the transitional state of the change process.

For over twenty years, the United States has implemented several changes to federal legislation of MAT medications to address the rising mortality from overdoses (Jones et al., 2023b). Within the last year, the United States Congress passed the Consolidated Appropriations Act (CAA), which removed the requirement of a X-waiver for all providers (SAMSHA, 2023). Despite these multiple changes, OUD continues to be a catastrophic issue. The results from Papers 1-3 showed MAT training and knowledge as having both negative and positive impacts

on the readiness process, illustrating just how complex of a problem increasing access to quality care for individuals seeking treatment for OUD actually is, and that it will take more than just training to address organizational readiness to implement MAT services in primary care. Our study adds to current literature that removal of the X-waiver requirement alone may not be sufficient in increasing providers' readiness to implement MAT services.

The ADKAR construct of reinforcement was identified as an area of concern across all three papers, as the means were either below or just hovering around the midpoint of the subscales. This indicates reinforcement as a barrier point to sustainable change (Hiatt, 2006). Literature has highlighted a lack of support as a key barrier to access to OUD treatment (Gordon et al., 2022; Haffajee et al., 2018; Nyaku et al., 2024.) Primary care organizations looking to implement or expand MAT treatment must consider that without reinforcement providers may not adopt new practices or the organization may see a decrease in utilization from providers who are administrating MAT services to OUD patients (Hiatt, 2006).

### 5.2 Limitations

Although this research provided vital insight into the perceptions of primary care providers and factors that impact their ability to treat individuals with opioid use disorder using medication assisted treatment in academic health profession training centers, it was not without its limitations. All three papers utilize non-experimental correlation designs and regressions to complete analyses. While the researcher agrees with the selected quantitative methods, caution is advised with respect to external validity. As the study design and regression analysis may be used to make inferences and determine relationships, no claims of causality can be made (Polit & Beck, 2017; Polit & Beck, 2017). Furthermore, the generalizability of the three studies may be

limited by the small sample size, use of non-probability sampling, and targeting providers only in the Hamptons Roads area in Virginia.

### 5.3 Future Studies and Recommendations

There were several areas of future research identified over the three studies. First, the research was conducted within a few weeks just in seven counties in Virginia and produced a limited sample set. Since the studies concluded, mortality rates from OUD have continued to rise (Ahmad et al., 2024) and policies governing previously required training to administer MAT medications have changed (SAMSHA, 2023). Due to this, there is a clear need to increase generalizability through replications of these studies in academic health centers outside of Virginia's Hampton Roads. Furthermore, evaluation of CAA's impact on providers' readiness and stigmatization is necessary. Although the internal consistency of the studies was acceptable (Dent & Goldberg, 1999; Hiatt & Creasey, 2012), expansion of this work should include that the reliability of each construct be re-tested to ensure the items measure their intended construct.

Policies and training can impact providers' stigma towards treating individuals with OUD (Chung et al., 2024; Franz et al., 2024). In order to obtain a better understanding of the motivations of primary care providers to treat patients with OUD, societal perceptions and individual stigma of the providers should be explored through qualitative research methodology. Additionally, a qualitative or mix method research design should explore providers' perceptions of their current state of change and the perceived impact it has on organizational transitions toward sustainable integration of MAT services. Particularly investigating the impact of perceived extent in which each organization incorporated MAT services on the stages of the ADKAR model, as an unclear direction can lead to feelings of uncertainty and promote resistance to change (Dent & Goldberg, 1999; Hiatt & Creasey, 2012).

