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The Effectiveness of the Mobile Crisis Outreach Model

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The Effectiveness of the Mobile Crisis Outreach Model

by

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Dedication

I dedicate this dissertation to my mom, Maureen Molloy Casey, who wanted me to complete this doctorate more than anyone. Her unconditional love, encouragement, and model of personal resiliency provided me with the strength to achieve this dream.

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The Effectiveness of the Mobile Crisis Outreach Model

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Since the deinstitutionalization in the 1950s of thousands of individuals with severe mental illness who were released from psychiatric hospitals without adequate support, communities have struggled to provide crisis interventions for people who would otherwise end up in emergency departments, jails, and hospitals. Mobile crisis outreach teams began to emerge in the early 1970s as one solution to the need for stabilizing consumers in the community. Despite their proliferation over the past 30 to 40 years, there is a paucity of program evaluations or sound empirical investigations supporting their effectiveness (Murphy, Irving, Adams, & Driver, 2012). The purpose of this study was to determine the effectiveness of the mobile crisis outreach team model in reducing placement in more costly and restrictive settings and in linking individuals to more appropriate mental health services. The specific aim of this study was to evaluate the relative effectiveness of three independent variables, which are distinct crisis intervention methods on a number of dependent variables related to community-based behavioral health utilization and post intervention emergency department utilization, inpatient psychiatric hospitalization, and crisis residential stays. Results were mixed with respect to crisis interventions' statistically significant effect on decreasing post intervention ED visits, psychiatric hospitalizations, and crisis residential stays. The interventions were not significantly different from each other. Following the interventions, approximately 70% of participants were linked to

community-based behavioral health services although results suggest that other factors such as a diagnosis of schizophrenia and older age are most predictive of service linkage. Future research is needed to distinguish the impact of the mobile aspect of crisis interventions.

Table of Contents

List of Tables	xiii
List of Figures	xv
Chapter 1: Introduction	1
Background	3
Development of the Mobile Crisis Outreach Model.....	5
MCOT Structure and Operation for Proposed Study.....	5
Deficits in Empirical Research	7
Statement of the Problem.....	8
Purpose of the Study	8
Hypotheses	9
Chapter 2. Literature Review and Conceptual Framework	11
Crisis Defined	11
Theoretical Contributions to Crisis Intervention	12
Psychoanalytic Theory	12
Existential Theory.....	13
Humanism.....	13
Cognitive-Behavioral Theories.....	14
General Systems Theory.....	15
Crisis Theory.....	15
Basic Crisis Intervention Theory	15
Expanded Crisis Theory.....	16
Applied Crisis Theory.....	17
History of Crisis Intervention	18
Crisis Intervention Models and Strategies	21
Seven-Stage Model of Crisis Intervention.....	21
ABC Model.....	23
Crisis Services Continuum.....	26

23-Hour Crisis Observation or Stabilization.....	28
Short-Term Crisis Residential Stabilization Services.....	29
Evidence for Short-Term Crisis Residential Stabilization Services	29
24/7 Crisis Hotlines.....	30
Warm Lines.....	31
Peer Crisis Services.....	32
Advanced Directives.....	33
Mobile Crisis Services	34
Chapter 3: Methodology	38
Methods.....	38
Austin Travis County Integral Care: Description of Programs	39
Data Collection	42
Cerner Community Behavioral Health Solution.....	42
Integrated Care Collaborative Database	44
Managed Care Operations Data	45
Sample.....	45
Intervention Sample Statistics.....	45
Measures	49
Data Restructuring	56
Analysis.....	58
ANOVA	58
Chi-Square	59
Multiple Regression	60
Multiple Regression Assumptions	60
Logistic Regression.....	62
Logistic Regression Assumptions.....	62
Statistical Tests and Hypotheses.....	64
Chapter 4: Results	69
Mixed Analysis of Variance	69
Hypothesis 1 (Emergency Department Visits): Mixed ANOVA	70

Assumptions.....	70
Results.....	72
Hypothesis 2 (Inpatient Psychiatric Hospitalization): Repeated Measures ANOVA	75
Assumptions.....	75
Results.....	77
Hypothesis 3 (Crisis Residential Stays): Repeated Measures ANOVA	79
Assumptions.....	79
Results.....	81
Hypothesis 4 (Linkage to Services): Chi-Square Test of Independence	84
Analysis.....	88
Hypothesis 5 (Emergency Department Visits): Multiple Regression Analysis	88
Results.....	89
Hypothesis 6 (Inpatient Psychiatric Hospitalizations): Multiple Regression Analysis	94
Results.....	95
Hypothesis 7 (Crisis Residential Stays): Multiple Regression Analysis	99
Results.....	101
Analysis.....	106
Hypothesis 8 (Linkage to Services): Logistic Regression	106
Results.....	107
Chapter 5: Discussion	110
Discussion of Results.....	111
Limitations	122
Implications.....	124
Directions for Future Research	124
Conclusions.....	128

Appendix A. Ethnicity Breakdown by Intervention and	130
Appendix B. Gender Breakdown by Intervention	131
Appendix C. Specific Primary Axis I DSM-IV-TR Diagnosis across Interventions	132
Appendix D. Primary Axis I DSM-IV-TR Diagnosis Category by Intervention	137
References.....	138

List of Tables

Table 3.1: Service Dates and Age by Intervention.	47
Table 3.2: Ethnicity.....	47
Table 3.3: Gender.....	48
Table 3.4: Primary Axis I Diagnosis Category.....	49
Table 3.5: Study Variables.....	50
Table 3.6: Participants Receiving MCOT Services during FY14.....	51
Table 3.7: Participants Receiving EMCOT Services during FY14.	51
Table 3.8: Services Associated with Each Dependent Variable.	54
Table 3.9: Dependent Variables.....	55
Table 4.1: Descriptive Statistics: Emergency Department Visits (Square Root Transformations).	72
Table 4.2: Tests of Within-Subject Effects.....	73
Table 4.3: Tests of Between-Subject Effects.....	74
Table 4.4: Descriptive Statistics (Inverse Transformations).....	77
Table 4.5: Tests of Within-Subject Effects.....	78
Table 4.6: Tests of Between-Subject Effects.....	78
Table 4.7: Descriptive Statistics (Log 10 Transformations).....	81
Table 4.8: Tests of Within-Subjects Effects.	83
Table 4.9: Tests of Between-Subjects Effects.	83
Table 4.10: Case Processing Summary.....	85
Table 4.11: Intervention * Linkage to Services Post-Intervention.	86
Table 4.12: Chi-Square Tests.....	87
Table 4.13: Symmetric Measures	87
Table 4.14: Descriptive Statistics.	90
Table 4.15: Model Summary ^c	91
Table 4.16: ANOVA ^a	91
Table 4.17: Coefficients ^a	92
Table 4.18: Model Summary ^c	96

Table 4.19: ANOVA ^a	96
Table 4.20: Coefficients ^a	97
Table 4.21: Descriptive Statistics.	102
Table 4.23: ANOVA ^a	103
Table 4.24:	104
Table 4.25: Omnibus Tests of Model Coefficients.....	108
Table 4.26: Hosmer and Lemeshow Test.	108
Table 4.27: Model Summary.	108
Table 4.28: Classification Table ^a	108
Table 4.29: Variable in the Equation.	109
Table 5.1: Participants Receiving MCOT Services during FY14.....	113
Table 5.2: Participants Receiving EMCOT Services during FY14.	113

List of Figures

Figure 2.1: Robert's (1991) Seven-Stage Model of Crisis Intervention.	22
Figure 3.1: Crisis Intervention Models.	41
Figure 3.2: Multiple Regression Model for Emergency Department Visits.	65
Figure 3.3: Multiple Regression Model for Inpatient Psychiatric Hospitalizations.	65
Figure 3.4: Multiple Regression Model for Crisis Residential Stays.	66
Figure 3.5: Multiple Regression Model for the Continuous Dependent Variables.	66
Figure 3.6: Logistic Regression Model for Linkage to Community-Based Behavioral Health Services.	67
Figure 4.1: Descriptive Statistics.	74
Figure 4.2: Estimated Marginal Means.	79
Figure 4.3: Estimated Marginal Means.	84
Figure 4.4: Linkage to Services.	87
Figure 5.1: Estimated Marginal Means.	116

Chapter 1: Introduction

In any given year, an estimated one in four adults in the United States will experience a mental health disorder. A national prevalence study by Kessler, Chiu, Demler, and Walters revealed that 26.2% of adults, 57.7 million people, were diagnosed with a mental illness. Approximately 6% of those individuals have a severe form of mental illness. Individuals with mental illness often have more than one disorder. Co-morbidity studies among those with mental health diagnoses indicate that 14.4% have one disorder, 5.8% have at least two co-occurring illnesses, and 6.3% have 3 or more (Kessler et al., 2005).

Resources to meet the needs of those with serious mental illness are sorely lacking. The combined forces of deinstitutionalization and managed care push large numbers of people into communities before they are ready. In recent years, substantial budget cuts have resulted in further reductions in psychiatric bed availability, fewer crisis centers, and decreased access to effective treatment. Overall, states have decreased their mental health budgets by over 4 billion dollars, 12%, between 2009 and 2012 (NASMHPD, 2012). In both public and private hospitals, inpatient care capacity has decreased by 6% nationally, which translates to 3200 psychiatric beds.

In tandem with an insufficient and declining pool of inpatient beds are pressures to limit inpatient stays. This results in individuals being released back into the community before they are fully stabilized or capable of sustaining their restored state.

Theoretically anyone, especially those with mental health problems, can experience a psychiatric crisis. Those with serious mental illness, however, are especially vulnerable. The lack

of proper outpatient services and supports coupled with reduced inpatient capacity for treatment during the acute phases of illness has challenged communities to manage the high volume of psychiatric emergency situations. National research studies indicate that the number of psychiatric emergencies is increasing (Zeller, 2010).

Law enforcement is most often called to respond to crises among those with mental illness. In the absence of other more therapeutic community supports, police officers are left to determine whether to transport the person in crisis to the emergency department, back to the hospital, or if determined to be engaged in criminal activity or a potential threat to the safety of others, to jail.

Recognizing the need for more appropriate crisis intervention, both to reduce the burden on community systems (such as psychiatric hospitals, law enforcement officers, jail officials, and emergency departments) and to offer individuals more appropriate and effective de-escalation and stabilization support, a multitude of community-based crisis intervention approaches have emerged. These community-based mental health crisis interventions assist in stabilizing persons experiencing a mental health crisis by employing various interventions with the aim of restoring the individual to their level of functioning prior to the crisis event (Kanel, 2007).

One such model is mobile crisis services, which is designed to provide individual crisis assessments and intervention services, refer clients to available community resources, and to follow-up with them to ensure linkage to these community resources (APA, 2002; Murphy et al., 2012). Recommended best practices from the American Psychological Association (APA) for psychiatric crisis services identify mobile crisis outreach teams (MCOT) as a key component of a comprehensive community psychiatric crisis continuum (Allen, Forster, Silver, & Currier, 2002).

BACKGROUND

Individuals with serious mental illness (i.e., schizophrenia, bi-polar disorder, or severe depression) who are not receiving proper treatment or those who experience traumatic events such as natural or man-made disasters, rape, assault, or accidents, are vulnerable to mental health crises (World Health Organization, 2012); Mitchell, 2006). A crisis is defined as a situation that overwhelms an individual's capacity to cope effectively and is often triggered by a stressful life event and/or perceived threat (; Mitchell & Everly, 1999). Flannery and Everly (2000) classify a crisis as a response condition that involves:

- Disruption of psychological homeostasis.
- Failure of an individual's typical coping mechanisms to re-establish homeostasis.
- Functional impairment caused by the distress associated with the crisis event.

Mental health crises often follow trajectories that begin with intensely distressing emotions such as anxiety, panic, depression, anger, depression, hopelessness, and helplessness. Impairments to functioning can become obvious in the performance of work or school, the ability to maintain relationships, and to carry out daily activities. Unusual behaviors may be observed and personal hygiene may be neglected (SAMHSA, 2009). The most significant risk associated with a mental health crisis is suicide. Suicidal ideation and suicide attempts are indeed common among those in psychiatric crisis (Goldney, 2005; Links, Eynan, Ball, Barr, & Rourke, 2005).

The latest data available from the [Centers for Disease Control and Prevention](#) indicates that 38,364 suicide deaths were reported in the United States in 2010. This latest rise places suicide again as the 10th leading cause of death in the U.S. Nationally, the suicide rate increased 3.9

percent over 2009 to equal approximately 12.4 suicides per 100,000 people. The U.S. suicide rate has been increasing since 2000, which is the highest rate of suicide in 15 years. Nearly 1,000,000 people make a suicide attempt every year (Centers for Disease Control and Prevention, 2010), and 90% of people who die by suicide have a diagnosable and treatable psychiatric disorder at the time of their death. Crisis intervention is defined as the provision of emergency psychological care to individuals experiencing extreme distress in order to assist those individuals in returning to an adaptive level of functioning (Mitchell, 2006). It is designed to prevent or mitigate the negative repercussions of the crisis and/or associated trauma (Mitchell & Everly, 1999). Eric Lindemann's (1944) seminal research on grief provided the framework for crisis intervention procedures. Kardiner and Spiegel's (1947) study of the military provided the three basic principles of crisis response: (a) immediacy of intervention; (b) proximity to the crisis; and (c) expectancy of adaptive functioning. Caplan's (1964) community mental health models, which emphasized prevention, also shaped the early conceptualization of crisis intervention as an urgent and acute psychological intervention. More recently, the Substance Abuse and Mental Health Services Administration (2009) established fifteen essential principles for any appropriate crisis response (see Figure 1). They include:

1. Access to supports and services is timely.
2. Services are provided in the least restrictive manner.
3. Peer support is available.
4. Adequate time is spent with the individual in crisis.
5. Plans are strength-based.
6. Emergency interventions consider the context of the individual's overall plan of services.

7. Crisis services are provided by individuals with appropriate training and demonstrable competence to evaluate and effectively intervene with the problems being presented.
8. Individuals in self-defined crisis are not turned away.
9. Interveners have a comprehensive understanding of the crisis.
10. Helping the individual to regain a sense of control is a priority.
11. Services are congruent with the culture, gender, race, age, sexual orientation, health literacy and communication needs of the individual being served.
12. Rights are respected.
13. Services are trauma-informed.
14. Recurring crises signal problems in assessment or care.
15. Meaningful measures are taken to reduce the likelihood of future emergencies.

DEVELOPMENT OF THE MOBILE CRISIS OUTREACH MODEL

MCOT Structure and Operation for Proposed Study

MCOT has been established to provide on-site crisis intervention services to Travis County (Texas) residents. One branch of MCOT is dispatched via Austin Travis County Integral Care's (ATCIC or Integral Care) 24-hour Hotline. ATCIC's Crisis Division offers a continuum of crisis services in keeping with APA recommended standards of crisis care. The team expanded significantly during fiscal year 2014 and points of service access expanded as well. With respect to the original design, ATCIC's MCOT, first launched in 2006, and is comprised of 16 clinically licensed staff and a 20 hour/week prescriber. They work seven days week and are on call overnights. MCOT was initially developed in close collaboration with both the police and sheriff's

department Crisis Intervention Teams (CIT). Over time, the team has also developed close relationships with law enforcement assigned to local public school campuses K-12. On a first call in the community where there are not additional professional supports, the team goes in pairs. If there are additional professional supports or the individual is known to the team, one team member may respond. If needed, the team may contact CIT and request co-response. This collaboration also works in reverse, as CIT may request MCOT co-response to a call they receive.

As the model for the team has evolved, there has become an increasing emphasis on not only timely initial dispatch, but targeted follow up visits. Timely initial response combined with focused follow up to stabilize the immediate crisis and ensure linkage to care is crucial to the team's effectiveness. On average, ATCIC provides 3.6 services to individuals served by the team. MCOT provides over 95% of its services in the community. Fewer than 2% of individuals served require inpatient hospitalization and less than 1% of clients complete suicide within 30 days of service. A significant expansion of existing services was designed and implemented in 2014 through the Texas 1115 Medicaid Waiver opportunity. This expanded model, known as EMCOT, currently employs 22 clinical staff and a half time prescriber, and targets key community intercept points by using an approach that mirrors the criminal justice sequential intercept model. Throughout the development of ATCIC's MCOT program, the value of timely initial response combined with timely, targeted follow-up services has remained very clear. The practice of providing 3 follow up visits on average has been consistent even as the team has developed. Additionally clear is the importance of developing, valuing and nurturing the collaborative relationships, not only between EMCOT and each collaborator, but also by fostering relationships

among the collaborators. Many of these relationships have historically been fraught with tension and misunderstanding.

Primary access to MCOT is through calls taken at the crisis call center hotline from consumers or personal referral sources (i.e., family members, friends, etc.) Access to EMCOT is primarily through 911, EMS, the police department, and other community agencies. Calls are prioritized based on urgency. An MCOT team of two licensed mental health professionals, which is typically comprised of two licensed mental health professionals, is dispatched to the most urgent cases first. Upon arrival at the individual's location, the MCOT team conducts an assessment and provides intervention, which may include: medication evaluation, arrangement for psychiatric hospitalization, or transportation (of cooperative and medically stable individuals) to ATCIC's Psychiatric Emergency Services unit, its outpatient facility (The Inn), or another appropriate location. Both MCOTs also conduct follow-up with individuals who are non-compliant with medication, service/treatment referrals, or housing referrals, as well as with individuals who have recently been discharged from inpatient hospitalization, but did not keep scheduled aftercare appointments.

Deficits in Empirical Research

Mobile crisis teams have been described in the professional literature since 1971, but just as Geller, Fisher, and McDermeit (1995) observed twenty years ago, there is a lack of formal studies of their effectiveness. When Geller et al. surveyed state mental health agency directors in 1993, they found that 54 percent of the 37 states reporting utilization of mobile crisis services believed these services reduced the number of inpatient admissions. However, when asked if they

had routinely collected data on the impact of mobile crisis services, only eight state agency directors responded affirmatively.

The research conducted since Geller et al.'s study (1995) has lacked consistency in measuring program costs, hospitalization rates, risk of hospitalization, police response, and the impact of mobile crisis services on communities. This inconsistency compromises the ability to draw conclusions regarding MCOTs' effectiveness. Inconsistencies in the research literature result, in part, from the lack of uniformity in the structure of, and services provided by, existing mobile crisis teams throughout the United States.

Statement of the Problem

Geller et al. conducted a national survey of mobile crisis services in 1995 and found that their implementation across the United States was not accompanied by systematic evaluations. Most studies relied almost exclusively on qualitative analysis of interview with program directors. The few studies conducted since that time are primarily descriptive and have significant limitations including methodological shortcomings, inadequate and inconsistent descriptions of the interventions or models, and lack the inclusion of individuals in the study who have substance use disorders or presented with suicidal or homicidal risk (Murphy, Adams, & Driver. 2012; Vanderploeg, Schroeder, & Franks, 2008).

Purpose of the Study

The purpose of the proposed study was to determine the effectiveness of the mobile crisis outreach team model in reducing placement in more costly and restrictive settings and in linking

individuals to more appropriate mental health services. The specific aim of this study was to evaluate the relative effectiveness of three independent variables, which are distinct crisis intervention methods on a number of dependent variables related to community-based behavioral health utilization, criminal justice involvement, and future crisis intervention. It is hypothesized that MCOT and EMCOT will have a greater positive impact on the dependent variables as compared to PES only. Analyses will examine these direct relationships and their relative importance using multiple regression for the continuous dependent variables and logistic regression for the dichotomous dependent variable. The study further aims to contribute to the field's understanding of mobile crisis outreach by employing a sound empirical approach that improves upon previous investigations.

HYPOTHESES

Hypothesis 1 (H₁): Participation in crisis intervention services will reduce the number of emergency department visits, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 2 (H₂): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 3 (H₃): Participation in crisis intervention services will reduce the number of crisis residential stays, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 4 (H₄): Participation in crisis intervention services will increase the likelihood that the participant will be linked to community-based behavioral health services, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 5 (H₁): Participation in crisis intervention services will reduce the number of emergency department visits with behavioral health issue as the primary reason after controlling for the effects of history, diagnosis, ethnicity, gender, and housing status, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 6 (H₂): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations after controlling for the effects of history, diagnosis, ethnicity, gender, and housing status, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 7 (H₄): Participation in crisis intervention services will reduce the number of crisis residential stays after controlling for the effects of history, diagnosis, ethnicity, gender, and housing status, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 8 (H₅): Participation in crisis intervention services will increase engagement in outpatient services after controlling for the effects of history, diagnosis, ethnicity, gender, and housing status, and MCOT and EMCOT will have a stronger effect than PES.

Chapter 2. Literature Review and Conceptual Framework

CRISIS DEFINED

A multitude of definitions for the term *crisis* exist in the literature. Most definitions, such as Kanel's (2007), incorporate 3 key components: (a) a precipitating event; (b) a perception of the event that leads to the experience of stress; and (c) a failure of standard coping mechanisms and reduced functioning. Roberts (2000) posits that crisis is "a period of psychological disequilibrium, experienced as a result of a hazardous event or situation that constitutes a significant problem that cannot be remedied by using familiar coping strategies" (p.7). Hoff, Hallisay, and Hoff (2009) explain crisis in a clinical context as "an acute emotional upset arising from situational, developmental, or sociocultural sources, and results in a temporary inability to cope by means of using one's usual problem-solving devices" (p. 4). James and Gilliland (2013) add "unless the person obtains relief, the crisis has the potential to cause severe affective, behavioral, and cognitive malfunctioning up to the point of instigating injurious or lethal behavior to oneself or others" (p. 8). Caplan (1961), recognized as the Father of modern crisis intervention, characterizes a crisis as "an obstacle that is, for a time, insurmountable by use of customary methods of problem solving. A period of disorganization ensues, a period of upset, during which many abortive attempts at a solution are made". Or more simply, "it is an upset in the steady state of an individual" (1961, p. 18). For purposes of this study, the definition proposed by James and Gilliland (2013) will be adopted because it successfully distills the key components of the most recognized and aforementioned definitions and is consistent with the theoretical framework proposed to ground

this study. Crisis is “the perception or experiencing of an event or situation as an intolerable difficulty that exceeds the person’s current resources and coping mechanisms.” (pg. 23)

THEORETICAL CONTRIBUTIONS TO CRISIS INTERVENTION

Crisis Theory was born of an eclectic mix of theoretical paradigms; elements of Psychoanalytic theory, existentialism, humanism, cognitive behavioralism, and general systems theory are all recognized contributions to the crisis model (Kanal, 2007). These theoretical influences have shaped both the concept of crisis as a system and crisis intervention as an intentional set of actions aimed at helping someone experiencing a crisis.

Psychoanalytic Theory

Psychoanalytic theory assumes that early childhood fixations are the underlying influence behind the precipitating event leading to a crisis. More specifically, the model’s application to crisis theory frames the disequilibrium associated with an individual’s crisis and can be understood through analysis of the person’s past emotional experiences and unconscious thoughts (Fine, 1973). One of Freud’s key assertions is that each individual possesses a finite amount of psychic energy. The theory posits that individuals with preexisting neuroses, psychosis, or personality disorders lack the psychic energy to cope with crisis because their energy is already consumed with prior stressors (Brennes, 1974). In conceptualizing pathology in general, the psychodynamic paradigm historically dominated the field’s understanding of mental illness as it relates to trauma. As understanding of Post-traumatic stress disorder (PTSD) grew, psychoanalysis was maligned for ignoring the psychic impact of war on veterans and allegedly offering a tool for the government to deny benefits and treatment to those suffering from PTSD. The current science surrounding

PTSD is more balanced in acknowledging predisposing factors as a contributing influences on both the onset and intensity of the illness.