Since policies surrounding the X-waiver have changed (SAMSHA, 2023) and the need for OUD treatment is increasing (Ahmad et al., 2024), the need for policy makers to develop legislation that not only increases access to care, but promotes sustainable change by increasing motivations, decreasing stigma, and increasing the confidence of the providers that they do have the knowledge and ability to treat individuals with OUD is crucial. Based on our findings, MAT trainings are still needed to develop providers' knowledge and decrease stigma, as MAT knowledge and trainings aided in the promotion of appropriateness, personal valence, and diminished individual levels of provider stigma toward individuals with OUD. As our findings suggest, the area of reinforcement was identified as a barrier to readiness to integrate MAT services in clinical practice. Reinforcement is vital to maintain sustainable change in an organization, their employees need reinforcement to maintain the desired change in the future state (Hiatt, 2006; Prosci Inc., n.d.a). In order for primary care organizations to successfully make the transition to OUD treatment as a normal part of clinical care, continued mentorship and support is needed after training (Gordan et al., 2022; Haitt, 2006; Lanham et al., 2022). It is recommended that policy makers ranging from federal legislators to organizational administrators consider developing and implementing effective trainings that not only increase providers' knowledge, but address stigmatization of individuals with OUD and MAT medication and dispel misinformation (Chung et al., 2024; Franz et al., 2024). Furthermore, clear communication from leadership that addresses the need for MAT services, how the practice of MAT aligns with organizational goals, how the transition will take place, and mentorship for providers is needed to address the stages of change in the ADKAR model that all providers experience as primary care organization strive to obtain effective sustainable care OUD patients (Hiatt, 2006).

## 5.4 Final Thoughts

This dissertation, through use of the ADKAR model, identified factors that impacted primary care providers' readiness to treat individuals with opioid use disorder using MAT in academic health profession training centers. Although the research showed having MAT knowledge and trainings increased a provider's level of awareness for the need for MAT in clinical practice, desire to implement MAT in clinical practice, and diminished stigma towards people with OUD, increasing provider readiness to address the need for MAT services in primary care is complex and will take more than training to fix the problem. These findings continue to highlight lack of support as barrier to sustainable change. With MAT policy changes and a seemingly never-ending need OUD services, primary care facilities must take action with management providing support and a clear vision for change that removes uncertainty and doubt from providers who will undergo change initiatives to provide MAT services. If support is not provided and primary care providers are resistant or slow to adopt practices, it will narrow access to quality care for an extremely vulnerable population that desperately needs their help.

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## Appendix A: MAT Readiness for Change Questionnaire

You are invited to participate in a research study designed to gain a better understanding of factors that influence primary care providers' readiness to integrate medication-assisted treatment (MAT) services. Carmen Ingram-Thorpe, a doctoral candidate in the College of Health Professions at Virginia Commonwealth University is conducting this study. The project is under the supervision of Dr. Susan Parish.

In this study you will complete the online survey comprised of five sections. The questions throughout the survey are designed to: 1) understand primary care providers' readiness to integrate MAT in a primary care clinical setting; 2) identify areas of perceived stigma that may influence primary care providers' ability to integrate MAT services in primary care; 3) evaluate primary care providers' level of MAT knowledge; and 4) identify barriers to integrating MAT services in a primary care setting. It will take approximately 15-20 minutes to complete the questionnaire. To thank you for your time and completion of the survey, you will be offered the chance to enter a drawing for one of fifteen $50 Visa gift cards.

**Eligibility Criteria:**

A Drug Enforcement Administration licensed provider: physician, physician assistant, or nurse practitioner; a resident; a nurse practitioner student in clinicals; or a physician assistant student in clinical rotations
Currently practicing in a primary care setting: family practice or internal medicine
Clinical practice is in one of the seven Hampton Roads cities of Virginia: Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, or Virginia Beach.
At least 18 years of age

Participation is voluntary, this survey is anonymous, and no IP addresses will be collected. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. At the end of the survey, you will be offered the chance to enter a drawing for a gift card by entering your contact information. This information will be collected and stored separately from the survey data.

Thank you in advance for your valuable insights. If you have questions at any time about the survey or the procedures, you may contact Carmen Ingram-Thorpe by email at ingramthorpcl@vcu.edu. Thank you very much for your time and support.