Existential Theory

Existentialisms' contribution to crisis theory and treatment coalesce around the concept of anxiety as a normal human condition and personal choice in assigning meaning to the experience of crisis. Bugental (1978, p. 13) proposed a short-term adjustment model that encourages a reframe of crisis as opportunity for growth and empowerment through choice.

Existential theory also provides helpful concepts regarding suffering as a universal human condition and the acceptance of personal responsibility in changing one's circumstances. Understanding that others have struggled with similar challenges can help mitigate the sense of being alone that many individual's in crisis experience. Particularly in situations where crises may be associated with an individual's poor choices, such as addiction issues, existentialist techniques of support and guidance with alternative perspective taking can lead to positive action.

Humanism

Humanistic theory similarly highlights the growth potential associated with crisis, while recognizing the inherent threats to growth. Carl Roger's contributions to crisis theory and treatment are most notably associated with the techniques of reflection and empathy (Corsini & Wedding; 1989, p. 175-179). These counseling techniques are employed to aid the traumatized individual to understand their emotions, acquire self-acceptance, and make new choices to cope and heal. The theory's tenets of hope and trust in the strength of the human spirit to overcome

adversity have positively influenced practitioners' approaches to crisis intervention (Kanel, 2007, p. 19).

The influences of humanistic/interpersonal theory in crisis work are also evidenced in intervention techniques regarding locus of control. Individuals who maintain an external locus of control rely on others for validation and will remain in a crisis state. Communicating positive regard and genuineness can help an individual regain an internal locus of control for self-evaluation. This shift, in turn, empowers an individual to regain a sense of their own power and to take action to better cope with the crisis situation (Goldfried, 2004).

Cognitive-Behavioral Theories

Cognitive theory maintains that crises are experienced as a function of faulty thinking regarding the events or circumstances precipitating the crisis. Cognitive approaches to treatment stem primarily from rational-emotive therapy (Beck, 1976), and Meichenbaum's stress inoculation and self-instructional training (Meichenbaum, 1985). The theories assert that individuals can emerge from their distress by recognizing and modifying their maladaptive behavior and irrational thinking about crisis events. Behavioral theory contributes a widely used problem-solving model to crisis intervention by (a) defining the problem; (b) reviewing ways to correct the problem; (c) brainstorming alternate ways of coping; (d) deciding on courses of action; and (e) implementing the behavior change and following up.

General Systems Theory

The General Systems model is based on Newton's law of physics, which states that every action is followed by an equal and opposite reaction. This model has expanded crisis theory to account for the influence of family or groups on an individual's response and subsequent ability to cope with a crisis event. Reframing the crisis situation and promoting positive interpretation of issues (e.g. recognizing interpersonal strengths in coping) and key strategies derived from family systems theory are applied to crisis interventions (Peake, Borduin, & Archer, 1988, p. 90-95).

Crisis Theory

Crisis Theory as an overarching paradigm is composed of basic crisis theory, expanded crisis theory, and applied crisis theory (Janosik, 1986). A more recent addition to crisis theory is an ecological, contextual model based on ecosystem theory (Coyne et al., 2003; James, Cogdal, & Gilliland, 2003, p. 653, p.341-342; Myer & Moore, 2006; Norris, Hamblen, Watson, Ruzek, Gibson, Price, & Stevens, 2006).

Basic Crisis Intervention Theory

Basic Crisis Intervention theory began with the writings of Erich Lindemann in the mid 1940's and 50's, and was enhanced by Caplan in the 1960's. Lindemann's research will be explained in more detail in the subsequent history of crisis intervention section, but in summary his work centers on crisis as a response to grief and loss. Drawing from general systems ecosystems, he framed the constellation of distressing thoughts and feelings that accompany grief as normal, time-limited, and capable of being reduced through brief intervention.

Lindemann challenged the assumption of pathology for individuals experiencing acute reactions to loss and chronicled normal, common grief responses such as (a) preoccupation with the loss; (b) identification with the loss; (c) feelings of guilt and anger; (d) disruptions of daily routines; and (e) physical symptoms (Janosik, 1984, p. 11).

Caplan (1964) broadened basic crisis theory beyond grief and loss to include the spectrum of traumatic events. Caplan conceptualized crises as obstacles to an individual's achievement of life goals. He, like Lindemann, relied singularly on psychodynamic theory to frame traumatic reactions from an equilibrium/disequilibrium paradigm.

Expanded Crisis Theory

With an ever-widening application of crisis theory to intervention in the field of trauma, exclusive reliance on precipitating factors as an explanatory model became viewed as insufficient. PTSD, in particular, illuminated the limitations of basic theory. Many individuals with PTSD were assumed initially to exhibit pathology as a function of early life events. This subsequently led to misdiagnoses and improper treatment. Increased recognition of trauma as the primary cause of the disorder prompted expansion of crisis theory to incorporate developmental, sociological, psychological, environmental, and situational factors (Shallcross, 2010; James & Gilliland, 2013, p. 14) into the theoretical construct.

Applied Crisis Theory

Applied crisis theory distinguishes four categories of crises (Brammes, 1985; James and Gilliland, 2013, p. 17): developmental crises, situational crises, existential crises, and ecosystemic crises (Bronfenbrenner, 1985, p. 656; Myer & Moore, 2006)

Developmental crises coincide with normal transitions during developmental stages of growth throughout the lifespan. An individual may experience crisis states secondary to developmental milestones such as graduating from school, moving away from one's childhood home, getting married, and having children. Developmental crises often unfold over the course of many years and require adjustment in role functioning of the individual.

Situational crises arise in response to unexpected or unusual occurrences such as natural or manmade disasters, unexpected loss of a loved one, automobile accidents, or assaults. Features that distinguish a situational crisis from a developmental crisis include their unpredictability, rapid onset, emergency quality and type of experience.

Existential crises, by nature, affect an individual's sense of purpose and meaning in life. Significant events in a person's life, such as a life threatening experience, traumatic loss, divorce, etc. are often the trigger for questioning the core value of one's life.

Ecosystemic crises are generally associated with human-caused (e.g. terrorism) or natural disasters and overwhelm not only an individual's coping mechanisms, but adversely affect whole communities and systems. Biologic events such as disease and epidemics as well as economic collapse are other examples of situations that can cause ecosystemic crises.

HISTORY OF CRISIS INTERVENTION

Although the recognition that crises pose dangers requiring intervention date back to Hippocrates in 400 B.C., modern crisis intervention theory and practice began with Erich Lindemann's work in the 1940's. His research began in 1943 after a massive fire at a nightclub in Boston resulted in the death of 493 individuals. Known as the Coconut Grove Fire, Lindemann and colleagues affiliated with Massachusetts General Hospital studied the traumatic aftermath and formulated the beginning of crisis theory and intervention strategies (Lindemann, 1944). The theory itself was formulated from systematic observation of the survivors immediate and late onset guilt reactions as well as the effects on the family members who lost loved ones. The researchers noted common reports of somatic distress, preoccupation with thoughts and visions of those who died, guilt, anger, and difficulty with normal routines of daily living. Lindemann attributed the duration of the grief symptoms to the person's ability to move through the stages of grief without suppression or delay. He uses the term *grief work* to describe the process of allowing oneself to experience intense distress in order to accept the loss, adjust to life without the deceased, and develop new relationships.

Lindemann's colleague at Mass General, Gerald Caplan, broadened the pioneering work on grief and loss. Caplan focused his work on developmental crises and conducted in depth research on the grief and loss experienced by women who gave birth to children with birth defects as a result of taking the drug thalidomide. He anchored his conceptualization on crisis as a disruption in the steady state of homeostasis. He wrote of the balance between cognitive and

emotional experience that is significantly altered with traumatic events (Caplan, 1961). Regular problem-solving strategies fail and the individual's reaction follows four stages:

1. Increased tension from the emotional response to the precipitating event.
2. Disruption and anxiety with daily functioning.
3. Continued to failure of emergency strategies and distress evolving to depression.
4. Mental breakdown or shift to employ alternative and more successful coping strategies.

Lydia Rappaport (1967) enhanced Lindemann and Caplan's work by emphasizing the significance of the precipitating event and translating that understanding to recommended action on the part of the crisis worker. She highlighted the time sensitivity of the support needed for an individual in crisis. "A little help, rationally directed and purposefully focused at a strategic time, is more effective than more extensive help given at a period of less emotional accessibility" (Rappaport, 1967, p. 38). She emphasized the need to conduct a thorough assessment of the key problem(s) and to convey optimism and hope while working in true partnership with the person to problem-solve through the crisis.

In addition to the work of these pioneering researchers, two key systemic movements shaped crisis interventions: the suicide prevention movement and the Community Mental Health Services Act. The suicide prevention movement was the first psychotherapeutic intervention to be targeted for people in crisis. The National Save-a-Life League, the first suicide prevention center, was started in 1906 in New York (Bloom, 1984). Through funding from the National Institute of Mental Health, which developed its own Center for Studies of Suicide Prevention, the number of suicide prevention centers grew from 28 in 1966 to close to 200 in 1972 (Roberts, 1979).

The most significant political movement that created the infrastructure for the delivery of mental health services was the Community Mental Health Centers Act of 1963. At the time of its inception, John F Kennedy's vision for the legislation was to reduce custodial care of mental health to patients within 10- 20 years. To ensure a proper safety net following the accelerated timetable for deinstitutionalization, the law required Community Mental Health Centers (CMHC) to provide emergency services as part of their system of behavioral healthcare. Twenty four hour crisis and emergency services soon became core to the mission of CMHC's, which in turn spurred the development of crisis intervention programs. Indeed, Foley and Sharfstein (1983), noted that crisis intervention units within CMHS grew by over 50% in the decade between 1970 and 1980. The Lanterman Petris Short Bill of 1968 also added requirements for community-based mental health services; including specific provisions for crisis intervention.

Three social movements further supported the foundation and subsequent growth of crisis intervention: Alcoholics Anonymous (AA), Vietnam veterans, and the Womens Movement (Yeager and Roberts, 2015). Although these movements did not inform the clinical practice of crisis intervention nor did they provide the infrastructure and funding, but they did harness the power of political pressure, social recognition, and public relations in shining the spotlight on crisis intervention for inadequately or unaddressed social problems.

Alcoholics Anonymous contributed to the crisis intervention field through its founding principles of aiding others in times of distress and providing opportunities to transform crisis into opportunity (Le, Inguarson, & Page,1995; Slaikou, 1990).

The Vietnam veterans' movement brought recognition to the plight of thousands of returned soldiers suffering from PTSD. Their advocacy efforts resulted in formal classification of PTSD as a mental disorder and financial support for counseling and crisis intervention services. Finally, the women's movement brought attention to the hidden epidemics of domestic violence and child abuse. Crisis hotlines and specialized services proliferated in concert with the formal recognition of the needs associated with these vast social problems.

CRISIS INTERVENTION MODELS AND STRATEGIES

There are an abundance of practice models and techniques to guide crisis intervention efforts. Roberts' seven stage model is perhaps best known, and most widely used, in crisis response (Eaton, 2005; Ligon, 2005; SAMHSA, 2013). Roberts' describes his model as derivative of those developed by Caplan, Golan, and Parad in the 60's and 70's (Roberts, 2000).

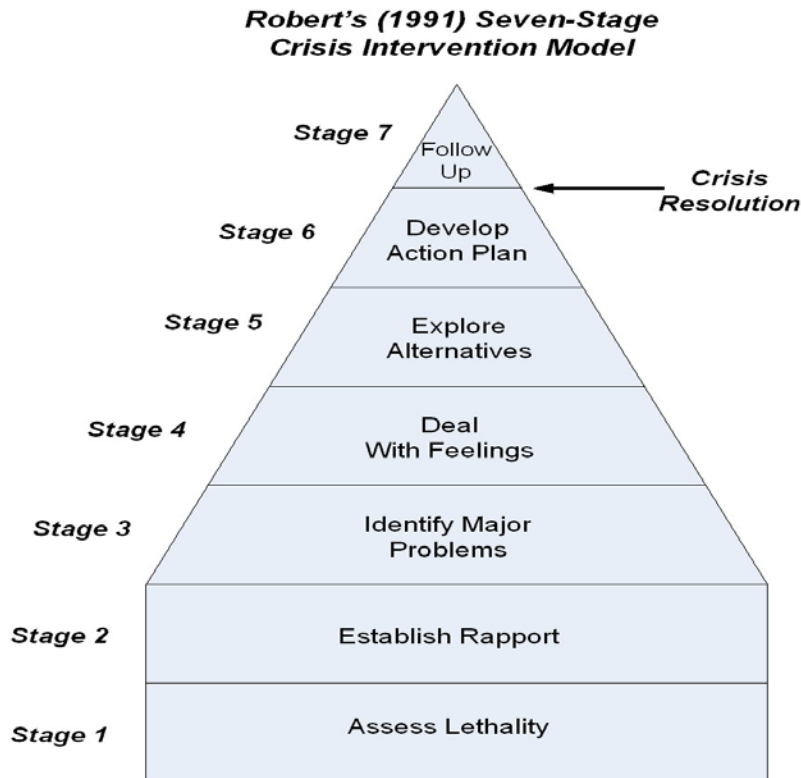
Seven-Stage Model of Crisis Intervention

Roberts' seven-stage model of crisis intervention is designed as a guide, not a rigid protocol, for assessing individuals experiencing an acute crisis or stress disorder. The model encompasses the following (Roberts 2005):

1. Plan and conduct a thorough assessment (including lethality, dangerousness to self or others, and immediate psychosocial needs).
2. Make psychological contact, establish rapport, and rapidly establish the relationship (conveying genuine respect for the client, acceptance, reassurance, and a nonjudgmental attitude).

3. Examine the dimensions of the problems in order to define it (including the last straw or precipitating event).
4. Encourage an exploration of feelings and emotions.
5. Generate, explore, and assess past coping attempts.
6. Restore cognitive functioning through implementation of action plan.
7. Follow up and leave the door open for booster sessions 3 and/or 6 months later.

Figure 2.1: Robert's (1991) Seven-Stage Model of Crisis Intervention.



The Roberts Model is alternately sometimes referenced as the ACT Model. The three letter acronym condenses the seven stages to highlight assessment of the presenting problem,

connecting clients to support systems, and focus on traumatic reactions and PTSD in addressing behavioral emergencies (Kleespies, 2009).

ABC Model

The ABC Model proposed by Kanel (2012) has its origins in Jones (1968) ABC steps to crisis management include: (a) achieving contact; (b) boiling the problem down to the basics; and (c) coping. Kanel also credits the renowned psychological theories of Sullivan and Adler with influencing Kanel's ABC model. Kanel's ABC Model of Crisis Intervention:

1. Developing and maintaining rapport.
2. Identifying the problem.
3. Developing coping strategies with the client.

Kanel's model provides a brief problem-focused intervention designed for a period of no more than 4-6 weeks after a crisis event. Although components are presented sequentially, Kanel emphasizes that the strategies can be implemented at any point in accordance with the unique needs and circumstances of the individual. The intervention is intended for use by both professionals and paraprofessionals to address a full range of crisis situations including cultural issues, substance abuse, and suicide.

Collins and Collins (2005) and Myers and Moore (2006) developed models that highlight the critical elements of developmental and ecological context. Collins and Collins (2005) specify the need to assess an individual's stage of development and the interrelationship of those lifespan factors and the environment. They emphasize that every crisis is unique in its meaning and impact on an individual and as such, the collaborative assessment of ecological factors is necessary. Myer

and Meyer (2006) introduced a formula for crisis assessment that calculates an individual's proximity to the precipitating event, reaction to it, and the amount of life change as a result of the event. These factors are then divided by the passage of time. Its main value to crisis intervention work lies in its highlight of the interactive factors that ultimately lead to understanding the true impact of the crisis.

Gilliland and James (1997) generated a diagnostic model of crisis intervention that is founded upon the aforementioned equilibrium model (people in crisis are in a state of disequilibrium and focus should be on stabilization, the cognitive model (crises evolve from faulty thinking and correcting those misconceptions is key to crisis resolution), and the psychosocial model (factors of heredity and learning need to be collaboratively assessed in understanding and resolving crisis). Their synthesized 6 step model includes the following:

1. Build a helping relationship.
2. Assure safety.
3. Give support.
4. Examine alternatives.
5. Assist with an action plan.
6. Obtain commitment (requires counselor follow-up).

The National Center for PTSD (2006) compiled a field manual on an evidence-based crisis intervention model referred to as Psychological First Aid. The reference to Psychological First Aid as an intervention specific to disaster assistance dates back to the late 70's with Raphael's coordinated response to victims of an Australian railway disaster (Raphael, 1977). Large scale

disaster response has since been plagued with controversy over alleged unintended harm resulting from the critical incident stress debriefing (CISD) model designed by Mitchell and Everly (1995). Critics argued that CISD was crafted from the false premise that everyone requires psychological debriefing following a traumatic event in order to prevent PTSD. Some studies suggested that misapplications of CISD led to unnecessary and harmful exposure of some individuals to traumatic details of a disaster that they might not have otherwise been privy to if not for the intervention. Critics further contend that CISD's universal approach to debriefing, particularly with heterogeneous groups, can result in emotional distress and guidance for resolving the distress is absent from the protocol. Given Psychological First Aid's un-intrusive approach to crisis stabilization approach to crisis stabilization, it is the prevailing disaster response for behavioral health issues (Young, 2006).

Psychological First Aid's eight core actions (U.S. Department of Veterans Affairs, 2011, p.18):

1. Contact and engagement. Goal: To respond to contacts initiated by survivors, or to initiate contacts in a nonintrusive, compassionate, and helpful manner.
2. Safety and comfort. Goal: To enhance immediate and ongoing safety, and provide physical and emotional comfort.
3. Stabilization (if needed). Goal: To calm and orient emotionally overwhelmed or disoriented survivors.

4. Information gathering on current needs and concerns. Goal: To identify immediate needs and concerns, gather additional information, and tailor psychological first aid interventions.
5. Practical assistance. Goal: To offer practical help to survivors in addressing immediate needs and concerns.
6. Connection with social supports. Goal: To help establish brief or ongoing contacts with primary support persons and other sources of support, including family members, friends, and community helping resources.
7. Information on coping. Goal: To provide information about stress reactions and coping to reduce distress and promote adaptive functioning.
8. Linkage with collaborative services. Goal: To link survivors with available services needed at the time or in the future.

Psychological First Aid is intended for the immediate aftermath of a crisis and is based on Maslow's Hierarchy of needs principle of survival issues as primary. It may be used by any first responder while linking individuals to food, shelter, clothing, and safety. Psychological First Aid embodies only the initial basic measures to aid someone in crisis. For many victims of trauma, additional crisis intervention and trauma therapy may be necessary.

CRISIS SERVICES CONTINUUM

Crisis interventions are delivered through a vast array of crisis programs and services. The National Strategy for Suicide Prevention (U.S. Department of Health and Human Services, 2012) identified access to crisis care as an action objective. The current trend is away from more

expensive and restrictive crisis care in emergency departments and hospitals and towards community-based emergency services (SAMHSA, 2014).

General emergency departments and inpatient psychiatric hospitals have historically been the primary place of treatment for individuals experiencing a mental health or substance abuse related crisis. Those two acute treatment settings have been increasingly recognized as least optimal both clinically and financially. Staff of emergency departments are generally ill equipped to deal with psychiatric and substance abuse crises due to lack of formalized training. The time pressures of emergency medicine combined with lack of infrastructure also compromises effective behavioral healthcare in the ED setting. Increased pressure to deliver services in the least restrictive and most appropriate setting has led to growth of community-based alternatives and reduced usage of inpatient psychiatric hospitalization. The subsequent reduction in actual availability of psychiatric beds has increased demand for community-based alternatives even further. (Torrey, E.F., Fuller, D.A., Geller, J., Jacobs, C., & Ragosta, K., 2012)

SAMHSA (2014) outlines five core crisis services as part of a comprehensive continuum of care: (a) 23 hour crisis stabilization/observation beds, (b) short term crisis residential services and crisis stabilization, (c) 24/7 crisis hotlines and warm lines, (d) peer crisis services and mobile crisis services. The main goal of these alternatives to emergency departments is to ¹stabilize and improve psychological symptoms of distress and to engage individuals in the most appropriate treatment to address the problem that led to the crisis. ² (SAMHSA, 2014, p. 7).

The amount of empirical evidence supporting the effectiveness of crisis services lags behind their proliferation around the country, but a compelling body of literature is growing.

23-Hour Crisis Observation or Stabilization

Twenty-three-hour crisis observation or stabilization provides individuals experiencing a significant crisis with up to 23 consecutive hours of closely supervised care to reduce their distress and deescalate their symptoms. The key strategies with this type of crisis service include prompt assessments, stabilization, and linkage to the next appropriate level of care. The primary goal of 23-hour observation units is to prevent unnecessary hospitalizations for crises that can be addressed with brief intervention (SAMHSA, 2012). This type of service is indicated for individuals in need of safety from overwhelming thoughts of suicide or who are vulnerable because of reduced coping skills. Services may include medication, counseling, referrals, and linkage to ongoing services. The literature includes two studies on the effectiveness of 23-hour crisis observation. Gillig et al (1989) conducted a quasi-experimental study of 2 psychiatric emergency services, one with an observation unit and one without. Findings revealed that the observation component resulted in a significantly lower rate of hospital admissions (36% with observation vs. 52% without).

A second observational study at a veteran's affairs medical center found that inpatient hospitalizations decreased from 38% prior to program intervention to 12% after treatment (Francis et al., 2000). Almost 80% of the patient's primary psychiatric diagnosis was substance abuse or dependence. Staff participants attributed the decreased hospitalizations to the compressed time period to link to outpatient treatments and the timeliness of patient willingness to accept treatment when acutely distressed.

Short-Term Crisis Residential Stabilization Services

Crisis stabilization is a “direct service that assists with deescalating the severity of a person’s level of distress and/or need for urgent care associated with a substance use or mental health disorder. Crisis stabilization services are designed to prevent or ameliorate a behavioral health crisis and/or reduced acute symptoms of mental illness by providing 24-hour observation and supervision for persons who do not require inpatient services” (SAMHSA, 2012). It essentially offers a calm, protected alternative to hospitalization when a crisis requires a person to be removed from their environment to effectively resolve the crisis. Services offered include physical and psychiatric assessment, life skills training, counseling, treatment planning, and connection to ongoing services.

Evidence for Short-Term Crisis Residential Stabilization Services

Studies regarding the effectiveness of short-term crisis residential stabilization services suggest that the shorter term intervention is as effective as inpatient hospitalization in reducing symptoms and improving functioning. Moreover, short-term crisis stabilization is more cost effective and individuals report greater satisfaction with the intervention compared to inpatient stays. In a meta-analytic review of RCTS and other qualitative studies, Lloyd and Evans and colleagues (2009) indicate that there is evidence supporting crisis residential alternatives as more effective and less expensive than standard inpatient treatment. Of note, the services were limited to patients aged 16 through older adulthood and did not include substance abuse inpatient treatment or detoxification services.

24/7 Crisis Hotlines

Crisis hotlines are a direct service delivered via telephone that provide a person who is experiencing distress with immediate support and/or facilitated referrals. This service provides a person with a confidential venue to seek immediate support with the goal of decreasing hopelessness, promotes problem-solving and coping skills, and identifies persons who are in need or facilitated referrals to medical healthcare and/or community support services (SAMHSA, 2012).

Hotlines are generally the first point of contact with crisis services for persons in distress or their support systems to seek help. Most hotlines are primarily intended to provide support to those feeling overwhelmed and hopeless and to collaboratively craft a plan to improve coping and to access services if needed (Kalafat, Gould, Munfalch, & Kleinman, 2007). Hotlines are largely set up to serve existing populations or communities, and as such, do not limit services to those with certain diagnoses or to only those with insurance or ability to pay.

The National Suicide Prevention Lifeline is an example of a national hotline that offers a toll free number and routes calls through a single network to the nearest crisis center. A two-part investigation of crisis hotline outcomes examined both suicidal and non-suicidal callers (Gould, Kalafat, Mulfalch, & Kleinman, 2007; Kalafat et al., 2007). Using a sample of eight telephone crisis centers across the country with a total of 240 counselors, baseline and two week post call follow up assessments were conducted. Seven of the eight crisis participating centers were part of the National Suicide Prevention Lifeline network. The investigation revealed that suicidal callers showed significant reductions in suicidality from the beginning to the end of the call. Specific reductions were reported on intent to die, psychological pain, and hopelessness. Between the end

of the call and two-week follow up assessments, callers reported further significant reductions in psychological pain and hopelessness (Gould et al., 2007). Non-suicidal callers reported significant decreases in emotional distress from the beginning of the call to the end and at the two week follow assessment (Kalafat et al., 2007).

Warm Lines

Warm lines are differentiated from hotlines by their staffing and the urgency among the calls they take. Warm lines are staffed by individuals who are consumers of mental health services, also known as peers, or who have lived experience of a behavioral health condition (SAMHSA, 2010). A warm line is “a client service delivered via telephone by a peer that provides a person in distress with a confidential venue to discuss their current status and/or needs” (SAMHSA, 2012). Whereas hotlines are intended to field emergency situations, warm lines are more preventative and targeted to situations that may be unfolding before they lead to an emergency. Warm lines focus on building peer support networks and encouraging social connections. Techniques used include active listening, providing information and emotional support, and offering hope for recovery.

Dalgin, Maline, and Driscolle (2011) conducted a telephone survey of 480 warm line callers over four years. The study found that callers reported a reduction in feelings of isolation and utilization of crisis services. Most reported that it was of particular benefit that the warm lines were available during evening hours after the working day.

Peer Crisis Services

Services that include opportunities for support from others who have personal experience living with a mental illness and a substance abuse issue is an essential component of crisis service delivery (SAMHSA, 2009). Peer crisis services are designed to last less than 24 hours, but in certain circumstances, may be extended over several days. They offer a viable alternative to emergency department or inpatient psychiatric hospitalization (Ostrow & Fisher, 2011). They purport to offer calming environments that convey hopefulness for recovery.

Although more systematic investigations are needed, preliminary research shows promising outcomes for peer crisis services. The studies are limited to adults with severe mental illness in face to face services or suicide prevention hotlines staffed by peers.

An unpublished study conducted by Dumont and Jones in 2002, examined outcomes of a five-bed crisis hostel over two years. They reported better outcomes and lower costs than those randomized to treatment in emergency departments or hospitals (SAMHSA, 2014). Greenfield and colleagues (2008) also implemented a randomized control study of peer services and found greater symptom improvement in the peer service group as compared to the inpatient hospital treatment group. More specifically the study randomly assigned adults with SMI to peer-led short-term crisis residential program or to a standard inpatient unit. Peer services were associated with significantly greater reductions in symptoms, increased self-reported strengths, and great satisfaction with treatment.

Advanced Directives

Navigating the crisis services system while in a state of distress can be overwhelming. A critical component of crisis delivery, therefore, is an option that aids individuals to specify their preferences and needs ahead of time (Cambell & Kinsely, 2009). Similar to advanced directives related to physical health issues, a Psychiatric Advanced Directive (PAD) is a document that outlines an individual's future decisions regarding treatment in instances where the person is unable to make those decisions because of compromised mental functioning. Twenty-five states, including Texas, have adopted the use of PADs (Morrisey, 2010). It's important to note that PADs do not apply to emergency involuntary detention.

The evidence supporting the effectiveness of PADs on mental health outcomes and service utilization costs is unclear. One study of advanced directives jointly formulated by an individual and treatment team reported savings in costly service utilization associated with PADs, but results were not statistically significant (Flood et al., 2006). A similar study found no differences in hospitalization rates among those with directives and those without (Campbell & Kinsley, 2009).

Two additional studies suggest the collaborative development of the PADs between an individual and the treatment team vs. an individual alone is a factor in outcomes. Papageorgiou and colleagues (2002) compared inpatient hospitalization rates of those with a PAD developed without the aid of a treatment team to those without a directive and found no differences. In contrast, Henderson and colleagues (2004) found statistically significant differences in psychiatric hospitalization rates between those with PADs formulated with the support of a treatment team and those with no directive. Those with the jointly created PAD had 14% less hospital admissions

than those without an advanced plan. Although more investigations are clearly needed, the involvement of a mental health treatment team in the development of advanced directions may result in better patient outcomes and lower healthcare costs.

Mobile Crisis Services

Mobile crisis services are delivered through teams who provide psychological assessment and stabilization to individuals in the community who may be experiencing a mental health or substance abuse crisis (Scott, 2000). The American Psychiatric Association Report on Psychiatric Emergency Services defined mobile crisis services as “having the capacity to go out into the community to begin the process of assessment and definitive treatment outside of a hospital or healthcare facility (Allen et al., 2002). They are widely considered one of the most innovative components of the crisis services continuum (Simakhodskaya, 2009). The mobile crisis team model is unique in its design for quick, 24/7 response in the community or wherever the crisis may unfold (Ligon, 2015).

Mobile Crisis Outreach Teams (MCOT's) vary across the United States, but a recent systemic review of MCOT's revealed several key characteristics (SAMHSA, 2013):

- Target populations are not limited to those with severe mental illness and often include individuals at risk of suicide.
- Assessment, brief intervention, and referrals represent the core services offered by most teams.
- MCOT's are often interdisciplinary and may include law enforcement.

- Most collaborate with the larger crisis service system as well as the behavioral healthcare system.
- Crisis and suicide hotlines are often the access point for MCOT services.
- Rapid response and 24/7 operating hours.

Similar to emergency medical services for physical crises, MCOT's are designed to provide assistance to anyone in the community who is in need of crisis intervention. The National Suicide Prevention Lifeline reported that seventy-five percent of its hotline members were affiliated with a mobile crisis team (National Suicide Prevention Lifeline, 2011). A recent key informant survey conducted by Westat and Associates indicated that a significant percentage of MCOT responses involve persons at risk of suicide (SAMHSA, 2013). The staffing for MCOT's is typically interdisciplinary and mirrors standards for crisis intervention services (Simakhodskaya, Haddad, Quintero, & Malavede, 2009). Teams are composed of master level social workers and counselors, nurses, psychologists, and in some instances, psychiatrists (Cornelius et al., 2003; Simakhodskaya et al., 2009). The more common approach is to have MDs, APN's or PA's available on call to provide consultation to the team and needed medications to the individual in crisis (Hare, 2006; Ligon, 2005). Indeed, access to psychiatric medications is a required component, advanced by the APA standards for mobile crisis teams (Allen et al., 2002).

Partnerships with law enforcement in team crisis response is not uncommon and among police co-responders there is a mix of those who wear police uniforms and civilian clothing (Kisely et al., 2010; Ligon, 2005). Police officers who partner with mobile crisis teams are generally trained in addressing psychiatric crises and often have specialty training in behavioral health (Landeem, Pawlick, Rolfe, Cotter, & Holmes, 2004).

While the academic literature on MCOT's stretches back nearly three decades, the outcomes research component of this literature is not robust (SAMHSA, 2014; Brown, 2005). The limited evidence that does exist, however, points to favorable outcomes. Four studies were identified with empirical evidence on the effectiveness of mobile crisis services. Currier et al. (2010) conducted the one randomized control trial to determine whether a mobile crisis team intervention would be more effective than standard referral to a hospital-based clinic as a means of establishing near-term clinical contact after emergency department discharge. The investigators concluded that MCOTs' model was highly effective in contacting suicidal patients who were discharged with a 70% success rate vs a 30% success rate of an outpatient clinic. Reduced hospitalization rates and treatment costs for MCOT interventions relative to hospital-based services were also found by Guo, Biegel, Johnson, & Dyches, (2001) or when compared to first responder services (Scott, 2000).

The weaknesses of the existing body of evidence on MCOT effectiveness involves a lack of clarity on the MCOT model under investigation, lack of methodological rigor, and failure to study MCOT models that incorporate a follow-up component. The proposed study offers a unique contribution to the evidence base by clearly describing and investigating a model that incorporates the core features of MCOT models nationally, employing a quasi-experimental design comparing two models of MCOT intervention with a comparison group who received an outpatient emergency service, and investigating two models of MCOT intervention that include a robust follow-up component. The theoretical model proposed for the study is Robert's Seven Stage Model of Crisis Intervention. Robert's model has been identified as the most common approach utilized

by MCOTs nationally (Eaton, 2005; Ligon, 2005) and offers an excellent balance between being comprehensive and flexible.

Chapter 3: Methodology

METHODS

Austin Travis County Integral Care (ATCIC or Integral Care) provided several datasets that contain information critical to the aims of this dissertation. Integral Care de-identified the data and combined the datasets based on a unique identifier common to all of the systems. The data include elements of the *independent variables*: whether or not individuals received one of three different types of initial crisis intervention services. The data also includes information related to the *dependent variables*: linkage to community-based behavioral healthcare services, emergency department visits, crisis residential services, and inpatient psychiatric hospitalizations. Secondary data analysis was used to describe the study sample to evaluate the relative effectiveness of the crisis interventions. The initial crisis interventions are operationally defined by receipt of either mobile outreach crisis services (MCOT), expanded mobile outreach crisis services (EMCOT), or psychiatric emergency services (PES). The unit of analysis for the study is individual participants. The goals of the study are to examine the effectiveness of these three primary methods of initial crisis intervention overall and in relation to each other on the dependent variables. The dependent variables include linkage to community-based behavioral health services and inpatient psychiatric hospitalizations, crisis residential services, emergency department visits). Additional analysis controlled for specific covariates including history, primary Axis I diagnosis, ethnicity, age, and gender.

The following discussion reviews the methods used for collecting data for the study and describes the various sources from which the data were obtained. Additionally, the sample is

described. Each of the variables to be used in the study is operationally defined, including the dependent variables (inpatient psychiatric hospitalizations, crisis residential services, emergency department visits, linkage to community-based behavioral health services), control variables (history, primary Axis I diagnosis, ethnicity, age, gender), and the independent variables (MCOT, EMCOT, PES). The method of analysis is also addressed with a detailed description of the analysis techniques including mixed analysis of variance, chi square test, multiple hierarchical regression and logistic regression. Finally, the models to be used for analyses are reviewed, along with the hypotheses for the study. The University of Texas at Austin's Institutional Review Board (IRB) granted approval for this study in June of 2015.

Austin Travis County Integral Care: Description of Programs

Founded in 1966, ATCIC provides community-based behavioral health and developmental disabilities services in Travis County, administering an annual budget of \$92 million of local, state and federal funding at 46 physical facilities. In the last year, Integral Care served more than 26,000 individuals and families, offering numerous services and programs year-round. Individuals receiving services at Integral Care are often in dire need of care and have a single or combined diagnosis of developmental disabilities, persistent mental illnesses, and/or substance use. The agency provides a continuum of crisis services including a 24 hour hotline, an urgent care crisis clinic, and crisis intervention services provided via mobile teams throughout the community.

Psychiatric Emergency Services (PES) is ATCIC's walk-in psychiatric emergency service clinic open 24/7 and is staffed by licensed mental health clinicians, psychiatrists, nurses, and other qualified mental health professionals. PES provides psychiatric assessment, crisis intervention,

linkage to resources, and physician services to children/youth and adults experiencing psychiatric distress. PES is available for individuals in crisis to also have an initial assessment for services. PES staff work closely with other Integral Care programs, local emergency rooms, and the Crisis Intervention Teams (CIT) of the Austin Police Department and Travis County Sheriff's Department. PES is similar to an urgent care center on the physical health side of care. It is clinic-based and, unlike mobile crisis teams, has no follow-up component. PES does, however, often serve as a follow-up component to the initial crisis response services for EMCOT and MCOT. For example, EMCOT and MCOT refer individuals to PES for follow-up medications when immediate access to a mobile prescriber is not available.

The Mobile Outreach Crisis Team (MCOT) is also an ATCIC program. Composed of medical and mental health professionals, MCOT is dispatched by the crisis hotline and responds immediately on-site where a psychiatric crisis is occurring. MCOT is available 24/7 and responds to calls from the home, school, street or clinic. MCOT is staffed by registered nurses, licensed clinicians and a prescribing clinician who provide crisis assessment and intervention, including medication if needed. After the immediate crisis is resolved, MCOT links each individual with other resources to ensure their safety and continued well-being. As part of Integral Care's continuum of comprehensive psychiatric crisis services, the team works closely with Psychiatric Emergency Services (PES) and the Crisis Intervention Teams (CIT) of the Austin Police Department (APD) and Travis County Sheriff's Office (TCSO). MCOT provides psychiatric assessments, crisis intervention services, brief follow-up and service linkage for adults and children/youth in non-clinical, community settings. This unique program was developed in collaboration with the CIT of the APD and TCSO. Depending on the availability of resources,

MCOT provides follow-up visits and services to individuals who receive initial EMCOT interventions.

The Emergency Mobile Outreach Crisis Team (EMCOT) differs from MCOT mainly in its method of dispatch and model of co-response with law enforcement or emergency medical services. As previously mentioned, MCOT is dispatched through the ATCIC hotline and EMCOT is dispatched through 911 or directly by Emergency Medical Services (EMS) or the Austin Police Department (APD). EMCOT typically co-responds with APD and EMS. Both teams are composed of licensed mental health professionals and a psychiatrist, APN, or PA available on call for consultation to the team and to provide medication services to individuals in crisis. The table below outlines the crisis intervention models by method of dispatch, delivery of service, team composition, and average number of follow-up visits.

Figure 3.1: Crisis Intervention Models.

Crisis Intervention Models				
Program	Dispatch Type	Location of Service	Response Team	Follow-up
Expanded Mobile Crisis Outreach Team (EMCOT)	911	Community	Team of clinicians + APD or EMS	Average 3.2 visits
Mobile Crisis Outreach Team (MCOT)	Crisis Hotline	Community	Team of clinicians	Average 3.2 visits
Psychiatric Emergency Services (PES)	Walk-in	Clinic	1 clinician at a time	No formal follow-up component

Data Collection

To prepare the data for analyses, the following datasets were de-identified and combined based on a unique identifier. This process was essential to ensuring the confidentiality of the participants and to examining the research questions for the study. MS SQL scripts were created to transform the MS Excel databases into a research-ready format so that it could be imported into the Statistical Package for the Social Sciences (SPSS) for analysis. For descriptive purposes, secondary data analyses were performed on this de-identified dataset and subsequent analyses were performed for predictive purposes.

Cerner Community Behavioral Health Solution

Data related to crisis intervention services, primary Axis I diagnosis, gender, age, ethnicity, linkage to community-based behavioral health services, and crisis residential stays were all available through the Cerner Community Behavioral health Solution (CCBHS). Austin Travis County Integral Care uses CCBHS for its Electronic Health Records. The software has been certified as a Complete EHR Ambulatory for Meaningful Use by the Drummond group. The software includes robust functionality designed to maintain participant assessments, services, treatment plans and progress indicators.

The CCBHS software used by ATCIC serves as the primary location for all clinical information such as care plans developed based on individuals' needs and desires for recovery, physician assessments, prescriptions, lab results, and all progress notes entered by any staff coming into contact with the individuals ATCIC serves. All interaction with individuals is documented in

CCBHS, whether that interaction is by telephone, during clinic appointments, or out in the community.

Documentation is entered real-time and is immediately available to all other applicable staff with access to CCBHS. This real-time access to an individual's status and progress is vital to maximizing continuity of care. For example, if a Crisis Hotline worker wants to dispatch the Mobile Crisis Outreach Team (MCOT), the worker completes a full risk assessment, collects location information, and alerts MCOT of the dispatch. MCOT then opens the chart in CCBHS and is able to read the full assessment in order to be fully prepared when they arrive at the individual's location.

CCBHS is used to conduct risk assessments, document all contacts, and to relay pertinent information to other ATCIC service providers via progress notes. The risk assessment form in CCBHS conforms to standards established by the American Association of Suicidology and the National Suicide Prevention Lifeline. Areas of focus include: immediate risk of harm to self or others; past history of suicide attempts; and other risk factors such as substance use, family history, signs of depression, physical health issues, lack of positive buffers, and lack of family/community supports. Other pieces of information collected during an assessment that help in provision of ongoing care include: contact information, emergency contact information, whether there are other people, animals, or weapons present in the individual's home, and the individual's preference for follow-up contacts (phone number, times of day, frequency, etc.). Demographic information is also collected to aid in the evaluation of populations being served.

Integrated Care Collaborative Database

Data related to emergency department visits and psychiatric hospitalizations was gleaned from the ICare database, which is maintained by the Integrated Care Collaborative (ICC). The ICC is a nonprofit alliance of health care providers in Central Texas dedicated to the collection, analysis and sharing of health information with the goal of improving health care quality and cost efficiency across the continuum of care.

One of the ICC's primary functions is the operation and management of a regional Health Information Exchange called the ICare system. Through the analysis of clinical data in the ICare system, the ICC is able to identify needs in the Central Texas health care system and create programs to improve health outcomes for vulnerable populations. ICC Members are health and social services providers, payers and purchasers, including hospital systems, health care networks, community health centers, clinics, government agencies, nonprofit organizations, individual providers and others

ICare is based on proven, open-source HIE technology and is recognized by ONC and the State of Texas as a regional Texas Health Information exchange. ICare connects electronic health records across multiple organizations and is accessible through web-based provider portal. The portal gives providers access to a patients aggregate medical record. ICare facilitates the exchange of patient clinical summary data between disparate care delivery organizations and systems, as well as e-prescribing and the receipt of medication history, structured lab orders and results.

Managed Care Operations Data

Data related to psychiatric hospitalizations was also retrieved from the MCO database. MCO data contains a subset of patients insured by Medicaid managed care. MCO was retrieved from a Cerner Anasazi Database used by Tejas Behavioral Health Services to manage and reimburse inpatient, residential, and outpatient step-down services for persons with mental health and substance use disorders. The data also include hospital services, which are funded by Central Health and DSHS. As well as the City of Austin and Travis County funded detoxification, residential, Intensive Outpatient Programs (IOP), and outpatient substance use disorder services. Service recipients include community members who may or may not receive Integral Care services. A detailed description of how information from the four separate various data sources were combined into a single dataset is provided in the Data Restructuring section below.

SAMPLE

Intervention Sample Statistics

A description of the sample is provided that includes an overview of data pertaining to the sample's generalizability to a larger population as well as the population of participants who have received crisis services overall. Descriptive statistics are provided to compare sample characteristics between the crisis intervention groups.

The potential sample consisted of 4,935 individual participants. The study intentionally excluded anyone under 18 years of age, anyone who did not receive a face to face crisis intervention, and anyone who did not receive crisis intervention services within the selected timeframe. The rationale for the exclusions is described below.

The study intentionally excluded any participants with an intervention date after 6/11/2014. Since the database only contained service data through 6/10/2015, participants who experienced the intervention after 6/11/2014 were excluded from the study because they had not had a full year to potentially receive post-intervention services. Based on the intervention date, there were 910 participants who were excluded based on this criterion.

The reasoning for only including face to face crisis interventions, hence excluding telephone, telemedicine, or crisis chat via text messaging in the study is to build upon the evidence base for face to face interventions. Additionally, given that school-based mental health services commonly work in tandem with ATCIC's crisis services, the goal of examining the relative effectiveness MCOT, EMCOT, and PES alone would have added significant methodological challenges that may have ultimately compromised the interpretation of the results.

The final sample consisted of 3,485 individual participants who received initial crisis intervention services from PES, EMCOT, or MCOT during fiscal year (FY) 2014 (9/1/2013 to 8/31/2014). The remaining data were then combined into one dataset and analyzed for descriptive purposes. Of the 3,485 participants, 2,503 (71.82%) received PES services only during the intervention period while 424 (12.17%) received initial crisis services from MCOT and were considered part of the MCOT group and 558 (16.01%) received initial crisis services from EMCOT and were considered part of the EMCOT group. Participants receiving crisis intervention services ranged from 19 to 81 years overall, with a mean age of 39.81 years of age. The youngest participant receiving PES services was 19 and the oldest was 78 years, with a mean age of 39.74 years. The youngest participant receiving MCOT services was 20 and the oldest was 81 years,

with a mean age of 38.57. The youngest participant receiving EMCOT services was 19 and the oldest was 80 years, with a mean age of 41.10 years. Please see Table 3.1 for more detail.

Table 3.1: Service Dates and Age by Intervention.

Intervention	First Service	Last Service	Youngest	Oldest	Mean	<i>N</i>	%
PES	9/1/2013	6/11/2014	19	78	39.74	2503	71.82%
MCOT	9/2/2013	6/11/2014	20	81	38.57	424	12.17%
EMCOT	9/1/2013	6/11/2014	19	80	41.10	558	16.01%
Total			19	81	39.81	3485	100.00%

As Table 3.2 demonstrates, the majority of the participants (2,007; 57.59%) were White, while 853 (24.48%) of the participants were African-American and 447 (12.83%) were Hispanic. Other ethnicities were less represented in the sample, with 44 (1.26%) Asian, 27 (0.77%) Native American, 2 (0.06%) Hawaiian/Pacific Islander, and 105 (3.01%) participants with unknown or other ethnicities. The ethnic breakdowns for each crisis intervention group separately were similar to the overall sample (see Appendix A).

Table 3.2: Ethnicity.

Ethnicity	<i>N</i>	%
African American	853	24.48%
Asian	44	1.26%
Hawaiian/Pacific Islander	2	0.06%
Hispanic	447	12.83%
Native American	27	0.77%
White	2007	57.59%
Other	27	0.77%
Unknown	78	2.24%
Total	3485	100.00%

Table 3.3 displays sample data for participant gender. For gender, males and females were relatively equally represented, with 1,991 males (57.13%) and 1,494 females (42.87%). Reviewing the crisis intervention groups separately, the male to female breakdown is relatively equal as well (see Appendix B).

Table 3.3: Gender.

Gender	<i>N</i>	%
F	1494	42.87%
M	1991	57.13%
Total	3485	100.00%

The primary Axis I DSM-IV-TR diagnosis of the participants in the overall sample varied greatly, as did that of participants in each of the three crisis intervention groups. The specific primary diagnoses were re-categorized for summary purposes (see Appendix C). Using the primary diagnosis categories shown in Table 3.4, 1,273 (36.53%) participants were diagnosed with bi-polar disorder, 1,356 (38.91%) participants were diagnosed with a depression-related disorder, 853 (24.48%) were diagnosed with a schizophrenia-related disorder, 145 (4.16%) were diagnosed with substance use-related disorders, 48 (1.38%) were diagnosed with adjustment disorders, 39 (1.12%) were diagnosed with ADHD, 66 (1.89%) participants were diagnosed with anxiety-related disorders, 75 (2.15%) were diagnosed with other disorders and 40 (1.15%) had a deferred diagnosis or no diagnosis. The primary diagnosis categorical breakdown for the three initial crisis intervention groups separately was similar (see Appendix D).

Table 3.4: Primary Axis I Diagnosis Category.