**By completing this survey, you are consenting to participate in this study and affirm that you meet all eligibility criteria.**

Part I

**Attitudes Toward Change and Job**

We would like to understand how you feel about the integration of MAT into primary care for your profession. The following questions will help us do that. For each statement, please use the scale below to indicate the extent to which you agree the statement is true.

| | Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree or Disagree | Somewhat Agree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|---|
| In the long run, I feel it will be worthwhile for me if MAT is integrated into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| It doesn't make much sense for us to initiate the integration of MAT into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| I think that the primary care will benefit from integration of MAT. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Management has sent a clear signal that my clinic/department is going to change. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Integrating MAT into primary care makes my job easier. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| When MAT integration into primary care is implemented, I don't believe there is anything for me to gain. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| My past experiences make me confident that I will be able to perform successfully after MAT is integrated into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| My future in this job will be limited because of the integration of MAT into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Integrating MAT into primary care will improve our clinic's/ department's overall efficiency. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| I am worried I will lose some of my status in the clinic/department when MAT is integrated into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| There are some tasks that will be required when we implement the integration of MAT into primary care that I don't think I can do well. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| I do not anticipate any problems adjusting to the work I will have MAT is integrated into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| When I set my mind to it, I can learn everything that will be required when this integration of MAT into primary care is adopted. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| I have the skills that are needed to make this MAT integration work. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| This MAT integration matches the priorities of our clinic/department. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| This clinic's/department's most senior leader is committed to the integration of MAT into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| The time we are spending on this integration should be spent on something else. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Our clinic's/department's top decision makers have put all their support behind this MAT integration. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| I think we are spending a lot of time on this MAT integration when the senior managers don't even want it implemented. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| When we implement MAT, I feel I can handle it with ease. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| There are legitimate reasons for us to make this change to MAT integration. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Every senior manager has stressed the importance of implementing MAT integration into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| There are a number of rational reasons for the adoption of MAT into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Implementing MAT integration into primary care will disrupt many of the personal relationships I have developed. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |
| Our senior leaders have encouraged all of us to embrace this change to implementing MAT into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ | ❑ |

Part II

**Attitudes Toward Change and Stigma**

We would like to understand how you feel about MAT services in primary care and stigma related to opioid use disorder. The following questions will help us do that. Unless specifically told otherwise, the term "change(s)" refers to the integration of MAT into primary care. With that in mind, please use the scale below to indicate the extent to which you agree the statement is true.

| | Strongly Disagree | Disagree | Unsure | Agree | Strongly Agree |
|---|---|---|---|---|---|
| I understand the reasons for integrating MAT services into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ |
| To be part of these changes makes me feel excited. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I have the required skills to adapt to the changes. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I can adapt to change. | ❑ | ❑ | ❑ | ❑ | ❑ |
| Our members of the group support this change. | ❑ | ❑ | ❑ | ❑ | ❑ |
| Most people believe that a person who is addicted to opioids cannot be trusted. | ❑ | ❑ | ❑ | ❑ | ❑ |
| Most people believe that a person who is addicted to opioids is dangerous. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I understand the difficulties in integrating MAT services into primary care. | ❑ | ❑ | ❑ | ❑ | ❑ |
| This change will provide me a lot of opportunities. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I understand how my work is related to change. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I can positively help change. | ❑ | ❑ | ❑ | ❑ | ❑ |
| My manager supports this change. | ❑ | ❑ | ❑ | ❑ | ❑ |
| Most people think that a person who is addicted to opioids is to blame for their problems. | ❑ | ❑ | ❑ | ❑ | ❑ |
| Most people believe that a person who is addicted to opioids is lazy. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I know how effective integrating MAT services into primary care is. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I support the implementation of the change (using MAT services in primary care). | ❑ | ❑ | ❑ | ❑ | ❑ |
| Change is clear to me. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I believe that a person who is addicted to opioids cannot be trusted. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I can do better due to changes. | ❑ | ❑ | ❑ | ❑ | ❑ |