Primary Axis I Diagnosis Category	<i>N</i>	%
ADHD	39	1.12%
Adjustment Disorders	48	1.38%
Anxiety-related Disorders	66	1.89%
Bipolar-related Disorders	1356	38.91%
Depression-related Disorders	863	24.76%
Schizophrenia-related Disorders	853	24.48%
Substance Use-related Disorders	145	4.16%
Other	75	2.15%
Diagnosis Deferred or No Diagnosis	40	1.15%
Total	3485	100.00%

MEASURES

All variables necessary for the study are displayed in Table 3.5. The *independent variables* for this study include three initial crisis intervention services: PES, MCOT, and EMCOT. Since participants many participants received more than one intervention method, participants are considered part of the PES intervention group if they received PES services only during the fiscal year intervention period. Participants were considered part of the MCOT intervention group if they received MCOT services only or received initial MCOT services before receiving EMCOT or PES services during the intervention period. Participants were considered part of the EMCOT intervention group if they received EMCOT services only or received initial EMCOT services before receiving MCOT or PES services during the intervention period.

Table 3.5: Study Variables.

Variable Type	Variable Name	Variable Structure
Independent Variable	Intervention	Nominal, values dummy coded as separate dichotomous variables: -Mobile Outreach Crisis Services (MCOT) -Expanded Mobile Outreach Crisis Services (EMCOT) -Psychiatric Emergency Services (PES)
Dependent Variable	Inpatient Psychiatric Hospitalizations	Continuous, not recoded
Dependent Variable	Crisis Residential Services	Continuous, not recoded
Dependent Variable	Emergency Department Visits	Continuous, not recoded
Dependent Variable	Linkage to Community-Based Behavioral Health Services	Dichotomous, 0=no, 1=yes
Control Variable	History of Inpatient Psychiatric Hospitalizations	Continuous, not recoded
Control Variable	History of Crisis Residential Services	Continuous, not recoded
Control Variable	History of Emergency Department Visits	Continuous, not recoded
Control Variable	History of Linkage to Community-Based Behavioral Health Services	Dichotomous, 0=no, 1=yes
Control Variable	Age	Continuous, not recoded
Control Variable	Primary Axis I DSM-IV-TR Diagnosis	Nominal, values dummy coded as separate dichotomous variables
Control Variable	Ethnicity	Nominal, values dummy coded as separate dichotomous variables
Control Variable	Gender	Nominal, values dummy coded as separate dichotomous variables

Thus, none of the participants who were part of the PES group received MCOT or EMCOT services during the intervention period. For participants in the MCOT group, 382 (90.09%) received subsequent PES crisis intervention services within the intervention period, 19 (4.48%) received subsequent EMCOT services within the intervention period, and 23 (5.42%) subsequently received both PES and EMCOT services during the intervention period (see Table 3.6). For participants in the EMCOT group, 257 (46.06%) received subsequent PES services during the intervention period, 277 (49.64%) received subsequent MCOT services during the intervention period, and 24 (4.30%) subsequently received both PES and MCOT services during the intervention period (see Table 3.7).

Table 3.6: Participants Receiving MCOT Services during FY14.

EMCOT	PES	<i>N</i>	%
Yes	No	19	4.48%
No	Yes	382	90.09%
Yes	Yes	23	5.42%
Total		424	100.00%

Table 3.7: Participants Receiving EMCOT Services during FY14.

MCOT	PES	<i>N</i>	%
Yes	No	277	49.64%
No	Yes	257	46.06%
Yes	Yes	24	4.30%
Total		558	100.00%

The *dependent variables* for this study are inpatient psychiatric hospitalizations, crisis residential services, emergency department visits, and linkage to community-based behavioral

health services. The three continuous dependent variables (inpatient psychiatric hospitalizations, crisis residential services, emergency department visits), were operationally defined based on the number of service days for inpatient hospitalizations and crisis residential stays and number of visits for EDs) received by the participant within one year following the date of the initial crisis intervention, with a potential receipt of services through 6/10/2015. Specifically, number of emergency department visits was operationally defined as the number of visits within one year post-intervention. Emergency department visits included the following services: ED-No Psych Bed Available, Emergency Room, Hospital Visit (IP/OP) by Provider, and Urgent Care Facility. Number of inpatient psychiatric hospitalization days was operationally defined based on the provision of Inpatient Services, Mental Health Inpatient Services, Mental Health Residential Treatment Center Services, and/or SUC Residential Treatment Center Services. Number of crisis residential days was operationally defined as residential days in the following facilities: INN, Next Step, and 15th. Services that counted toward the number of crisis residential days were defined as ATCIC Crisis Residential and ATCIC SUD Residential Admission. See Table 3.8 for a crosswalk of the types of services associated with the specific dependent variables.

The fifth dichotomous dependent variable, linkage to community-based behavioral health services, included non-crisis, outpatient level of care services. Linkage to services was operationally defined based on whether the participant received at least one outpatient service within one year following the intervention. These services included ATCIC Clinic/Community Outpatient Services, ATCIC HIV Services, ATCIC SUD IOP Admission, ATCIC SUD Outpatient, ATCIC SUD Outpatient Detox/NTP Services, Clinic, Detox, MH Intensive Outpatient Program, MH Partial Hospitalization Program, Nursing Facility, Office Visit, Other Facility Visit,

and Outpatient, SUD Follow-Up Contact. Despite the fact that specific data were available related to the number of outpatient services received by the client, these data were translated into a dichotomous variable because of a lack of clinical evidence that a higher number of services improves outcomes. Additionally, the number of services that a person is provided is often influenced by other factors, such as mandated services packages required by the State based on assessments, lack of resources to provide more services, or client refusal to accept certain services. The factors influencing the number of services would compromise the ability to interpret the data. See Table 3.8 for a list of community-based behavioral health services associated with this dependent variable.

Table 3.8: Services Associated with Each Dependent Variable.

Service	Dependent Variable	N	%
ATCIC Crisis Residential	Crisis Residential Service	14164	4.29%
ATCIC SUD Residential Admission	Crisis Residential Service	785	0.24%
ED-No Psych Bed Available	Emergency Department Visit	7286	2.21%
Emergency Room	Emergency Department Visit	24	0.01%
Hospital Visit (IP/OP) by Provider	Emergency Department Visit	2713	0.82%
Urgent Care Facility	Emergency Department Visit	21	0.01%
Inpatient	Inpatient Psychiatric Hospitalization	318	0.10%
MH Inpatient	Inpatient Psychiatric Hospitalization	45295	13.72%
MH Residential Treatment Center	Inpatient Psychiatric Hospitalization	236	0.07%
SUD Residential Treatment Center	Inpatient Psychiatric Hospitalization	616	0.19%
ATCIC Clinic/Community Outpatient Services	Outpatient Service	210624	63.78%
ATCIC HIV Services	Outpatient Service	8480	2.57%
ATCIC SUD IOP Admission	Outpatient Service	336	0.10%
ATCIC SUD Outpatient Service	Outpatient Service	3094	0.94%
ATCIC SUD Outpatient Detox/NTP Services	Outpatient Service	23616	7.15%
Clinic	Outpatient Service	7447	2.25%
Detox	Outpatient Service	1224	0.37%
MH Intensive Out Patient Program	Outpatient Service	1198	0.36%
MH Partial Hospitalization Program	Outpatient Service	1346	0.41%
Nursing Facility	Outpatient Service	16	0.00%
Office Visit	Outpatient Service	30	0.01%
Other Facility Visit	Outpatient Service	1056	0.32%
Outpatient	Outpatient Service	220	0.07%
SUD Follow-Up Contact	Outpatient Service	102	0.03%
Total		330257	100.00%

For the dependent variables (Table 3.9), the majority of the services for the continuous dependent variables were inpatient psychiatric hospitalizations ($N=2,962$; 41.98%). There were 2,428 (34.41%) crisis residential services, and 1,666 (23.61%) emergency department visits. For the dichotomous dependent variable, linkage to community-based behavioral health services, there were 2,025 (58.11%) participants who were linked to services within one year after the intervention.

Table 3.9: Dependent Variables.

Variable	Based on	Pre (history)	%	Post (DV)	%
Linkage to Community- Based Behavioral Health Services	Participants	859	24.65%	2,025	58.11%
Inpatient Psychiatric Hospitalization	Services	37,591	68.24%	2,962	41.98%
Emergency Department Visit	Services	7,217	13.10%	1,666	23.61%
Crisis Residential Service	Services	10,278	18.66%	2,428	34.41%
Total		55,086	100.00%	7,056	100.00%

Control variables are pre-intervention service history, primary Axis I diagnosis, ethnicity, gender, and age. Primary diagnosis was operationally defined as the participant's primary diagnosis on Axis I of the Diagnostic and Statistical Manual of Mental Disorders, version IV-TR (DSM-IV-TR). The three continuous pre-intervention service history control variables (inpatient psychiatric hospitalizations, crisis residential services, emergency department visits), were constructed based on participants who had received services within two years prior to their initial intervention date. The continuous pre-history variables also served as the Time I variables in the

ANOVAs. The fifth dichotomous pre-intervention service history control variable (linkage to community-based behavioral health services) was created based on whether the participant was linked to those services at the time of the initial intervention or not. Thus, a “Yes” for this field indicated that the participant was linked to community-based behavioral health services at the time of the intervention and was coded as a 1. “No” for this field indicated that the participant was not linked to community-based behavioral health services at the time of the intervention and was coded as a 0. There were 859 (24.65%) participants who were linked to services at the time of the intervention.

Data Restructuring

The data provided for the control variables (history, primary Axis I diagnosis, ethnicity, gender, and age) and the independent variables (MCOT, EMCOT, PES) related to crisis intervention services during FY 2014 were structured as three separate datasets, one for each of the independent variables. These data were combined and manipulated to create one dataset that contained one record per participant (the intervention database). The operational definitions of each of the three initial crisis intervention groups were used to categorize participants into one of the three groups. Additional databases were obtained that contained information related to the dependent variables (inpatient psychiatric hospitalizations, crisis residential services, emergency department visits, and linkage to community-based behavioral health services). These databases were also combined to create one database that contained all data related to the dependent variables (the services database).

Aggregate data for the dependent variables were then added to the combined participant-level intervention database from the combined services database that represented the dependent variable outcomes before the intervention and after the intervention. The three continuous dependent variable (inpatient psychiatric hospitalizations, crisis residential services, emergency department visits) outcomes were tied to the intervention date such that services received up to two years prior to the intervention were considered historical pre-intervention services to be used as control variables, and services received up to one year after the intervention were considered post-intervention services to be used as dependent variables. The one dichotomous dependent variable (linkage to community-based behavioral health services), was tied to the intervention date such that if the participant received any outpatient services during the one year post-intervention period, the value was “Yes” and coded as 1 and otherwise the value was “No” and coded as a 0. The related historical pre-intervention control variable for linkage to services was given a value of “Yes” and coded as a 1 if the participant was linked to any service at the time of the intervention, and a “No” and coded as a 0 if not.

The nominal control variable, primary Axis I DSM-IV-TR diagnosis was recoded for summary purposes into nine diagnostic categories: Attention Deficit Hyperactivity Disorders (ADHD), Adjustment Disorders, Anxiety-related Disorders, Bipolar-related Disorders, Depression-related Disorders, Schizophrenia-related Disorders, Substance Use-related disorders, Other, and Diagnosis Deferred or No Diagnosis. The crosswalk between the specific diagnoses and the diagnostic categories is found in Appendix C.

Finally, to prepare the nominal independent variables (crisis interventions: PES, MCOT, and EMCOT) for analysis, the field denoting the intervention type was dummy coded.

Additionally, there were three nominal control variables: primary Axis I DSM-IV-TR diagnosis, gender, and ethnicity. These were also dummy coded in preparation for the analysis.

ANALYSIS

The following discussion outlines the analyses conducted for the study. It includes a discussion of a mixed model analysis of variance (ANOVA) used to test the first three hypotheses and chi square analysis used to test the fourth hypothesis. Multiple regression and binary logistic regression statistical techniques used to test hypotheses five through eights are also outlined and include descriptions of the data transformations and dataset restructuring required to effectively employ these statistical techniques. Additionally, the theoretical models for the analyses are presented and the hypotheses of the study and relevant research questions for the analyses are reviewed. All quantitative data are analyzed using the Statistical Package for the Social Sciences (SPSS) version 23.0.0 for Windows. SPSS was used for data management, data diagnostics, descriptive statistics, and multiple and logistic regression analysis. Descriptive statistics were used to analyze demographic data as well as data related to the dependent variables and the independent variables. Logistic Regression was used to test the theoretical model.

ANOVA

A mixed design analysis of variance model was used to test the first 3 hypotheses. The mixed ANOVA allows analysis of two or more independent variables within a repeated measures design (Howell, 2010). Within the design, the repeated measures factor is considered the within subjects factor and the grouping or categorical factors is considered the between subjects factor. The assumptions for an ANOVA require that the data meet the following criteria:

1. Normality: scores for each condition must be normally distributed around their mean.
2. Homogeneity of variance: each population must have the same error variance.
3. Sphericity of the covariance matrix: variances of differences between all groups are equal.

For the between-subject effects to meet the assumptions of the analysis of variance, the variance for any level of a group must be the same as the variance for the mean of all other levels of the group. When there is homogeneity of variance, sphericity of the covariance matrix will occur, because the between-subjects independence has been maintained. For the within-subject effects, it is important to ensure normality and homogeneity of variance are not being violated. If the assumptions are violated, a possible solution is to use the Greenhouse & Geisser adjustment to the degrees of freedom because they can correct for issues that can arise should the sphericity of the covariance matrix assumption be violated.

Chi-Square

A chi-square analysis was used to examine the association between crisis intervention services and linkage to community-based behavioral health services. Chi square tests whether two variables are statistically independent and is often referred to as the chi-square test of independence. More specifically, it tests for the independence between two nominal/dichotomous variables and is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more (Corder and Foreman, 2014). A rejection of the null hypothesis (independence) implies an association. Test statistics that follow a chi-squared distribution arise from an assumption of independent normally distributed data.

Multiple Regression

The hypotheses for the continuous dependent variables will be tested using multiple regression. Multiple regression is a well-established statistical technique and is appropriate for this study because it provides a method for investigating the influence of two or more variables on a designated dependent variable. Multiple regression is used to predict the value of a variable based on the value of two or more other variables, and also provides the overall fit (variance explained) of the model and the relative contribution of each of the predictors to the total variance explained.

Multiple Regression Assumptions

Multiple regression requires that the dependent variable used for analysis should be measured on a continuous scale and that two or more continuous or categorical independent variables are included in the analysis. Multiple regression assumes independence of observations (i.e., independence of residuals), which can be examined using the Durbin-Watson statistic.

In order to accurately estimate the relationship between variables using multiple regression, there should be a linear relationship between each of the independent variables and the dependent variable, and the dependent variable and the independent variables collectively. Linearity can be determined through visual observation of scatterplots and partial regression plots, though this method may lack clarity. If they are not linear, the data can be transformed. An alternative method involves examination of the correlation between the dependent variable and each of the independent variables. If this assumption is not met, the multiple regression analysis will underestimate the presence and strength of the relationship between the independent variable and the dependent variable (Singer & Willett, 2003).

The assumption of homoscedasticity is also assessed visually in order to ensure that the variance of the residuals is homogenous across predicted values of the dependent variable. The assumption is that the variances along the line of best fit remain similar as you move along the line. The studentized residuals can be plotted against the unstandardized predicted values. A scatterplot of the predicted and residual values can be used to test this assumption. If the assumption is met, the resulting graphic should show a random pattern, with no visually apparent funnels or shapes (Singer & Willett, 2003).

Multiple regression analysis also requires that the data not show multicollinearity. This occurs when you have two or more independent variables that are highly correlated with each other. This leads to problems with understanding which independent variable contributes to the variance explained in the dependent variable, as well as technical issues in calculating a multiple regression model. Multicollinearity can be examined through an inspection of correlation coefficients and Tolerance/VIF values.

Multiple regression assumes that there are no significant outliers, high leverage points or highly influential points. These represent unusual observations in that vary in terms of their impact on the regression line. An observation can be classified as more than one type of unusual point. However, all these points can negatively affect the regression equation that is used to predict the value of the dependent variable based on the independent variables. This can reduce the predictive accuracy of the results. These can be detected using "casewise diagnostics" and "studentized deleted residuals".

The normal distribution of error is tested based on the assumption of residual error. To test this assumption, the distribution of residual error is assessed visually using a normal probability

plot. This depicts the observed cumulative and expected normal probabilities of occurrence of the standardized residuals. The assumption of normally distributed residual error is met if the figure displays a linear pattern, which would indicate that the observed values conform to those that would be expected and that the variance of the residual errors is constant (Bryk & Raudenbush, 1992).

Logistic Regression

The hypothesis for the dichotomous dependent variable, linkage to community-based behavioral health services, will be tested using logistic regression. Logistic regression is appropriate because it is used with data in which there is a binary (success-failure) dependent variable, or where the outcome takes the form of a binomial proportion. In logistic regression, the relationship between predictor variables and an outcome variable is estimated. The probability that the outcome variable assumes a certain value, as opposed to estimating the value itself, is estimated.

Logistic Regression Assumptions

Logistic regression does not make many of the key assumptions of multiple regression models that are based on ordinary least squares algorithms – particularly regarding linearity, normality, homoscedasticity, and measurement level. First, it does not require a linear relationship between the dependent and independent variables because it applies a non-linear log transformation to the predicted odds ratio. Secondly, the independent variables do not need to be multivariate normal, although multivariate normality yields a more stable solution. Also the error terms do not need to be normally distributed. Thirdly, homoscedasticity is not needed. Logistic

regression does not need variances to be heteroscedastic for each level of the independent variables. Lastly, it can handle ordinal and nominal data as independent variables. The independent variables do not need to be metric (interval or ratio scaled).

Assumptions that do apply to binary logistic regressions are that the dependent variable be binary. Secondly, since logistic regression assumes that $P(Y=1)$ is the probability of the event occurring, it is necessary that the dependent variable is coded accordingly. That is, for a binary regression, the factor level 1 of the dependent variable should represent the desired outcome.

Thirdly, the model should be fitted correctly. Neither over fitting nor under fitting should occur. Thus, all meaningful variables, but only meaningful variables, should be included in the model. A stepwise method to estimate the logistic regression can be used to ensure this fit.

Fourthly, logistic regression requires the error terms of each observation to be independent. The data-points should not be from any dependent samples design, (e.g., before-after measurements, or matched pairings). Also, the model should have little or no multicollinearity such that independent variables would not be independent from each other. If multicollinearity exist, the interaction effects of categorical variables in the analysis and the model can be included. Additionally, centering the variables by deducting the mean of each could resolve the issue. If this does not lower the multicollinearity, a factor analysis with orthogonally rotated factors should be done before the logistic regression is estimated.

Lastly, binary logistic regression requires relatively large sample sizes. Because maximum likelihood estimates are less powerful than ordinary least squares, between 10 and 30 cases per independent variable are recommended.

STATISTICAL TESTS AND HYPOTHESES

The specific aim of this study was to evaluate the overall effectiveness and relative effectiveness of three primary crisis intervention methods (MCOT, EMOT, and PES) on a number of dependent variables related to community-based behavioral healthcare utilization and post-intervention crisis services. It was hypothesized that MCOT and EMCOT have a greater positive impact on the dependent variables as compared to PES only. Analyses examined these direct relationships and their relative importance using mixed ANOVAs and multiple regression for the continuous dependent variables and a chi square test and logistic regression for the dichotomous dependent variable. The analyses centered on those participants with a history of service utilization and who were not linked to community-based services at the time of the crisis intervention.

The relationships were hypothesized based on previous research cited in the literature review. Control variables for the model are history, primary Axis I diagnosis, ethnicity, gender, and age. Three multiple regression models were computed, one for each of the three continuous dependent variables: inpatient psychiatric hospitalizations, crisis residential services, and emergency department visits. One logistic regression model was run for the dichotomous dependent variable, linkage to community-based behavioral health services.

Figure 3.2: Multiple Regression Model for Emergency Department Visits.

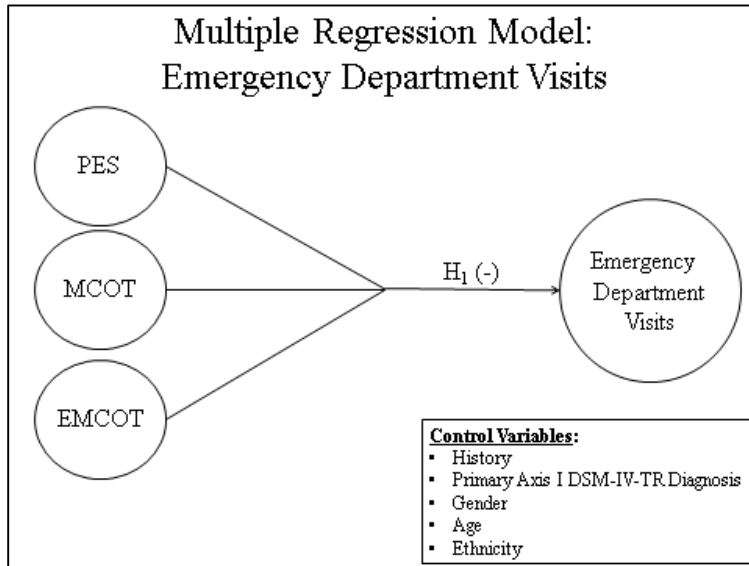


Figure 3.3: Multiple Regression Model for Inpatient Psychiatric Hospitalizations.

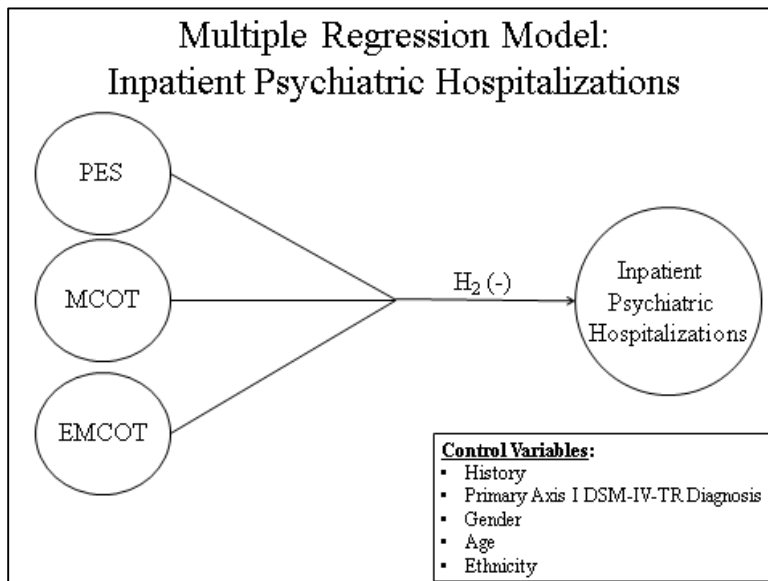


Figure 3.4: Multiple Regression Model for Crisis Residential Stays.