| | | | | | |
|---|---|---|---|---|---|
| My uncertainty has been resolved. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I am aware of the goals of the integrating MAT services into primary care | ❑ | ❑ | ❑ | ❑ | ❑ |
| I believe that a person who is addicted to opioids is dangerous. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I benefit from the change (using MAT services in primary care). | ❑ | ❑ | ❑ | ❑ | ❑ |
| I have the knowledge to adapt to the changes. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I think that a person who is addicted to opioids is to blame for their problems. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I have the ability to do things at a level that is needed for the changes. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I personally develop with this change. | ❑ | ❑ | ❑ | ❑ | ❑ |
| I believe that a person who is addicted to opioids is lazy. | ❑ | ❑ | ❑ | ❑ | ❑ |

## Part III
## MAT Knowledge

We would like to gain a better understanding of your knowledge of Medication-assisted treatment. The following questions will help us do that. Please select the best answer for each question.

1. Medication-assisted treatment (MAT) is the use of medications, in combination with counseling and behavioral therapies, to provide a "whole-patient" approach to the treatment of substance use disorders. True or False

   ☐ True
   ☐ False

2. Which medications have been approved by the FDA to treat opioid use disorder?

   A. Methadone, Buprenorphine, and Naltrexone
   B. Acamprosate, Disulfiram, and Naltrexone
   C. Buprenorphine, Naltrexone, and Disulfiram
   D. Methadone, Buprenorphine, and Acamprosate

3. Which medication treats opioid use disorder through partial activation of opioid receptor thus decreasing drug use and protect from overdose?

   A. Methadone
   B. Buprenorphine
   C. Naltrexone
   D. All the above

4. Which medication should be used to treat patient with opioid use disorder after at least 7 days after their last use of short-acting opioids and 10 to 14 days for long-acting

opioids by acting as an opioid antagonist at the receptor and used to reduce physical craving for opioids and alcohol?

A. Methadone
B. Buprenorphine
C. Naltrexone
D. All the above

5. Which type of providers are eligible to obtain a buprenorphine waiver (X-waiver)? Select all that apply.

- ☐ Physicians
- ☐ Physician Assistants
- ☐ Nurse Practitioners and Clinical Nurse Specialist
- ☐ Certified Registered Nurse Anesthetist and Certified Nurse Midwives

6. It is required for providers to obtain a buprenorphine waiver (X-waiver) to prescribe buprenorphine for treatment of opioid use disorder regardless of number of patients being treated. True or False

- ☐ True
- ☐ False

7. Which of the following drugs and drug formulations have been approved for office-based treatment of
opioid dependence:

A. Buprenorphine/naloxone sublingual film
B. Buprenorphine transdermal patches
C. Buprenorphine sublingual tablets and buccal film
D. Both A and C

8. In patients prescribed buprenorphine for opioid use disorder with acute pain, treating the acute pain with opioids does not increase the risk of relapse. True or False

- ☐ True
- ☐ False

9. Which of the following should be regular components of office-based treatment of opioid dependence with buprenorphine/naloxone?

A. Random urine drug screening
B. Regular updating of treatment agreement
C. Random call-backs and medication checks
D. All the above

10. An opioid-dependent patient presents for buprenorphine/naloxone induction. The patient reports using heroin four hours prior to coming to the office. The Clinical Opiate Withdrawal Score (COWS) is 5. Buprenorphine/naloxone 4/1 mg is given. Twenty minutes later the patient complains of nausea and vomits as well as complaining of back and neck pain. The most likely explanation for these symptoms is:

    A. Severe opioid withdrawal not relieved by buprenorphine
    B. Precipitated opioid withdrawal
    C. Opioid overdose
    D. Exacerbation of co-occurring pancreatitis

Part IV

**Demographics**

This final section contains items regarding your personal characteristics. These items are very important for statistical purposes. Respond to each item by selecting the response that best describes you.