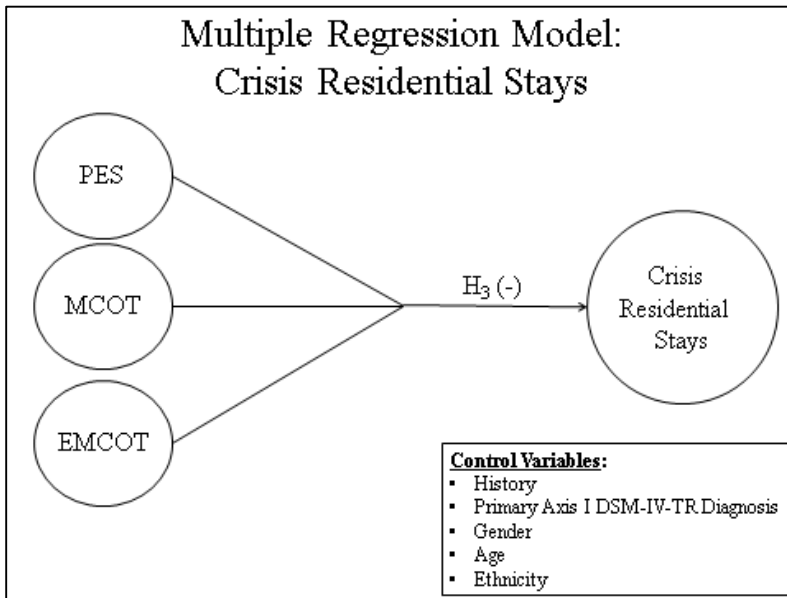


Figure 3.5: Multiple Regression Model for the Continuous Dependent Variables.

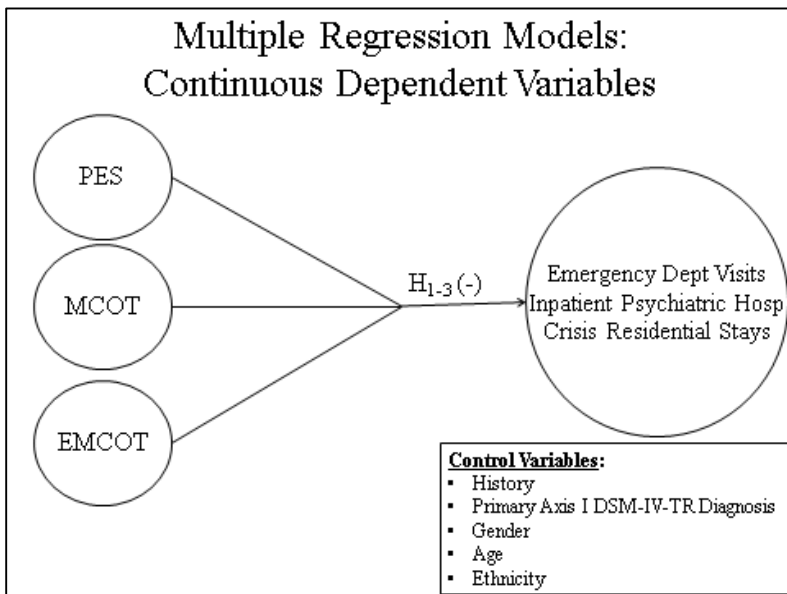
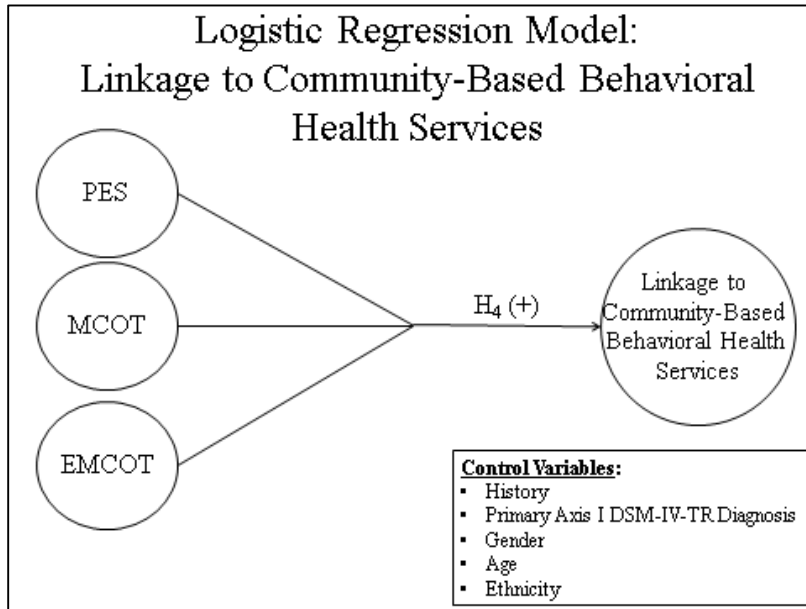


Figure 3.6: Logistic Regression Model for Linkage to Community-Based Behavioral Health Services.



Hypothesis 1 (H₁): Participation in crisis intervention services will reduce the number of emergency department visits, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 2 (H₂): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 3 (H₃): Participation in crisis intervention services will reduce the number of crisis residential stays, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 4 (H₄): Participation in crisis intervention services will increase the likelihood that the participant will be linked to community-based behavioral health services, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 5 (H₅): Participation in crisis intervention services will reduce the number of emergency department visits after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 6 (H₆): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 7 (H₇): Participation in crisis intervention services will reduce the number of crisis residential stays after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Hypothesis 8 (H₈): Participation in crisis intervention services will increase the likelihood that the participant will be linked to community-based behavioral health services after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Chapter 4: Results

The results of this research include descriptive statistics for both participant-level and service-level data as well as correlational analyses. Hierarchical multiple regression and logistic regression were used to evaluate the relationship between the control variables (history, primary Axis I DSM-IV-TR diagnosis, ethnicity, gender, age), the Intervention, and each dependent variable (linkage to community-based behavioral healthcare services, emergency department visits, crisis residential services, inpatient psychiatric hospitalizations, and linkage to community-based behavioral health services). Three of the models used hierarchical multiple regression to analyze continuous forms of the dependent variables: emergency department visits, crisis residential services, and inpatient psychiatric hospitalizations. Logistic regression was used to analyze the single dichotomous dependent variable (linkage to community-based behavioral healthcare services). Results from the analysis of the multiple regression and logistic regression models are provided. Additionally, further exploratory analyses are examined and potential explanations for results that were contrary to study hypotheses are addressed.

MIXED ANALYSIS OF VARIANCE

For the first three hypotheses, mixed analysis of variance (ANOVA) was used to investigate a potential interaction between the independent variables on individual dependent variables. Mixed ANOVA compares mean differences between groups that are split on two or more independent variables. For all mixed ANOVAs, the level of measurement and sample size requirements were satisfied. ANOVA requires that the assumptions of normality, outliers, homogeneity of variance, and sphericity are met. Each of these assumptions is reviewed in turn.

Additionally, the results of the tests required determine whether the assumptions are met are discussed. See Appendix X for charts and tables related to these assumptions. Finally, the results for the analyses are reviewed.

HYPOTHESIS 1 (EMERGENCY DEPARTMENT VISITS): MIXED ANOVA

Hypothesis 1 (H₁): Participation in crisis Intervention services will reduce the number of emergency department visits, and MCOT and EMCOT will have a stronger effect than PES.

Assumptions

The *assumption of normality* is that the dependent variable is normally distributed for all levels of the between- and within-subjects factors. A Shapiro-Wilk test was used to test the assumption of normality in regards to whether the data is normally distributed. Neither the history of emergency department visits nor the dependent variable, number of emergency department visits following intervention, satisfied the criteria for a normal distribution. A Square Root transformation was used for both variables to correct severe positive skewness. The mixed ANOVA is somewhat robust to deviations from normality.

The *assumption of outliers* is that there are no outliers. The presence of outliers was tested for each group. A boxplot was used to identify outliers. For the history of emergency department visits, there were 5 cases had residuals greater than 3 standard deviations. For the dependent variable, number of emergency department visits, there were 7 cases with residuals greater than 3 standard deviations. A log₁₀ transformation was conducted, which resulted in 0 cases with residuals greater than 3 standard deviations for either group, so all participants were included in the dataset.

The *assumption of homogeneity* of variance means that variance for each of the interventions is homogeneous for the emergency department visits. It assumes that there are equal variances between the levels of the between-subjects factor, group, at each level of the within-subjects factor, time, and for the dependent variable, emergency department visits. Based on this test, the Type I error rate can be affected if the variances are unequal. Levene's test of equality of error variances was used to test the assumption of homogeneity of variance. For the history of emergency department visits, the probability associated with Levene's test for equality of variances ($F(2, 334) = 0.320, p = .726$) is greater than the alpha for diagnostic tests (0.01). For the dependent variable, emergency department visits following intervention, the probability associated with Levene's test for equality of variances ($F(2, 334) = 0.211, p = .810$) is greater than the alpha for diagnostic tests (0.01). In both cases, assumption of equal variances is satisfied and the assumption of homogeneity of variance was met, as assessed by Levene's test of equality of error variances ($p > .05$). If the assumption of homogeneity of variance had been violated, the ratio of the largest to the smallest variance would have been computed to consider whether the analysis could be completed.

Mixed ANOVA also assumes similar covariances. This was tested using Box's test of equality of covariance matrices. Using this technique, there was homogeneity of covariances, as assessed by Box's test of equality of covariance matrices ($p = .480$).

The *assumption of sphericity* was used to evaluate whether the variances of the differences between all combinations of related groups (levels) are equal. Violation of sphericity is when the variances of the differences between all combinations of related groups are not equal. In this case, the probability of Mauchly's test of sphericity was statistically significant ($p < .05$). Thus, we

reject the null hypothesis and accept the alternative hypothesis that the variances of the differences are not equal. The assumption of sphericity was not satisfied. Since the assumption was not satisfied, the statistics from the Greenhouse-Geisser were used for the test of the main effect and the interaction effect.

Results

The means and standard deviations for the participants in relation to emergency department visits are shown in Table X. A mixed ANOVA revealed that crisis intervention services produced a significant decrease in the number of emergency department visits following the interventions ($F(1, 334) = 229.612, p = .000, \text{partial } \eta^2 = .407$).

Table 4.1: Descriptive Statistics: Emergency Department Visits (Square Root Transformations).

	Number of Emergency Department Visits before Intervention			Number of Emergency Department Visits after Intervention		
	Mean	Std. Deviation	<i>N</i>	Mean	Std. Deviation	<i>N</i>
EMCOT	3.5045	3.05806	59	.8629	1.18227	59
MCOT	4.1890	3.00404	49	.8485	1.29678	49
PES	3.5376	2.80288	229	.8054	1.44557	229
Total	3.6265	2.87899	337	.8218	1.37844	337

There was, however, no statistically significant interaction between the intervention groups and time on number of emergency department visits following crisis intervention services. The null hypothesis that the pattern of change in the repeated measure (emergency department visits)

was the same for the different types of crisis intervention services received by the participant was accepted. There is no significant interaction effect between the interventions.

The main effect of time showed a statistically significant difference in the number of emergency department visits across time ($F[1, 334] = 229.612, p < .001, \text{partial } \eta^2 = .407$). The interaction effect between the repeated measures factor of time and the type of crisis intervention was not statistically significant ($F[1,334]=1.062, p=.347, \text{partial } \eta^2=.006$) The Estimated Marginal Means chart supports the interpretation that there was no substantial change in the number of emergency department visits based on the type of crisis intervention services received by the participant.

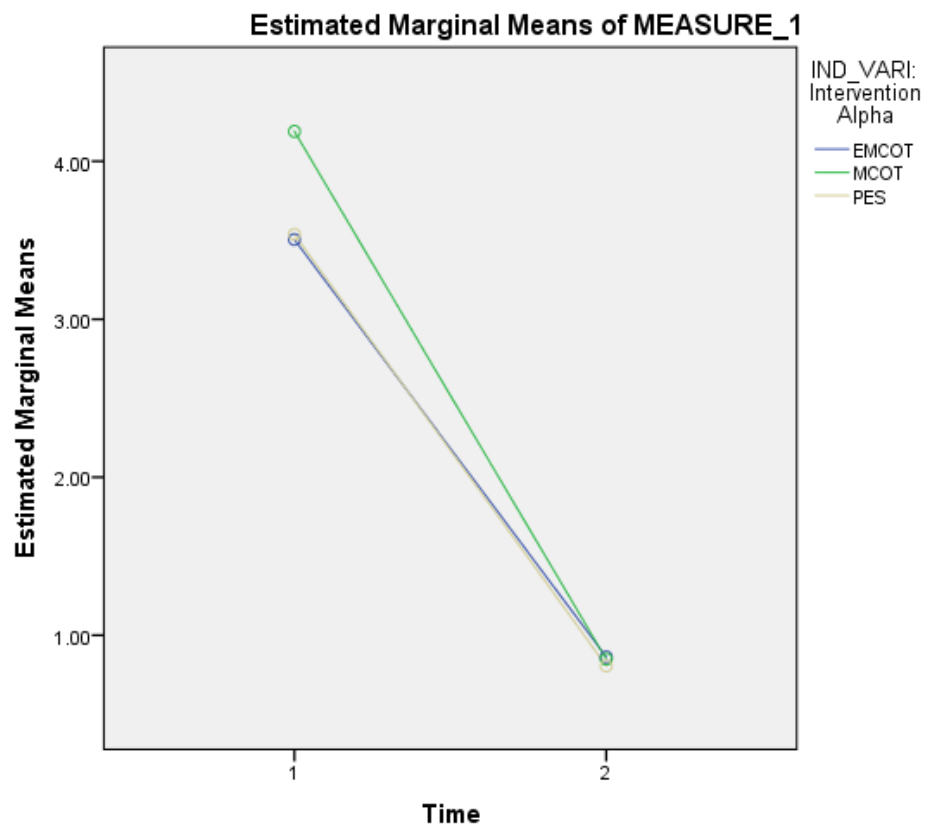
Table 4.2: Tests of Within-Subject Effects.

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	909.991	1	909.991	229.612	.000	.407
	Greenhouse-Geisser	909.991	1.000	909.991	229.612	.000	.407
	Huynh-Feldt	909.991	1.000	909.991	229.612	.000	.407
	Lower-bound	909.991	1.000	909.991	229.612	.000	.407
Time * Intervention	Sphericity Assumed	8.420	2	4.210	1.062	.347	.006
	Greenhouse-Geisser	8.420	2.000	4.210	1.062	.347	.006
	Huynh-Feldt	8.420	2.000	4.210	1.062	.347	.006
	Lower-bound	8.420	2.000	4.210	1.062	.347	.006
Error (Time)	Sphericity Assumed	1323.700	334	3.963			
	Greenhouse-Geisser	1323.700	334.000	3.963			
	Huynh-Feldt	1323.700	334.000	3.963			
	Lower-bound	1323.700	334.000	3.963			

Table 4.3: Tests of Between-Subject Effects.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	2264.929	1	2264.929	363.468	.000	.521
Intervention	9.969	2	4.985	.800	.450	.005
Error	2081.301	334	6.231			

Figure 4.1: Descriptive Statistics.



HYPOTHESIS 2 (INPATIENT PSYCHIATRIC HOSPITALIZATION): REPEATED MEASURES ANOVA

Hypothesis 2 (H₂): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations, and MCOT and EMCOT will have a stronger effect than PES.

Assumptions

The *assumption of normality* is that the dependent variable is normally distributed for all levels of the between- and within-subjects factors. A Shapiro-Wilk test was used to test the assumption of normality in regards to whether the data is normally distributed. Neither the history of inpatient psychiatric hospitalizations nor the dependent variable, number of psychiatric hospitalizations following intervention, satisfied the criteria for a normal distribution. A log₁₀ transformation was used for both variables to correct severe positive skewness.

The *assumption of outliers* is that there are no outliers. The presence of outliers was tested for each group. A boxplot was used to identify outliers. For the history of inpatient psychiatric hospitalizations, there were 2 cases had residuals are greater than 3 standard deviations. For the dependent variable, number of inpatient psychiatric hospitalizations, there were 3 cases had residuals are greater than 3 standard deviations. A log₁₀ transformation was conducted, which resulted in 0 cases with residuals greater than 3 standard deviations for either group, so all participants were included in the dataset.

The *assumption of homogeneity of variance* means that variance for each of the interventions is homogeneous for the inpatient psychiatric hospitalizations. It assumes that there are equal variances between the levels of the between-subjects factor, group, at each level of the

within-subjects factor, time, and for the dependent variable, inpatient psychiatric hospitalizations. Based on this test, the Type I error rate can be affected if the variances are unequal. Levene's test of equality of error variances was used to test the assumption of homogeneity of variance. For the history of inpatient psychiatric hospitalizations, the probability associated with Levene's test for equality of variances ($F[2, 603] = 0.1496, p = .225$) is greater than the alpha for diagnostic tests (0.01). For the dependent variable, inpatient psychiatric hospitalizations following intervention, the probability associated with Levene's test for equality of variances ($F[2, 603] = 0.718, p = .488$) is greater than the alpha for diagnostic tests (0.01). In both cases, assumption of equal variances is satisfied and the assumption of homogeneity of variance was met, as assessed by Levene's test of equality of error variances ($p > .05$).

Mixed ANOVA also assumes similar covariances. This was tested using Box's test of equality of covariance matrices. Using this technique, there was homogeneity of covariances, as assessed by Box's test of equality of covariance matrices ($p = .761$).

The *assumption of sphericity* was used to evaluate whether the variances of the differences between all combinations of related groups (levels) are equal. Violation of sphericity is when the variances of the differences between all combinations of related groups are not equal. In this case, the probability of Mauchly's test of sphericity was statistically significant ($p < .05$). Thus, we reject the null hypothesis and accept the alternative hypothesis that the variances of the differences are not equal. The assumption of sphericity was not satisfied. Since the assumption was not satisfied, the statistics from the Greenhouse-Geisser were used for the test of the main effect and the interaction effect.

Results

The means and standard deviations for the participants in relation to inpatient psychiatric hospitalizations are shown in Table 4.4. A mixed ANOVA revealed that crisis intervention services did not produce a significant decrease in the number of inpatient psychiatric hospitalizations following the intervention ($F [2, 603] = 1.639, p = .185, \text{partial } \eta^2 = .006$).

Table 4.4: Descriptive Statistics (Inverse Transformations).

Intervention Alpha	Number of Inpatient Psychiatric Hospitalizations before Intervention			Number of Inpatient Psychiatric Hospitalizations after Intervention		
	Mean	Std. Deviation	<i>N</i>	Mean	Std. Deviation	<i>N</i>
EMCOT	.2029	.32364	108	.1803	.28419	108
MCOT	.1477	.28859	67	.1702	.24616	67
PES	.2014	.30258	431	.1448	.26806	431
Total	.1958	.30491	606	.1539	.26866	606

Moreover, there was no statistically significant interaction between the intervention groups and time on number of inpatient psychiatric hospitalizations following crisis intervention services ($F [2, 603] = 1.639, p = .185, \text{partial } \eta^2 = .006$). The null hypothesis that the pattern of change in the repeated measure (inpatient psychiatric hospitalizations) was the same for the different types of crisis intervention services received by the participant was accepted. There was no significant interaction effect. The Estimated Marginal Means chart supports the interpretation that there was not substantial change in the number of inpatient psychiatric hospitalizations based on the type of crisis intervention services received by the participant.

Table 4.5: Tests of Within-Subject Effects.

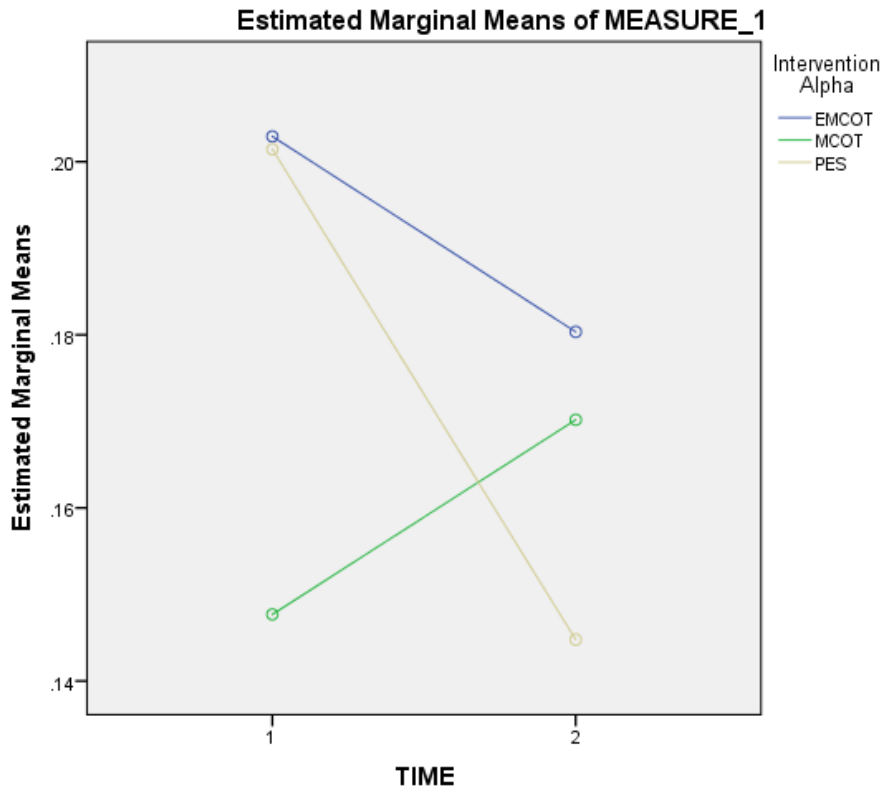
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	
Time	Sphericity Assumed	.061	1	.061	.999	.318	.002
	Greenhouse-Geisser	.061	1.000	.061	.999	.318	.002
	Huynh-Feldt	.061	1.000	.061	.999	.318	.002
	Lower-bound	.061	1.000	.061	.999	.318	.002
Time* Intervention	Sphericity Assumed	.206	2	.103	1.693	.185	.006
	Greenhouse-Geisser	.206	2.000	.103	1.693	.185	.006
	Huynh-Feldt	.206	2.000	.103	1.693	.185	.006
	Lower-bound	.206	2.000	.103	1.693	.185	.006
Error (Time)	Sphericity Assumed	36.681	603	.061			
	Greenhouse-Geisser	36.681	603.000	.061			
	Huynh-Feldt	36.681	603.000	.061			
	Lower-bound	36.681	603.000	.061			

Note: There is no statistical difference on the treatment among the groups.

Table 4.6: Tests of Between-Subject Effects.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	20.694	1	20.694	198.292	.000	.247
Intervention	.097	2	.049	.466	.627	.002
Error	62.929	603	.104			

Figure 4.2: Estimated Marginal Means.



HYPOTHESIS 3 (CRISIS RESIDENTIAL STAYS): REPEATED MEASURES ANOVA

Hypothesis 3 (H₃): Participation in crisis intervention services will reduce the number of crisis residential stays, and MCOT and EMCOT will have a stronger effect than PES.

Assumptions

The *assumption of normality* is that the dependent variable is normally distributed for all levels of the between- and within-subjects factors. A Shapiro-Wilk test was used to test the assumption of normality in regards to whether the data is normally distributed. Neither the history of crisis residential stays nor the dependent variable, number of crisis residential stays following

intervention, satisfied the criteria for a normal distribution. A log 10 transformation was used for both variables to correct for positive skewness.

The *assumption of outliers* is that there are no outliers. The presence of outliers was tested for each group. A boxplot was used to identify outliers. For the history of crisis residential stays, there were 14 cases with residuals greater than 3 standard deviations. For the dependent variable, number of crisis residential stays, there were 10 cases with residuals greater than 3 standard deviations. A log10 transformation was conducted, which resulted in 0 cases with residuals greater than 3 standard deviations for either group, so all participants were included in the dataset.

The *assumption of homogeneity of variance* means that variance for each of the interventions is homogeneous for the crisis residential stays. It assumes that there are equal variances between the levels of the between-subjects factor, group, at each level of the within-subjects factor, time, and for the dependent variable, crisis residential stays. Based on this test, the Type I error rate can be affected if the variances are unequal. Levene's test of equality of error variances was used to test the assumption of homogeneity of variance. For the history of crisis residential stays, the probability associated with Levene's test for equality of variances ($F(2, 430) = 0.057, p = .945$) is greater than the alpha for diagnostic tests (0.01). For the dependent variable, crisis residential stays following intervention, the probability associated with Levene's test for equality of variances ($F(2, 430) = 0.212, p = .809$) is greater than the alpha for diagnostic tests (0.01). In both cases, assumption of equal variances is satisfied and the assumption of homogeneity of variance was met, as assessed by Levene's test of equality of error variances ($p > .05$).

Mixed ANOVA also assumes similar covariances. This was tested using Box's test of equality of covariance matrices. Using this technique, there was homogeneity of covariances, as assessed by Box's test of equality of covariance matrices ($p = .819$).

The *assumption of sphericity* was used to evaluate whether the variances of the differences between all combinations of related groups (levels) are equal. Violation of sphericity is when the variances of the differences between all combinations of related groups are not equal. In this case, the probability of Mauchly's test of sphericity was statistically significant ($p < .05$). Thus, we reject the null hypothesis and accept the alternative hypothesis that the variances of the differences are not equal. The assumption of sphericity was not satisfied. Since the assumption was not satisfied, the statistics from the Greenhouse-Geisser were used for the test of the main effect and the interaction effect.

Results

The means and standard deviations for the participants in relation to crisis residential stays are shown in Table X. A mixed ANOVA revealed that crisis intervention services produced a significant decrease in the number of crisis residential stays following the intervention ($F(2, 430) = 0.046, p = .956, \text{partial } \eta^2 = .000$).

Table 4.7: Descriptive Statistics (Log 10 Transformations).

Intervention	Number of Crisis Residential Stays before Intervention			Number of Crisis Residential Stays after Intervention		
	Mean	Std. Deviation	<i>N</i>	Mean	Std. Deviation	<i>N</i>
EMCOT	1.2037	.39970	65	.2489	.33845	65
MCOT	1.2165	.40402	49	.2413	.32525	49
PES	1.2329	.39503	319	.2585	.34150	319
Total	1.2267	.39597	433	.2551	.33854	433

However, there was no statistically significant interaction between the intervention groups and time on number of crisis residential stays following crisis intervention services ($F(2, 430) = 0.046, p = .956, \text{partial } \eta^2 = .000$).

The null hypothesis that the pattern of change in the repeated measure (crisis residential stays) was the same for the different types of crisis intervention services received by the participant was accepted. There was no significant interaction effect.

The main effect of time showed a statistically significant difference in the number of crisis residential stays across time ($F(1, 430) = .046, p = .956, \text{partial } \eta^2 = .000$). The Estimated Marginal Means chart supports the interpretation that there was no substantial change in the number of crisis residential stays based on the type of crisis intervention services received by the participant.

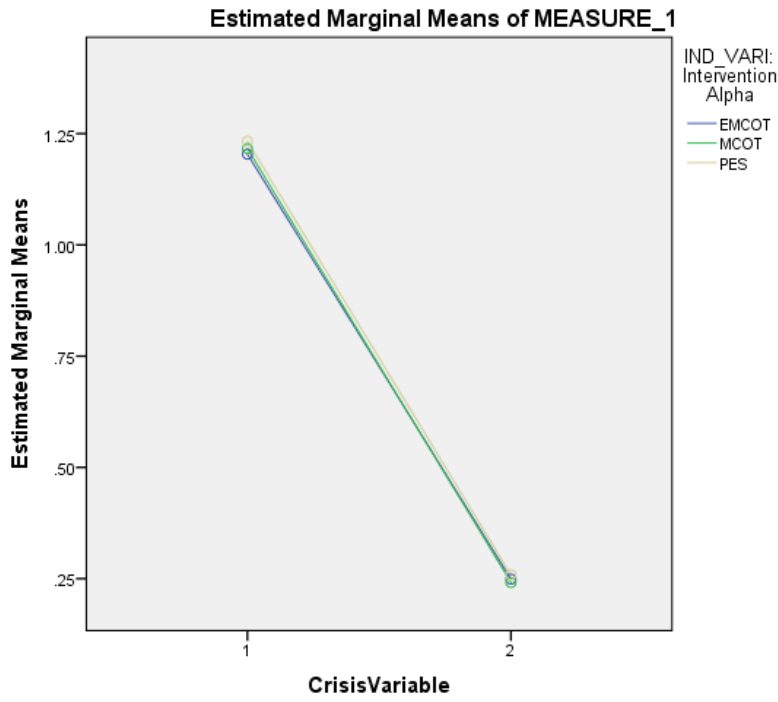
Table 4.8: Tests of Within-Subjects Effects.

Measure:		Type III	df	Mean	F	Sig.	Partial
Source		Sum of		Square			Eta
		Squares					Squared
CrisisVariable	Sphericity Assumed	108.350	1	108.350	915.921	.000	.681
	Greenhouse-Geisser	108.350	1.000	108.350	915.921	.000	.681
	Huynh-Feldt	108.350	1.000	108.350	915.921	.000	.681
	Lower-bound	108.350	1.000	108.350	915.921	.000	.681
CrisisVariable * Intervention	Sphericity Assumed	.011	2	.005	.046	.956	.000
	Greenhouse-Geisser	.011	2.000	.005	.046	.956	.000
	Huynh-Feldt	.011	2.000	.005	.046	.956	.000
	Lower-bound	.011	2.000	.005	.046	.956	.000
Error (CrisisVariable)	Sphericity Assumed	50.867	430	.118			
	Greenhouse-Geisser	50.867	430.000	.118			
	Huynh-Feldt	50.867	430.000	.118			
	Lower-bound	50.867	430.000	.118			

Table 4.9: Tests of Between-Subjects Effects.

Measure:							
Transformed Variable:							
Source		Type III	df	Mean	F	Sig.	Partial
		Sum of		Square			Eta
		Squares					Squared
Intercept		248.876	1	248.876	1613.873	.000	.790
Intervention		.056	2	.028	.183	.833	.001
Error		66.310	430	.154			

Figure 4.3: Estimated Marginal Means.



HYPOTHESIS 4 (LINKAGE TO SERVICES): CHI-SQUARE TEST OF INDEPENDENCE

Hypothesis 4 (H4): Participation in crisis intervention services will increase the likelihood that the participant will be linked to community-based behavioral health services, and MCOT and EMCOT will have a stronger effect than PES.

The chi-square test of independence is a frequently used hypothesis test because it can be used with any pair of variables that can be treated as categorical. It tests for differences within individual categories of the dependent variable. Two variables are statistically independent if the classification of a case into a particular category of the independent variable has no effect on the probability that the case will fall into any particular category of the dependent variable.

The chi-square test of independence requires that no cells have an expected frequency less than 5. The hypothesis holds true if the observed counts for the categories of the variables in the sample are different from the expected counts. The null hypothesis is that the two variables are independent, and is rejected if the probability of the test statistic is less than or equal to alpha. A chi-square test was conducted between the type of crisis intervention service received and linkage to community-based behavioral health services. All expected cell frequencies were greater than five. There was not statistically significant association between the type of crisis intervention service and linkage to community-based behavioral health services following the receipt of crisis intervention services ($\chi^2(2) = 3.13, p = 0.209$).

Table 4.10: Case Processing Summary.

	Cases					
	Valid		Missing		Total	
	<i>N</i>	Percent	<i>N</i>	Percent	<i>N</i>	Percent
Intervention* Linkage to Services Post-Intervention	859	100.0%	0	0.0%	859	100.0%

Table 4.11: Intervention * Linkage to Services Post-Intervention.

		Linkage to Services Post-Intervention		
Intervention		Not Linked to Services Post Intervention	Linked to Services Post Intervention	Total
EMCOT	Count	43	120	163
	Expected Count	34.7	128.3	163.0
	% within Intervention	26.4%	73.6%	100.0%
	% within Linkage to Services Post-Intervention	23.5%	17.8%	19.0%
	% of Total	5.0%	14.0%	19.0%
	Count	20	83	103
MCOT	Expected Count	21.9	81.1	103.0
	% within Intervention	19.4%	80.6%	100.0%
	% within Linkage to Services Post-Intervention	10.9%	12.3%	12.0%
	% of Total	2.3%	9.7%	12.0%
	Count	120	473	593
	Expected Count	126.3	466.7	593.0
PES	% within Intervention	20.2%	79.8%	100.0%
	% within Linkage to Services Post-Intervention	65.6%	70.0%	69.0%
	% of Total	14.0%	55.1%	69.0%
	Count	183	676	859
	Expected Count	183.0	676.0	859.0
	% within Intervention	21.3%	78.7%	100.0%
Total	% within Linkage to Services Post-Intervention	100.0%	100.0%	100.0%
	% of Total	21.3%	78.7%	100.0%

Table 4.12: Chi-Square Tests

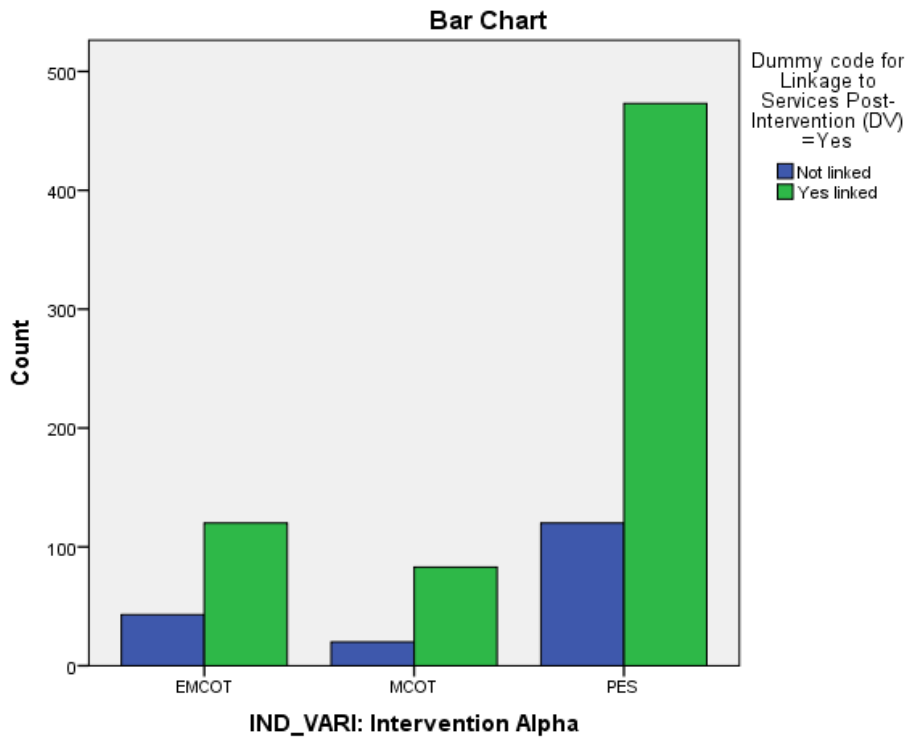
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.127 ^a	2	.209
Likelihood Ratio	3.009	2	.222
Linear-by-Linear Association	2.351	1	.125
<i>N</i> of Valid Cases	859		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 21.94.

Table 4.13: Symmetric Measures

	Value	Approximate Significance
Nominal by Nominal-Phi	.060	.209
Nominal by Nominal- Cramer's V	.060	.209
<i>N</i> of Valid Cases	859	

Figure 4.4: Linkage to Services.



Analysis

The multiple regression models were analyzed using continuous dependent variables. This method was used to examine whether each dependent variable could be predicted based on the independent and control variables and to determine the overall fit of the model and relative contribution of each of the predictors to the total variance explained. Results related to the overall model are presented, followed by results for the control variables and the independent variables.

HYPOTHESIS 5 (EMERGENCY DEPARTMENT VISITS): MULTIPLE REGRESSION ANALYSIS

Hypothesis 5 (H₅): Participation in crisis intervention services will reduce the number of emergency department visits after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Each of the assumptions inherent to multiple regression analysis was evaluated. The *assumption of normality* was tested visually using a plot of the studentized residuals. The residuals were slightly non-normally distributed; however, the regression is fairly robust to non-normality. The assumption of normality is satisfied.

The *assumption of independence of observations* was tested using the Durbin-Watson test. Regression analysis assumes that the residual errors are independent and there is no serial correlation. The Durbin-Watson statistic tests for the presence of serial correlation among the residuals. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.072, which falls within the acceptable range of 1.50 – 2.50.

The *assumption of linearity* requires that the independent variables collectively and separately are linearly related to the dependent variable. This assumption was tested visually using studentized residual scatterplots. A square root transformation was conducted to correct this issue.

The *assumption of homoscedasticity* was tested visually using scatterplots of the studentized residuals. The assumption is that the residuals are equal for all values of the predicted dependent variable. A log 10 transformation was conducted to correct this issue.

The *assumption of the independence of variables* was reviewed by checking for multicollinearity. Multicollinearity occurs when two or more independent variables are highly correlated with each other, which can lead to problems differentiating variable contribution to the variance explained. The tolerance values for all of the independent variables are larger than 0.10. Thus, multicollinearity is not a problem in this regression analysis.

The data were examined to determine whether there were any data points that might be detrimental to the fit or generalization of the regression equation. *Outliers* were reviewed using the casewise diagnostics table, checking for cases where the standardized residual is greater than ± 3 standard deviations. Six cases were removed due to having residuals greater than ± 3 standard deviations. *Leverage values* were examined to determine whether values greater than 0.5 were seen. Two cases had values greater than 0.5. *Influential points* were reviewed using Cook's Distance, checking for values above 1. In all cases, the Cook's Distance value was less than 1.

Results

The relationship between the combination of history of emergency department visits, gender, age, primary diagnosis, and ethnicity and the dependent variable, number of emergency

department visits was statistically significantly ($F(12, 328) = 2.528, p = .003$). However, after controlling for the covariates, the addition of crisis services to the model was not statistically significant ($p = .429$). Contrary to the research hypothesis, participation in crisis intervention services did not reduce the number of emergency department visits after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age. The addition of the crisis intervention to the model explained less than 1% of the variance ($R^2 \text{ change} = .005$).

Table 4.14: Descriptive Statistics.

	Mean	Std. Deviation	<i>N</i>
Number of Emergency Department Visits After Intervention	.7117	1.13881	329
COVARY: Age	41.17	11.326	329
COVARY: Dummy code for Diagnosis: Bipolar-related disorders	.3708	.48376	329
COVARY: Dummy code for Diagnosis: Adjustment disorders	.0091	.09520	329
COVARY: Primary Diagnosis: Depression- related disorders	.1763	.38165	329
COVARY: Primary Diagnosis: Anxiety- related disorders	0.0000	0.00000	329
COVARY: Primary Diagnosis: Schizophrenia-related disorders	.3678	.48294	329
COVARY: Ethnicity: White	.6049	.48962	329
COVARY: Ethnicity: African-American	.2553	.43670	329
COVARY: Ethnicity: Hispanic	.0881	.28394	329
COVARY: Gender: Female	.3556	.47943	329
Num_ED_B4_SQRT	3.5651	2.85275	329
Intervention: EMCOT	.1793	.38421	329
Intervention: MCOT	.1459	.35354	329
Intervention: PES	.6748	.46917	329

Table 4.15: Model Summary^c.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					
					R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.288 ^a	.083	.054	1.10772	.083	2.867	10	318	.002	
2	.296 ^b	.088	.053	1.10825	.005	.850	2	316	.429	1.547

a. Predictors: (Constant), Num_ED_B4_SQRT, COVARY: Dummy code for Ethnicity:African-American, COVARY: Age, COVARY: Dummy code for Gender: Female, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity: Hispanic, COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Dummy code for Diagnosis:Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White

b. Predictors: (Constant), Num_ED_B4_SQRT, COVARY: Dummy code for Ethnicity:African-American, COVARY: Age, COVARY: Dummy code for Gender: Female, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity: Hispanic, COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Dummy code for Diagnosis:Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White, EMCOT_DUMMY, MCOT_DUMMY

c. Dependent Variable: Num_ED_AFTER_SQRT

Table 4.16: ANOVA^a.

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.174	10	3.517	2.867	.002 ^b
	Residual	390.203	318	1.227		
	Total	425.377	328			
2	Regression	37.261	12	3.105	2.528	.003 ^c
	Residual	388.116	316	1.228		
	Total	425.377	328			

a. Dependent Variable: Num_ED_AFTER_SQRT

b. Predictors: (Constant), Num_ED_B4_SQRT, COVARY: Dummy code for Ethnicity:African-American, COVARY: Age, COVARY: Dummy code for Gender: Female, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity: Hispanic, COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Dummy code for Diagnosis:Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White

c. Predictors: (Constant), Num_ED_B4_SQRT, COVARY: Dummy code for Ethnicity:African-American, COVARY: Age, COVARY: Dummy code for Gender: Female, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity: Hispanic, COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Dummy code for Diagnosis: Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White, EMCOT_DUMMY, MCOT_DUMMY

The variables in the overall model that made a statistically significant contribution to the variance in post intervention ED visits were female gender ($t=-2.191$, $p=.029$) and history of ED visits ($t=4.093$ $p<.001$). EMCOT ($t=1.303$, $p=.193$)and MCOT ($t=.287$, $p=.774$) did not have a statistically significant greater effect than PES on post intervention ED visits.

Table 4.17: Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.260	.432		.602	.548
	COVARY: Age	.006	.006	.061	1.102	.271
	COVARY: Dummy code for Diagnosis: Bipolar-related disorders	.042	.247	.018	.171	.865
	COVARY: Dummy code for Diagnosis: Adjustment disorders	.369	.689	.031	.535	.593
	COVARY: Dummy code for Diagnosis: Depression-related disorders	.041	.269	.014	.153	.879
	COVARY: Dummy code for Diagnosis: Schizophrenia-related disorders	.148	.247	.063	.599	.550
	COVARY: Dummy code for Ethnicity: White	-.128	.282	-.055	-.456	.649
	COVARY: Dummy code for Ethnicity: African-American	.005	.297	.002	.018	.986
	COVARY: Dummy code for Ethnicity: Hispanic	-.200	.343	-.050	-.581	.562

	COVARY: Dummy code for Gender: Female	-.285	.130	-.120	-2.191	.029
	Num_ED_B4_SQRT	.088	.022	.221	4.093	.000
2	(Constant)	.184	.440		.419	.675
	COVARY: Age	.006	.006	.060	1.080	.281
	COVARY: Dummy code for Diagnosis: Bipolar-related disorders	.057	.247	.024	.229	.819
	COVARY: Dummy code for Diagnosis: Adjustment disorders	.339	.690	.028	.491	.624
	COVARY: Dummy code for Diagnosis: Depression-related disorders	.050	.269	.017	.185	.854
	COVARY: Dummy code for Diagnosis: Schizophrenia-related disorders	.150	.247	.064	.606	.545
	COVARY: Dummy code for Ethnicity: White	-.100	.283	-.043	-.354	.724
	COVARY: Dummy code for Ethnicity: African-American	.049	.300	.019	.163	.870
	COVARY: Dummy code for Ethnicity: Hispanic	-.172	.345	-.043	-.499	.618
	COVARY: Dummy code for Gender: Female	-.292	.130	-.123	-2.240	.026
	Num_ED_B4_SQRT	.088	.022	.221	4.059	.000
	EMCOT_DUMMY	.214	.164	.072	1.303	.193
	MCOT_DUMMY	.051	.179	.016	.287	.774

a. Dependent Variable: Num_ED_AFTER_SQRT

HYPOTHESIS 6 (INPATIENT PSYCHIATRIC HOSPITALIZATIONS): MULTIPLE REGRESSION ANALYSIS

Hypothesis 6 (H₆): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Each of the assumptions inherent to multiple regression analysis was evaluated. The *assumption of normality* was tested visually using a plot of the studentized residuals. The residuals were slightly non-normally distributed; however, the regression is fairly robust to non-normality. The assumption of normality is satisfied.

The *assumption of independence of observations* was tested using the Durbin-Watson test. Regression analysis assumes that the residual errors are independent and there is no serial correlation. The Durbin-Watson statistic tests for the presence of serial correlation among the residuals. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.903, which falls within the acceptable range of 1.50 – 2.50.

The *assumption of linearity* requires that the independent variables collectively and separately are linearly related to the dependent variable. This assumption was tested visually using studentized residual scatterplots. A log 10 transformation was conducted to correct this issue.

The *assumption of homoscedasticity* was tested visually using scatterplots of the studentized residuals. The assumption is that the residuals are equal for all values of the predicted dependent variable. A log 10 transformation was conducted to correct this issue.

The *assumption of the independence of variables* was reviewed by checking for multicollinearity. Multicollinearity occurs when two or more independent variables are highly correlated with each other, which can lead to problems differentiating variable contribution to the variance explained. The tolerance values for all of the independent variables are larger than 0.10. Thus, multicollinearity is not a problem in this regression analysis.

The data were examined to determine whether there were any data points that might be detrimental to the fit or generalization of the regression equation. *Outliers* were reviewed using the casewise diagnostics table, checking for cases where the standardized residual is greater than ± 3 standard deviations. Five cases were removed due to having residuals greater than ± 3 standard deviations. *Leverage values* were examined to determine whether values greater than 0.5 were seen. No cases had values greater than 0.5. *Influential points* were reviewed using Cook's Distance, checking for values above 1. In all cases, the Cook's Distance value was less than 1.

Results

The relationship between the combination of history of inpatient psychiatric hospitalizations, gender, age, primary diagnosis, and ethnicity and the dependent variable, number of inpatient psychiatric hospitalizations was statistically significant ($F(13, 587) = 14.055, p < .001$). After controlling for the covariates, the addition of crisis services to the model was statistically significant ($p = .001$), but for increased hospitalizations not reduced as had been hypothesized. The model explained 23.7% of the variance ($R^2 = .237$) and the addition of the crisis intervention variable to the model contributed less than 2% to the variance ($R^2 \text{ change} = .018$).

Table 4.18: Model Summary^c.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics				Durbin-Watson
						F Change	df1	df2	Sig. F Change	
1	.468 ^a	.219	.205	.36795	.219	15.031	11	589	.000	
2	.487 ^b	.237	.220	.36426	.018	7.004	2	587	.001	1.580

a. Predictors: (Constant), COVARY: Age, COVARY: Dummy code for Diagnosis: Anxiety-related disorders, COVARY: Dummy code for Gender: Female, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Diagnosis: Schizophrenia-related disorders, Num_Psych_B4_Log10, COVARY: Dummy code for Ethnicity: African-American, COVARY: Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White

b. Predictors: (Constant), COVARY: Age, COVARY: Dummy code for Diagnosis: Anxiety-related disorders, COVARY: Dummy code for Gender: Female, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Diagnosis: Schizophrenia-related disorders, Num_Psych_B4_Log10, COVARY: Dummy code for Ethnicity: African-American, COVARY: Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White, EMCOT_DUMMY, MCOT_DUMMY

c. Dependent Variable: Num_Psych_After_Log10

Table 4.19: ANOVA^a.