1. Which best describes your profession?

- ☐ MD/DO
- ☐ PA
- ☐ NP
- ☐ Resident
- ☐ PA student
- ☐ NP student
- ☐ Other

2. Ae you currently practicing in the Hampton Roads area (Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and/or Virginia Beach)?

- ☐ Yes
- ☐ No

3. In what specialty are you currently practicing?

- ☐ Family medicine
- ☐ Internal medicine
- ☐ Student
- ☐ Not currently practicing
- ☐ Other

4. How many years of practice do you have?

- ☐ In School
- ☐ In Residency
- ☐ <3 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ >10 years

5. Do you have previous training in pain management?

- ☐ Yes
- ☐ No

6. Do you have previous training in addiction?

- ☐ Yes
- ☐ No

7. Do you work with a provider that prescribes MAT medications?

- ☐ Yes
- ☐ No

8. How many hours MAT training have you completed?

- ☐ None
- ☐ 8 hours
- ☐ 24 hours
- ☐ Other

9. What type of training environment did you complete your MAT training?

- ☐ Online only
- ☐ In-person only
- ☐ Hybrid (online and in-person)
- ☐ Not Applicable

10. Have you obtained a buprenorphine wavier (X-waiver)?

- ☐ Yes
- ☐ No

11. Have you previously or are you currently prescribing MAT medications?

- ☐ Yes
- ☐ No

12. To what extent has you organization integrated MAT services?

- ☐ It hasn't been discussed to my knowledge
- ☐ We are currently discussing
- ☐ It's been discussed but decided not to move forward
- ☐ We are piloting
- ☐ It's a part of clinical practice
- ☐ Unsure

13. To which gender identity do you most identify?

- ☐ Male
- ☐ Female
- ☐ Transgender Male
- ☐ Transgender Female
- ☐ Gender Variant/Non-Conforming
- ☐ Not Listed
- ☐ Prefer Not to Say

Thank you for completing this survey.

## Appendix B: Recruitment Email

Dear Health Care Provider:

In the United States, mortality due to **opioids overdose has outpaced motor vehicle accidents as a leading cause of preventable deaths**. Despite medication-assisted treatment (MAT) being a more effective treatment option than behavioral treatment alone, the use of MAT for opioid use disorder remains low. Currently, 48 states, including Virginia, lack the capacity to provide sufficient MAT services. Due to this gap in coverage, there is a growing push for primary care practitioners to be the first-line providers to identify and manage opioid use disorder.

**To gain a better understanding of factors that influence primary care providers' readiness to integrate MAT services**, I am asking for your help with an important survey of primary care providers who specialize in internal and family medicine in the Hampton Roads area. This research study is being conducted by Carmen Ingram-Thorpe, a doctoral candidate in the College of Health Professions at Virginia Commonwealth University. The project is under the supervision of Dr. Susan Parish. It will take approximately 15-20 minutes to complete the questionnaire. To thank you for your time and completion of the survey, you will be offered the chance to **enter a drawing for one of fifteen $50 Visa gift cards**.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures, you may contact Carmen Ingram-Thorpe by email at ingramthorpcl@vcu.edu.

Please click on this link to complete the survey:

Insert URL link here

Thank You,

Carmen Ingram-Thorpe MSEd, MPH, PhD Candidate
Virginia Commonwealth University
College of Health Profession

## Appendix C: Reminder Email

Dear Health Care Provider,

You were recently invited to participate in a survey, aimed at understanding primary care providers' readiness to integrate medication-assisted treatment services in a primary care clinical setting. Your feedback is valuable. If you have already completed this survey, we would like to thank you very much, and you may disregard this email.

If you have not answered the survey yet, we would like to urge you to do so. It should take about 15-20 minutes to complete. Simply click on the link below to begin.