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	22.385	11	2.035	15.031	.000 ^b
1 Residual	79.745	589	.135		
Total	102.130	600			
2 Regression	24.244	13	1.865	14.055	.000 ^c
2 Residual	77.886	587	.133		
Total	102.130	600			

a. Dependent Variable: Num_Psych_After_Log10

b. Predictors: (Constant), COVARY: Age, COVARY: Dummy code for Diagnosis: Anxiety-related disorders, COVARY: Dummy code for Gender: Female, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Diagnosis: Schizophrenia-related disorders, Num_Psych_B4_Log10, COVARY: Dummy code for Ethnicity: African-American, COVARY: Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White

c. Predictors: (Constant), COVARY: Age, COVARY: Dummy code for Diagnosis: Anxiety-related disorders, COVARY: Dummy code for Gender: Female, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Diagnosis: Schizophrenia-related disorders, Num_Psych_B4_Log10, COVARY: Dummy code for Ethnicity: African-American, COVARY: Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis: Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White, EMCOT_DUMMY, MCOT_DUMMY

The variables that made statistically significant contributions to the model were history ($t=10.656, p<.001$), a diagnosis of bipolar disorder ($t=2.381, p=.018$), a diagnosis of schizophrenia ($t=2.609, p=.0090$), and female gender ($t=3.371, p=.001$). Also, EMCOT ($t=3.328, p=.001$) and MCOT ($t=2.283, p=.023$) contributed significantly less to the variance in reduced psychiatric hospitalizations than PES.

Table 4.20: Coefficients^a.

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.126	.110		-1.149	.251
	Num_Psych_B4_Log10	.238	.022	.414	10.822	.000
	COVARY: Dummy code for Diagnosis: Bipolar-related disorders	.145	.065	.171	2.236	.026
	COVARY: Dummy code for Diagnosis: Adjustment disorders	.173	.162	.042	1.070	.285
	COVARY: Dummy code for Diagnosis: Depression-related disorders	.099	.068	.098	1.453	.147
	COVARY: Dummy code for Diagnosis: Anxiety-related disorders	-.165	.222	-.028	-.742	.458
	COVARY: Dummy code for Diagnosis: Schizophrenia-related disorders	.173	.065	.197	2.655	.008
	COVARY: Dummy code for Ethnicity: White	.008	.075	.010	.112	.911

Table 4.20 (continued)

	COVARY: Dummy code for Ethnicity: Hispanic	-.062	.087	-.044	-.707	.480
	COVARY: Dummy code for Ethnicity:African- American	.009	.079	.009	.108	.914
	COVARY: Dummy code for Gender: Female	-.098	.032	-.113	-3.065	.002
	COVARY: Age	-8.709E-05	.001	-.002	-.064	.949
2	(Constant)	-.180	.109		-1.647	.100
	Num_Psych_B4_Log1 0	.232	.022	.405	10.656	.000
	COVARY: Dummy code for Diagnosis:Bipolar- related disorders	.153	.064	.180	2.381	.018
	COVARY: Dummy code for Diagnosis: Adjustment disorders	.183	.160	.044	1.138	.256
	COVARY:Dummy code for Diagnosis: Depression-related disorders	.088	.068	.087	1.300	.194
	COVARY:Dummy code for Diagnosis: Anxiety-related disorders	-.214	.220	-.037	-.971	.332
	COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders	.168	.065	.192	2.609	.009
	COVARY: Dummy code for Ethnicity: White	.034	.075	.040	.453	.651
	COVARY: Dummy code for Ethnicity: Hispanic	-.029	.087	-.021	-.331	.741

Table 4.20 (continued)

COVARY: Dummy code for Ethnicity:African- American	.034	.078	.036	.438	.661
COVARY: Dummy code for Gender: Female	-.107	.032	-.123	-3.371	.001
COVARY: Age	1.092E-05	.001	.000	.008	.994
EMCOT_DUMMY	.133	.040	.123	3.328	.001
MCOT_DUMMY	.112	.049	.085	2.283	.023

a. Dependent Variable: Num_Psych_After_Log10

HYPOTHESIS 7 (CRISIS RESIDENTIAL STAYS): MULTIPLE REGRESSION ANALYSIS

Hypothesis 7 (H₇): Participation in crisis intervention services will reduce the number of crisis residential stays after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Each of the assumptions inherent to multiple regression analysis was evaluated. The *assumption of normality* was testing visually using a plot of the studentized residuals. The residuals were slightly non-normally distributed; however, the regression is fairly robust to non-normality. The assumption of normality is satisfied.

The *assumption of independence of observations* was tested using the Durbin-Watson test. Regression analysis assumes that the residual errors are independent and there is no serial correlation. The Durbin-Watson statistic tests for the presence of serial correlation among the residuals. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.035, which falls within the acceptable range of 1.50 – 2.50.

The *assumption of linearity* requires that the independent variables collectively and separately are linearly related to the dependent variable. This assumption was tested visually using studentized residual scatterplots. No transformation was conducted.

The *assumption of homoscedasticity* was tested visually using scatterplots of the studentized residuals. The assumption is that the residuals are equal for all values of the predicted dependent variable. No transformation was conducted.

The *assumption of the independence of variables* was reviewed by checking for multicollinearity. Multicollinearity occurs when two or more independent variables are highly correlated with each other, which can lead to problems differentiating variable contribution to the variance explained. The tolerance values for all of the independent variables are larger than 0.10. Thus, multicollinearity is not a problem in this regression analysis.

The data were examined to determine whether there were any data points that might be detrimental to the fit or generalization of the regression equation. *Outliers* were reviewed using the casewise diagnostics table, checking for cases where the standardized residual is greater than ± 3 standard deviations. Ten cases were removed due to having residuals greater than ± 3 standard deviations. *Leverage values* were examined to determine whether values greater than 0.5 were seen. Two cases had values greater than 0.5 and were removed. *Influential points* were reviewed using Cook's Distance, checking for values above 1. In all cases, the Cook's Distance value was less than 1.

Results

The relationship between the combination of history of crisis residential stays, gender, age, primary diagnosis, and ethnicity and the dependent variable, number of crisis residential stays was statistically significant ($F(12, 408) = 1.967, p = .026$). However, after controlling for the covariates, the addition of crisis services was not statistically significant to the model ($p=.979$). The null hypothesis is accepted, rejecting the research hypothesis that participation in crisis intervention services will reduce the number of crisis residential stays after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age. The overall model explained 5.5% of the variance in post intervention crisis residential stays ($R^2 = .055$), but the addition of the crisis intervention variable contributed nothing additional to the model ($R^2 \text{ change} = 0$).

Table 4.21: Descriptive Statistics.

	Mean	Std. Deviation	<i>N</i>
DepV: Num Crisis Residential Services After Intervention	2.16	2.869	433
COVARY: History: Num Crisis Residential Services Before Intervention	23.74	20.090	433
COVARY: Dummy code for Gender: Female	.3002	.45889	433
COVARY: Age	43.19	11.241	433
COVARY: Dummy code for Ethnicity:African-American	.3141	.46469	433
COVARY: Dummy code for Ethnicity: Hispanic	.0647	.24622	433
COVARY: Dummy code for Ethnicity: White	.5889	.49260	433
COVARY: Dummy code for Diagnosis:Bipolar-related disorders	.3649	.48196	433
COVARY: Dummy code for Diagnosis: Adjustment disorders	.0092	.09578	433
COVARY:Dummy code for Diagnosis: Depression-related disorders	.1824	.38666	433
COVARY:Dummy code for Diagnosis: Anxiety-related disorders	.0046	.06788	433
COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders	.3741	.48446	433
Intervention=EMCOT	.1501	.35760	433
Intervention=MCOT	.1132	.31716	433
Intervention=PES	.7367	.44092	433

Table 4.22: Model Summary^c

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.234 ^a	.055	.032	2.421	.055	2.367	10	410	.010	
2	.234 ^b	.055	.027	2.427	.000	.021	2	408	.979	1.452

a. Predictors: (Constant), COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Age, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Gender: Female, COVARY: History: Num Crisis Residential Services Before Intervention, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity:African-American, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis:Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White

b. Predictors: (Constant), COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Age, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Gender: Female, COVARY: History: Num Crisis Residential Services Before Intervention, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity:African-American, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis:Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White, INTERVENTION=MCOT, INTERVENTION=EMCOT

c. Dependent Variable: DepV: Num Crisis Residential Services After Intervention

Table 4.23: ANOVA^a.

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	138.742	10	13.874	2.367	.010 ^b
1 Residual	2402.826	410	5.861		
1 Total	2541.568	420			
2 Regression	138.994	12	11.583	1.967	.026 ^c
2 Residual	2402.574	408	5.889		
2 Total	2541.568	420			

a. Dependent Variable: DepV: Num Crisis Residential Services After Intervention

b. Predictors: (Constant), COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Age, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Gender: Female, COVARY: History: Num Crisis Residential Services Before Intervention, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity:African-American, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis:Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White

c. Predictors: (Constant), COVARY:Dummy code for Diagnosis: Schizophrenia-related disorders, COVARY: Age, COVARY: Dummy code for Ethnicity: Hispanic, COVARY: Dummy code for Gender: Female, COVARY: History: Num Crisis Residential Services Before Intervention, COVARY: Dummy code for Diagnosis: Adjustment disorders, COVARY: Dummy code for Ethnicity:African-American, COVARY:Dummy code for Diagnosis: Depression-related disorders, COVARY: Dummy code for Diagnosis:Bipolar-related disorders, COVARY: Dummy code for Ethnicity: White, INTERVENTION=MCOT, INTERVENTION=EMCOT

The variables that contributed statistical significance to the variance in the model were history ($t=3.132$, $p=.002$) and age ($t=2.519$, $p=.012$). EMCOT ($t=-.206$, $p=.837$) and MCOT ($t=-.023$, $p=.982$) did not contribute significantly more to reduced post intervention crisis stays than PES.

Table 4.24:

		Unstandardized Coefficients		Standardized Coefficients		
	Model	B	Std. Error	Beta	t	Sig.
1	(Constant)	.212	1.019		.208	.836
	COVARY: History: Num Crisis Residential Services Before Intervention	.019	.006	.154	3.144	.002
	COVARY: Gender: Female	-.483	.263	-.090	-1.841	.066
	COVARY: Age	.028	.011	.127	2.563	.011
	COVARY: Ethnicity: African-American	.440	.716	.083	.614	.539
	COVARY: Ethnicity: Hispanic	.920	.835	.093	1.102	.271
	COVARY: Ethnicity: White	.762	.704	.152	1.083	.280
	COVARY: Primary Diagnosis: Bipolar-related disorders	-.529	.511	-.104	-1.035	.301
	COVARY: Primary Diagnosis: Adjustment disorders	-1.108	1.313	-.044	-.844	.399
	COVARY: Primary Diagnosis: Depression-related disorders	-.549	.545	-.086	-1.007	.315

	COVARY: Primary Diagnosis: Schizophrenia-related disorders	-.355	.507	-.070	-.699	.485
2	(Constant)	.240	1.045		.229	.819
	COVARY: History: Number of Crisis Residential Services Before Intervention	.019	.006	.154	3.132	.002
	COVARY: Gender: Female	-.478	.265	-.089	-1.806	.072
	COVARY: Age	.028	.011	.126	2.519	.012
	COVARY: Ethnicity: African-American	.426	.727	.080	.586	.558
	COVARY: Ethnicity: Hispanic	.908	.845	.092	1.075	.283
	COVARY: Ethnicity: White	.756	.710	.151	1.065	.287
	COVARY: Primary Diagnosis: Bipolar- related disorders	-.531	.514	-.104	-1.032	.303
	COVARY: Primary Diagnosis: Adjustment disorders	-1.118	1.319	-.044	-.847	.397
	COVARY: Primary Diagnosis: Depression-related disorders	-.546	.548	-.086	-.996	.320
	COVARY: Primary Diagnosis: Schizophrenia-related disorders	-.352	.509	-.069	-.690	.490
	Intervention: EMCOT	-.071	.344	-.010	-.206	.837
	Intervention: MCOT	-.009	.384	-.001	-.023	.982

a. Dependent Variable: DepV: Num Crisis Residential Services After Intervention

Analysis

The logistic regression model was analyzed using a dichotomous version of the dependent variable. Results related to the overall model are presented, followed by results for the control variables and the independent variables.

HYPOTHESIS 8 (LINKAGE TO SERVICES): LOGISTIC REGRESSION

Hypothesis 8 (H₈): Participation in crisis intervention services will increase the likelihood that the participant will be linked to community-based behavioral health services after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

Each of the assumptions inherent to logistic regression analysis was evaluated. The categories of the dependent variable were mutually exclusive and exhaustive. The *assumption of independence of observations* was tested using the Durbin-Watson test. Regression analysis assumes that the residual errors are independent and there is no serial correlation. The Durbin-Watson statistic tests for the presence of serial correlation among the residuals. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.035, which falls within the acceptable range of 1.50 – 2.50.

The *assumption of linearity* requires a linear relationship between the continuous independent variables and the logit transformation of the dependent variable. This assumption was tested visually using studentized residual scatterplots. No transformation was conducted.

The *assumption of the independence of variables* was reviewed by checking for multicollinearity. Multicollinearity occurs when two or more independent variables are highly

correlated with each other, which can lead to problems differentiating variable contribution to the variance explained. The tolerance values for all of the independent variables are larger than 0.10. Thus, multicollinearity is not a problem in this regression analysis.

The data were examined to determine whether there were any data points that might be detrimental to the fit or generalization of the regression equation. *Outliers* were reviewed using the casewise diagnostics table, checking for cases where the standardized residual is greater than ± 3 standard deviations. No cases had residuals greater than ± 3 standard deviations. *Leverage values* were examined to determine whether values greater than 0.5 were seen. No cases had values greater than 0.5. *Influential points* were reviewed using Cook's Distance, checking for values above 1. In all cases, the Cook's Distance value was less than 1.

Results

A logistic regression was performed to ascertain the effects of the independent variables and the control variables on the likelihood that participants were linked to community-based behavioral health services following the intervention. The logistic regression model was statistically significant ($\chi^2(10) = 44.399, p < .001$). The model explained 7.9% (Nagelkerke R²) of the variance in linkage to community-based services and correctly classified 79.2% of cases. A diagnosis of schizophrenia had higher odds of being linked to services post intervention. Older age had higher odds per 1.02 year of age of being linked to services post intervention. The crisis interventions did not significantly contribute to the odds of being linked to services post intervention.

Table 4.25: Omnibus Tests of Model Coefficients.

		Chi-square	df	Sig.
Step 1	Step	44.399	10	.000
	Block	44.399	10	.000
	Model	44.399	10	.000

Table 4.26: Hosmer and Lemeshow Test.

Step	Chi-square	df	Sig.
1	4.570	8	.802

Table 4.27: Model Summary.

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	826.735 ^a	.051	.079

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.28: Classification Table^a.

Observed		Predicted			
		Dummy code for Linkage to Services Post-Intervention (DV)=Yes		Percentage Correct	
		Not linked	Yes linked		
Step 1	Dummy code for Linkage to Services Post-Intervention (DV)=Yes	Not linked	1	176	.6
		Yes linked	1	675	99.9
Overall Percentage					79.2

a. The cut value is .500

Table 4.29: Variable in the Equation.

		B	S.E.	Wald	df	Sig.
Step 1 ^a	DIAG_BIPOLAR(1)	.309	.271	1.299	1	.254
	DIAG_ADJ(1)	-.299	.687	.189	1	.664
	DIAG_DEPRESS(1)	-.153	.300	.261	1	.610
	DIAG_ANX(1)	-.886	.809	1.198	1	.274
	DIAG_SCHITZ(1)	1.142	.303	14.180	1	.000
	ETH_WHITE(1)	.515	.452	1.298	1	.254
	ETH_AFRAMER(1)	.462	.468	.975	1	.324
	ETH_HISP(1)	-.057	.496	.013	1	.909
	GENDER_FEMALE(1)	.096	.179	.287	1	.592
	Age	.021	.008	7.394	1	.007
	MCOT_DUMMY(1)	.638	.334	3.652	1	.056
	PES_DUMMY(1)	.338	.218	2.402	1	.121
	Constant	-.640	.592	1.168	1	.280

a. Variable(s) entered on step 1: MCOT_DUMMY, PES_DUMMY.

Chapter 5: Discussion

An overarching goal of this dissertation was to examine the effects of three crisis interventions on the subsequent utilization of intensive emergency services and linkage to community-based behavioral healthcare services. The specific aims of this study were to evaluate the effects of the Expanded Mobile Crisis Outreach Team (EMCOT), the traditional Mobile Crisis Outreach Team (MCOT), and Psychiatric Emergency Services (PES) on the number of post intervention emergency department visits, inpatient psychiatric hospitalizations, and crisis residential stays as well as linkage to community-based behavioral healthcare services. The effects of history of service utilization, age, gender, primary diagnosis, and ethnicity served as control variables in the regression analyses. The selection of these particular variables was an outgrowth of the theoretical framework for the study and previous research on crisis intervention influences on service utilization.

The theoretical model used for the study is Robert's Seven Stage Model of Crisis Intervention. Roberts' seven-stage model of crisis intervention is designed as a guide, not a rigid protocol, for assessing individuals experiencing an acute crisis or stress disorder. The model encompasses the following (Roberts, 2005, as cited in Roberts & O Hens, 2005):

1. Plan and conduct a thorough assessment (including lethality, dangerousness to self or others, and immediate psychosocial needs).
2. Make psychological contact, establish rapport, and rapidly establish the relationship (conveying genuine respect for the client, acceptance, reassurance, and a nonjudgmental attitude).

3. Examine the dimensions of the problems in order to define it (including the last straw or precipitating event).
4. Encourage an exploration of feelings and emotions.
5. Generate, explore, and assess past coping attempts.
6. Restore cognitive functioning through implementation of action plan.
7. Follow up and leave the door open for booster sessions 3 and/or 6 months later.

Robert's model has been identified as the most common approach utilized by MCOTs nationally (Eaton, 2005; Ligon, 2005) and offers a comprehensive and flexible crisis intervention protocol. The few studies on the effectiveness of MCOTs research suggest favorable outcomes in the reduction of emergency department visits and psychiatric hospitalizations (Guo, Biegel, Johnson, & Dyches, 2001; Scott, 2000). There is additional empirical support for MCOTs effectiveness in linking individuals to services (Currier et al, 2010). ANOVA, chi square test, multiple linear regression and logistic regression were used to evaluate the respective effect of three types of crisis intervention (PES, MCOT, and EMCOT) on emergency service utilization and linkage to services. This discussion will present a summary of the findings from the analyses related to each hypotheses, review findings from exploratory analyses, assess the limitations of the study, review implications for the field, and provide suggestions for future research.

DISCUSSION OF RESULTS

The overall results of this study are mixed in terms of support for the notion that crisis intervention services are associated with reductions in subsequent use of emergency departments and crisis residential programs. The initial hypothesis was that there is a negative association

between the amount of emergency services received in the one year post-intervention and the crisis intervention, such that the number of emergency department visits, crisis residential services, and inpatient psychiatric hospitalizations were expected to decrease in comparison to the amount of services received in the two years prior to the intervention. ANOVA results support the hypotheses for reduced emergency department visits and crisis residential stays, but after controlling for the covariates, the regression analyses results do not support the hypotheses. Study results do not support the hypothesis that there would be a positive association between linkage to services and the intervention such that participants would be more likely to receive community-based behavioral health services post-intervention than pre-intervention.

Contrary to the original hypotheses, crisis interventions did not significantly reduce psychiatric hospitalizations and MCOTs were not more effective than PES on the dependent variables. Discussion of the potential reasons for the findings on psychiatric hospitalizations are included with the relevant hypotheses.

Across all of the results, the hypothesis that EMCOT and MCOT would perform better than PES was not confirmed. Possible reasons for this finding stem from the similarities that the crisis intervention models share across crisis intervention techniques, staffing, and population served. More specifically, each of the models use Robert's Seven Stage Model of crisis intervention and incorporate de-escalation strategies, safety planning, motivational interviewing, and cognitive-behavioral approaches. They share a standardized crisis assessment and frequently use Crisis Incident Stress Debriefing protocols along with Psychological First Aid. The behavioral healthcare staff across all the models include licensed mental health professionals, nurses, and psychiatrists. In addition, clients are frequently served across the various interventions as part of a

crisis continuum. As the previously reported tables below indicate, 46% of EMCOT clients and 90% of MCOT clients are served by PES as part of follow-up services to access medications and other support services until access to ongoing outpatient clinic services can be facilitated. The mobile teams also support each other as a follow-up service with MCOT providing follow-up services to almost half of EMCOT clients, and EMCOT providing significantly little follow-up (4%) to MCOT's clients.

The models' differences in method of dispatch, response team composition, location of services, and co-response with EMS and law enforcement did not appear to affect outcomes between them.

Table 5.1: Participants Receiving MCOT Services during FY14.

EMCOT	PES	<i>N</i>	%
Yes	No	19	4.48%
No	Yes	382	90.09%
Yes	Yes	23	5.42%
Total		424	100.00%

Table 5.2: Participants Receiving EMCOT Services during FY14.

MCOT	PES	<i>N</i>	%
Yes	No	277	49.64%
No	Yes	257	46.06%
Yes	Yes	24	4.30%
Total		558	100.00%

Hypothesis 1 (H₁): Participation in crisis intervention services will reduce the number of emergency department visits, and MCOT and EMCOT will have a stronger effect than PES.

A mixed ANOVA revealed that crisis intervention services produced a significant decrease in the number of emergency department visits following the interventions ($F(1, 334) = 229.612$, $p = .000$, partial $\eta^2 = .407$). There was, however, no statistically significant interaction between the intervention groups and time on number of emergency department visits following crisis intervention services. The interaction effect between the repeated measures factor of time and the type of crisis intervention was not statistically significant ($F[1,334]=1.062$, $p=.347$, partial $\eta^2=.006$).

For those with a history of ED visits, the overall mean number of ED visits was reduced from an average of 10.71 visits per year to an average of 2.57 in the year following the crisis interventions. EMCOT, MCOT, and PES intervened with individuals with similar histories of ED visits and did not significantly differ from one another in subsequent reductions.