As always, your participation in this study is completely voluntary and responses are confidential. Data from this research will be reported only in the aggregate. If you have questions at any time about the survey or the procedures, you may contact Carmen Ingram-Thorpe by email at ingramthorpcl@vcu.edu.

Insert URL link here

Thank you for your help,

Carmen Ingram-Thorpe MSEd, MPH, PhD Candidate
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## Appendix D: Summary of Changes to RFCQ

| Subscale | Original | Revised Version |
|---|---|---|
| Appropriateness | In the long run, I feel it will be worthwhile for me if the organization adopts this change. | In the long run, I feel it will be worthwhile for me if **MAT is integrated into primary care**. |
| | It doesn't make much sense for us to initiate this change. | It doesn't make much sense for us to initiate **the integration of MAT into primary care.** |
| | I think that the organization will benefit from this change. | I think that the **primary care** will benefit from **integration of MAT**. |
| | This change makes my job easier. | **Integrating MAT into primary care** makes my job easier. |
| | When this change is implemented, I don't believe there is anything for me to gain. | When **MAT integration into primary care** is implemented, I don't believe there is anything for me to gain. |
| | This change will improve our organization's overall efficiency. | **Integrating MAT into primary care** will improve our **clinic's/department's** overall efficiency. |
| | This change matches the priorities of our organization. | This **MAT integration** matches the priorities of our **clinic/department**. |
| | The time we are spending on this change should be spent on something else. | The time we are spending on this **integration** should be spent on something else. |
| | There are legitimate reasons for us to make this change. | There are legitimate reasons for us to make this change **to MAT integration**. |
| | There are a number of rational reasons for this change to be made. | There are a number of rational reasons for **the adoption of MAT into primary care.** |
| Management Support | Management has sent a clear signal this organization is going to change. | Management has sent a clear signal that **my clinic/department** is going to change. |
| | This organization's most senior leader is committed to this change. | This **clinic's/department's** most senior leader is committed to **the integration of MAT into primary care**. |
| | Our organization's top decision makers have put all their support behind this change effort. | Our **clinic's/department's** top decision makers have put all their support behind this **MAT integration.** |

| | | |
|---|---|---|
| | I think we are spending a lot of time on this change when the senior managers don't even want it implemented. | I think we are spending a lot of time on this **MAT integration** when the senior managers don't even want it implemented. |
| | Every senior manager has stressed the importance of this change. | Every senior manager has stressed the importance of **implementing MAT integration into primary care**. |
| | Our senior leaders have encouraged all of us to embrace this change. | Our senior leaders have encouraged all of us to embrace this change **to implementing MAT into primary care.** |
| Change Efficacy | My past experiences make me confident that I be able to perform successfully after this change is made. | My past experiences make me confident that I will be able to perform successfully after **MAT is integrated into primary care.** |
| | There are some tasks that will be required when we change that I don't think I can do well. | There are some tasks that will be required when we **implement the integration of MAT into primary care** that I don't think I can do well. |
| | I do not anticipate any problems adjusting to the work I will have when this change is adopted. | I do not anticipate any problems adjusting to the work I will have when **MAT is integrated into primary care.** |
| | When I set my mind to it, I can learn everything that will be required when this change is adopted. | When I set my mind to it, I can learn everything that will be required when this **integration of MAT into primary care** is adopted. |
| | I have the skills that are needed to make this change work. | I have the skills that are needed to make this **MAT integration** work. |
| | When we implement this change, I feel I can handle it with ease. | When we implement this **MAT integration**, I feel I can handle it with ease. |
| Personal Valence | My future in this job will be limited because of this change. | My future in this job will be limited because **of the integration of MAT into primary care.** |
| | I am worried I will lose some of my status in the organization when this change is implemented. | I am worried I will lose some of my status in the **clinic/department when MAT is integrated into primary care.** |
| | This change will disrupt many of the personal relationships I have developed. | **Implementing MAT integration into primary care** will disrupt many of the personal relationships I have developed. |