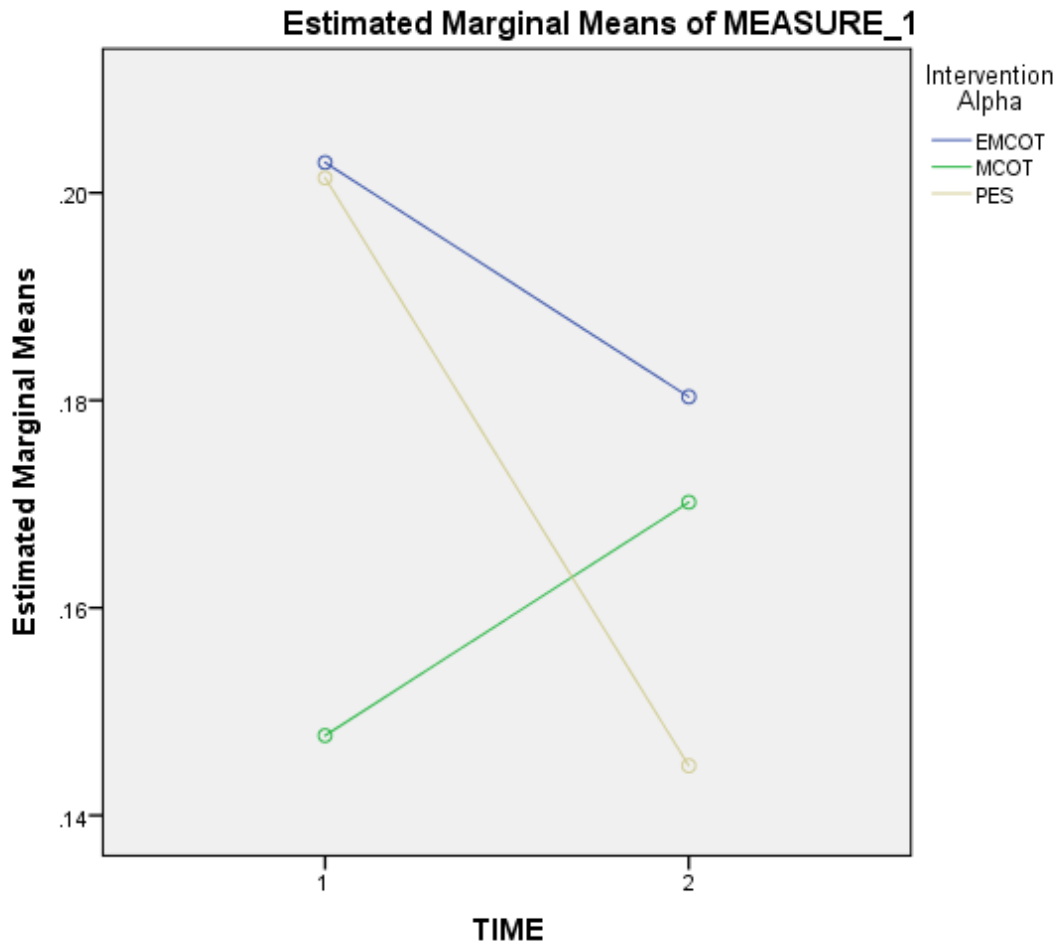
Reducing unnecessary emergency department visits through crisis interventions offers significant cost savings (Wilder, 2013), but also offers a timelier and less distressing experience for individuals experiencing a behavioral health emergency. NAMI conducted a survey on the emergency room experience and found that an individual in distress often experiences a lengthy wait time without mental health treatment and surrounded by noise, trauma and bright lights 24 hours a day (NAMI, 2015). Another prevalent issue across emergency departments is psychiatric boarding, which is defined by Alakeson, Pande and Ludwig (2010) as placing psychiatric patients to wait in hallways or other emergency room areas for inpatient beds. Numerous studies have sought to quantify the length of time psychiatric patients remain waiting in EDs, with average boarding times ranging anywhere from 6.8 hours to 34 hours (Zeller, Calma, & Stone, 2014).

Hypothesis 2 (H₂): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations, and MCOT and EMCOT will have a stronger effect than PES.

A mixed ANOVA revealed that crisis intervention services did not produce a significant decrease in the number of inpatient psychiatric hospitalizations following the intervention ($F [2, 603] = 1.639, p = .185, \text{partial } \eta^2 = .006$). Moreover, there was no statistically significant interaction between the intervention groups and time on number of inpatient psychiatric hospitalizations following crisis intervention services ($F [2, 603] = 1.639, p = .185, \text{partial } \eta^2 = .006$).

This result is contrary to the existing evidence base and may be influenced by the MCOT outcomes. Although there is no statistical difference between the groups, the estimated margin of means graph suggests that MCOT had a subsequent increase in psychiatric hospitalizations. This finding is possibly due to MCOT's role in conducting hospital discharge interventions. MCOT performs 20 hospital discharge interventions per week, whereas EMCOT and PES team members are almost never dispatched for hospital discharges. It is possible that the discharge dates were not entered in a timely way and that the actual date of discharge data are inaccurate, thus making it appear that an individual had a subsequent hospitalization to MCOT intervention. The secondary dataset available for this study precludes identifying the source of this potential data entry error, but follow-up analysis should be conducted.

Figure 5.1: Estimated Marginal Means.



Hypothesis 3 (H₃): Participation in crisis intervention services will reduce the number of crisis residential stays, and MCOT and EMCOT will have a stronger effect than PES.

A mixed ANOVA revealed that crisis intervention services produced a significant decrease in the number of crisis residential stays following the intervention ($F(2, 430) = 0.046, p = .956, \text{partial } \eta^2 = .000$). However, there was no statistically significant interaction between the intervention groups and time on number of crisis residential stays following crisis intervention services ($F(2, 430) = 0.046, p = .956, \text{partial } \eta^2 = .000$).

Studies regarding the effectiveness of short-term crisis residential stabilization services suggest that the shorter term intervention is as effective as inpatient hospitalization in reducing symptoms and improving functioning (SAMHSA, 2012). Moreover, short-term crisis stabilization is more cost effective and individuals report greater satisfaction with the intervention compared to inpatient stays (Hawthorne et al, 2005). In a meta-analytic review of RCTS and other qualitative studies, Lloyd and Evans and colleagues (2009) indicate that there is evidence supporting crisis residential alternatives as more effective and less expensive than standard inpatient treatment.

This finding appears positive if interpreted as crisis interventions helping to obviate the need for crisis residential treatment. In light of the prior finding on psychiatric hospitalizations, it is unclear if inpatient hospital treatment contributed to the reductions in the utilization of the less restrictive crisis residential services.

Hypothesis 4 (H4): Participation in crisis intervention services will increase the likelihood that the participant will be linked to community-based behavioral health services, and MCOT and EMCOT will have a stronger effect than PES.

A chi-square test was conducted between the type of crisis intervention service received and linkage to community-based behavioral health services. All expected cell frequencies were greater than five. There was not statistically significant association between the type of crisis intervention service and linkage to community-based behavioral health services following the receipt of crisis intervention services ($\chi^2(2) = 3.13, p = 0.209$). Across all crisis intervention types, 78.7% of individuals who were not engaged in services at the time of the crisis interventions were subsequently linked to community-based behavioral health services within the year following the

crisis interventions. As the chi square test revealed, individuals were equally likely to be linked to services across the intervention types (73.6% of those who received an initial EMCOT intervention were linked to community-based behavioral health services, 80.6% within the MCOT group were linked and 79.8% within the PES group were linked).

A compelling research base suggests that linkage to community-based behavioral healthcare service yields improved clinical outcomes for individuals with mental illness as well as financial benefits to the larger system (Fuller, Perkins, Parker, Holdworth, Kelly, Roberts, Martinez, and Frager, 2011).

Hypothesis 5 (H₅): Participation in crisis intervention services will reduce the number of emergency department visits after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

The relationship between the combination of history of emergency department visits, gender, age, primary diagnosis, and ethnicity and the dependent variable, number of emergency department visits was statistically significant ($F(12, 328) = 2.528, p = .003$). However, after controlling for the covariates, the addition of crisis services to the model was not statistically significant ($p = .429$). Contrary to the research hypothesis, participation in crisis intervention services did not reduce the number of emergency department visits after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age. The addition of the crisis intervention to the model explained less than 1% of the variance ($R^2 \text{ change} = .005$).

The variables in the overall model that made a statistically significant contribution to the variance in post intervention ED visits were female gender ($t = -2.191, p = .029$) and history of ED visits

($t=4.093$ $p<.001$). EMCOT ($t=1.303$, $p=.193$) and MCOT ($t=.287$, $p=.774$) did not have a statistically significant greater effect than PES on post intervention ED visits.

The significance of the covariates of gender and history reflect the empirical literature. Men are more likely than women to use emergency departments (Horst, Mart, Gambler, and Coco, 2011; World Health Organization, 2009). History of emergency department utilization is a strong predictor of future emergency department visits (Bernstein, Hing, Moss, Allen, Siller, & Tiggle 2003; Horst et al, 2011).

Hypothesis 6 (H₆): Participation in crisis intervention services will reduce the number of inpatient psychiatric hospitalizations after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

The relationship between the combination of history of inpatient psychiatric hospitalizations, gender, age, primary diagnosis, and ethnicity and the dependent variable, number of inpatient psychiatric hospitalizations was statistically significant ($F(13, 587) = 14.055$, $p < .001$). After controlling for the covariates, the addition of crisis services to the model was statistically significant. ($p=.001$). The model explained 23.7% of the variance (R Square= .237) and the addition of the crisis intervention variable to the model contributed less than 2% to the variance (R square change=.018). The variables that made statistically significant contributions to the model were history of psychiatric hospitalizations ($t=10.656$, $p<.001$), a diagnosis of bipolar disorder $t=2.381$, $p=.018$), a diagnosis of schizophrenia ($t=2.609$, $p=.0090$), and female gender

($t=-3.371$, $p=.001$). Contrary to the hypothesis, EMCOT ($t=3.328$, $p=.001$) and MCOT ($t=2.283$, $p=.023$) contributed significantly to the variance in model by increased psychiatric hospitalizations.

As with the previous model, the statistically significant covariates of history, psychiatric diagnosis, and gender mirrors the evidence-base. Individuals with diagnoses of schizophrenia and bipolar disorder have higher rates of inpatient hospitalization than those with other mental illnesses (Blader, 2011) Males are more likely to than women to use inpatient care (World Health Organization, 2009) and historical patterns of healthcare utilization are significant predictors of future use (Bernstein et al, 2011).

Hypothesis 7 (H7): Participation in crisis intervention services will reduce the number of crisis residential stays after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

The relationship between the combination of history of crisis residential stays, gender, age, primary diagnosis, and ethnicity and the dependent variable, number of crisis residential stays was statistically significant ($F(12, 408) = 1.967$, $p = .026$). . However, after controlling for the covariates, the addition of crisis services was not statistically significant to the model ($p=.979$). The null hypothesis is accepted, rejecting the research hypothesis that participation in crisis intervention services will reduce the number of crisis residential stays after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age. The overall model explained 5.5% of the variance in post intervention crisis residential stays ($R^2 = .055$), but the addition of the different crisis interventions variable did not explain any further variance to the model ($R^2 \text{ change} = 0$). The variables that contributed statistical significance to the variance

in the model were history ($t=3.132$, $p=.002$) and age ($t=2.519$, $p=.012$). EMCOT ($t=-.206$, $p=.837$) and MCOT ($t=-.023$, $p=.982$) did not contribute significantly more to reduced post intervention crisis stays than PES.

As previously noted, a substantial body of literature identifies history as a predictor of future patterns of healthcare utilization (Blader, 2011). Older age is also significantly associated with use of inpatient services (World Health Organization, 2009).

Hypothesis 8 (H₈): Participation in crisis intervention services will increase the likelihood that the participant will be linked to community-based behavioral health services after controlling for the effects of history, primary Axis I diagnosis, ethnicity, gender, and age, and MCOT and EMCOT will have a stronger effect than PES.

A logistic regression was performed to ascertain the effects of the independent variables and the control variable on the likelihood that participants were linked to community-based behavioral health services following the intervention. The logistic regression model was statistically significant ($\chi^2(10) = 44.399$, $p < .001$). The model explained 7.9% (Nagelkerke R²) of the variance in linkage to community-based services and correctly classified 79.2% of cases.

A diagnosis of schizophrenia had higher odds of being linked to services post intervention. Older age had higher odds per 1.02 year of age of being linked to services post intervention. The crisis interventions did not significantly contribute to the odds of being linked to services post intervention.

As discussed with respect to the chi square test, empirical evidence indicates that linkage to community-based behavioral healthcare service is related to positive clinical and financial outcomes (Fuller, Perkins, Parker, Holdworth, Kelly, Roberts, Martinez, and Frager, 2011).

Epidemiological studies report that 40% of individuals with schizophrenia received no mental health services in the previous year (Mojtbai, Fuchtmann, Chang, Kotov, Carig, and Bromet, 2009), underscoring the need for increased linkage. Indeed, there is clear and specific evidence that community-based treatment, especially the Assertive Community Treatment Model, reduces psychiatric hospitalizations and improves clinical outcomes for individuals with schizophrenia (Muesser, Bond, and Drake, 2001).

LIMITATIONS

The limitations of this study pertain to the data sources, the absence of law enforcement encounter data, the restricted diagnostic information, the lack of crisis type data, and the discrepant timeframes for pre and post data. These limitations should be carefully considered in interpreting the results of this study.

The data source for psychiatric hospitalizations and emergency department visits, the iCare database, only reflects major hospitals in Travis County and Williamson County. One major hospital in the area is not represented in the data. Smaller private hospital data is also not included. The data is further limited to only those individuals who provided consent for their healthcare information to be shared. Local anecdotal estimates are that approximately 20% of patients do not provide consent, but this proportion could be substantially more and there is no present method of determining the refusal rate for consents. Additionally, the database does not include individuals with private insurance. Only individuals with Medicaid, Medicare, or those who lack a payor source are reflected in the data.

The database for crisis residential services and community-behavioral services, CCBHS Electronic Health Record, is limited to data from the local public mental health system. Data on individuals who obtain treatment in privately funded facilities or with individual private providers are not represented in the findings of this study. Data on inpatient or outpatient treatment accessed outside the Austin Travis County area are also not included within the scope of this investigation.

This study was originally designed to examine jail data, but attempts to access to jail encounter information were unsuccessful. Evidence suggests that MCOTs, particularly those models that co-respond with law enforcement, such as EMCOT, are successful in reducing jail stays. The lack of that outcome information constrains the ability for this study to understand the potential impact of crisis services on criminal justice involvement and to contribute such information to the literature.

The data on mental health diagnoses are limited to the primary Axis I DSM-IV-TR diagnosis. Information on co-morbidity of diagnoses is lacking. There is a paucity of data on MCOT effectiveness with individuals who have a substance abuse disorder and the absence of this data as far as percentage of participants with co-morbid substance abuse diagnoses in the current investigation restricts the ability to contribute to the knowledge base. Co-morbidity data on PTSD would also have added to understanding of prevalence rates among those served by crisis services and in what ways that diagnosis is associated with outcomes.

A significant limitation is associated with the repeated measures ANOVAs for all three of the continuous DVs. Time I is based on two years of history of service utilization and the Time II post intervention period includes only one year of data. The database provided for the secondary data analysis did not allow for detailed analysis of one year of service history, so additional data

is required and subsequent data analysis is needed for a more comparable interpretation of the results.

IMPLICATIONS

The results of this study provide support for effectiveness of crisis services overall in reducing use of costly and restrictive emergency services. Although the mobile crisis interventions did not improve outcomes more than the clinic-based urgent care model of PES, the results offer evidence for MCOTs effectiveness in reducing emergency department utilization and crisis residential use. More research is needed to better determine MCOTs effectiveness in linking individuals to community-based behavioral healthcare services.

Implications for policy and practice relate to the follow-up component of crisis services, the linkage to treatment component, history as a risk factor, and the need to distinguish appropriate hospitalizations versus those that are preventable.

DIRECTIONS FOR FUTURE RESEARCH

Future research should involve in depth investigations of MCOTs, particularly EMCOTs, who co-respond with law enforcement and other emergency responders. Studies that examine diversion rates from emergency services and jail should be prioritized. Individuals who experience mental health crises often receive their initial intervention from emergency first responders. First responders, such as law enforcement officers or emergency medical service providers, are not adequately trained or equipped to address and assess the complexity of most mental health crises. These interventions frequently result in over-use and misuse of admission to emergency departments, psychiatric hospitals, and incarcerations. Preliminary diversion data from ATCIC's

EMCOT show promise and underscore the need for empirical investigation. EMCOT and first responders co-respond to mental health crisis calls, as dispatched by the 911 Call Center, to provide timely, professional psychiatric crisis services at the physical location of the person's crisis. Since its inception in September of 2014, EMCOT has diverted 79% of all dispatches from Austin Travis County Emergency Medical Services from going to an emergency department, and have diverted 88% of all dispatches from law enforcement from being emergently detained (psychiatric commitment) or arrested. In addition to diversion, research should investigate the benefits of EMCOT's crisis intervention training to Austin Police Department; Austin Travis County Emergency Medical Services; and Travis County Sheriff's Office to the quality of the joint interventions. Further analysis should target MCOT's follow-up services, which can provide up to 90 days of crisis relapse prevention services after the initial crisis assessment.

Evaluation of the MCOT model's goal of providing timely, quality psychiatric crisis assessments and interventions to prevent the over-use and misuse of emergency departments, unnecessary psychiatric hospitalizations, and arrests should also include a cost-effectiveness component. Keeping people out of the aforementioned facilities when appropriate saves money on the micro-level (the people and their families who receive MCOT services instead of more costly interventions, such as ambulance rides, emergency departments admissions, and psychiatric hospital admissions)) and the macro-level (opportunities savings for emergency departments, more bed space for medical crises at emergency departments, saving HD funds for persons who necessitate psychiatric hospitalization, saving cost of booking and incarceration). It also saves time and efforts of our first responder partners by allowing them to clear the mental health call

once MCOT has arrived on-scene so that they may focus their efforts on their respective areas of expertise (medical emergencies and public safety).

As mentioned local diversion data looks promising.

- ATCEMS on average receives 4,000 mental health dispatches a year that don't usually require emergency medical attention. Prior to this expansion, ATCEMS had two choices when responding to mental health calls: 1) Transport them to an emergency department, or 2) Request a law enforcement officer to assess the person for an emergency detention. Most people who experience mental health crises do not require either of these dispositions to safely resolve the mental health crisis; in fact, going to an emergency department unnecessarily or being assessed by a law enforcement officer when not indicated can escalate the crisis. The entire department of ATCEMS has been trained to dispatch MCOT when the mental health call meets the referral criteria (namely, that the client does not require emergency medical attention). To date, this project has received 894 emergency dispatches from ATCEMS to respond to mental health calls. MCOT's goal is to release the paramedic from the scene within 5-10 minutes of arrival.
- An MCOT staff member rides out three times a week with an ATCEMS paramedic on a specialty team to co-respond to mental health calls or assess persons on their "high alert" list who utilize the emergency departments with a high frequency. These persons usually have a serious medical condition, and this project has found that the vast majority of this population also has a co-occurring psychiatric disorder. To date, staff have responded to 208 cases through these ride-alongs.

- ATCEMS staff run a three-day report for all persons that were transported to the emergency department when their chief complaint was a psychiatric issue. This data is given to MCOT as referrals for follow-up, to determine if the person is in need of any further crisis services. To date, we have received 785 routine referrals for follow-up.
- Austin Police Department on average receives 12,000 mental health dispatches a year, of which only 4,000 result in an emergency detention. Prior to this expansion, APD had three choices when responding to mental health calls: 1) Implement an emergency detention, 2) Arrest the person if he/she was engaging in a criminal act, and 3) Talk to the person and leave the scene. Most people who experience mental health crises require an intermediary disposition (i.e., less than an emergency detention/arrest but more than only speaking to a police officer). The entire department of APD has been trained to dispatch MCOT as an alternative to assessment for emergency detention OR as jail diversion (when the person experiencing a mental health crisis is engaging in a victimless crime). To date, this project has received 787 emergency dispatches from APD to respond to mental health calls. MCOT's goal is to release the officer from the scene within 5-10 minutes of our arrival.
- APD's Crisis Intervention Team unit can also make referrals to MCOT for follow-up to determine if further crisis services are needed. To date, this team has received over 2,000 routine referrals for follow-up.
- Travis County Sheriff's Office Crisis Intervention Team, Austin Community College District Police, and Pflugerville Police Department's Crisis Intervention Team may dispatch MCOT directly to request co-response on mental health calls. To date, this project has received 172 requests for co-response from these entities.

- Central Booking counseling staff may also request MCOT to assess a person who is discharging from their facility but is experiencing a mental health crisis. To date, MCOT has received 92 requests to assess inmates.
- APD recently completed a survey about their collaboration with MCOT. 239 officers responded. 85% reported that the collaboration helped the department, and 89% reported that the collaboration benefited the community. One officer commented that “MCOT is a force multiplier and puts cops back on the street.”
- APD recently reported that in the year of MCOT’s collaboration with APD responding to 911 dispatches, arrests of mentally ill persons decreased by 39%.

In addition to research on diversion, future investigations should examine the types of crises and their relationship to MCOT’s effectiveness. Most MCOTs report suicidal ideation or intent as their most frequent crisis. Crises related to acute psychosis are also frequent.

Other areas of inquiry that would add value to the field are consumer satisfaction, co-morbidity of substance use disorders and PTSD, and clinical outcomes.

CONCLUSIONS

The weaknesses of the existing body of evidence on MCOT effectiveness involves a lack of clarity on the MCOT model under investigation, lack of methodological rigor, the exclusion of individuals with substance abuse disorders, and failure to study MCOT models that incorporate a follow-up component. The current study offers a unique contribution to the evidence base by clearly describing and investigating a model that incorporates the core features of MCOT models nationally, comparing two models of MCOT intervention with a comparison group who received

an outpatient emergency service, the inclusion of individual's with substance use disorders and two models of MCOT intervention that include a robust follow-up component. The study provided overall support for the effectiveness of crisis intervention services as well as MCOTs. Some mixed results with respect to MCOT outcomes warrant further investigation.

Appendix A. Ethnicity Breakdown by Intervention and

Ethnicity

Intervention	Ethnicity	<i>N</i>	%
EMCOT	African American	117	20.97%
EMCOT	Asian	11	1.97%
EMCOT	Hawaiin/Pacific Islander	1	0.18%
EMCOT	Hispanic	57	10.22%
EMCOT	Native American	6	1.08%
EMCOT	Other	2	0.36%
EMCOT	Unknown	9	1.61%
EMCOT	White	355	63.62%
Total EMCOT		558	100.00%
MCOT	African American	103	24.29%
MCOT	Asian	6	1.42%
MCOT	Hawaiian/Pacific Islander	1	0.24%
MCOT	Hispanic	47	11.08%
MCOT	Native American	3	0.71%
MCOT	Other	8	1.89%
MCOT	Unknown	15	3.54%
MCOT	White	241	56.84%
Total MCOT		424	100.00%
PES	African American	633	25.29%
PES	Asian	27	1.08%
PES	Hispanic	343	13.70%
PES	Native American	18	0.72%
PES	Other	17	0.68%
PES	Unknown	54	2.16%
PES	White	1411	56.37%
Total PES		2503	100.00%

Appendix B. Gender Breakdown by Intervention

Intervention	Gender	<i>N</i>	%
EMCOT	F	269	48.21%
EMCOT	M	289	51.79%
Total EMCOT		558	100.00%
MCOT	F	223	52.59%
MCOT	M	201	47.41%
Total MCOT		424	100.00%
PES	F	1002	40.03%
PES	M	1501	59.97%
Total		2503	100.00%

Appendix C. Specific Primary Axis I DSM-IV-TR Diagnosis across Interventions

Primary Diagnosis	Category	<i>N</i>	%
Abuse-Phys/Sex Or Neg Of Child	Other	3	0.09%
Adjust Disorder With Anxiety	Adjustment Disorders	2	0.06%
Adjust Do W/Mix Distur-Inactiv	Adjustment Disorders	2	0.06%
Adjust Do/Anxiety & Depression	Adjustment Disorders	15	0.43%
Adjustment Do Nos-Inactive	Adjustment Disorders	2	0.06%
Adjustment Do Unspecified	Adjustment Disorders	4	0.11%
Adjustment Do W/Depressed Mood	Adjustment Disorders	9	0.26%
Adjustment Do W/Distrb Of Cond	Adjustment Disorders	1	0.03%
Adjustment Do W/Mixed Disturba	Adjustment Disorders	8	0.23%
Adult Antisocial Behavior	Other	1	0.03%
Agoraphobia W/Panic Disorder	Anxiety-related Disorders	1	0.03%
Alcohol Abuse	Substance Use-related Disorders	7	0.20%
Alcohol Dependence	Substance Use-related Disorders	48	1.38%
Amphetamine Dependence	Substance Use-related Disorders	5	0.14%
Amphetamine Abuse	Substance Use-related Disorders	1	0.03%
Anxiety Disorder Nos	Anxiety-related Disorders	13	0.37%
Asperger's D/O	Other	7	0.20%
Att-Deficit Hyper Combine Type	ADHD	33	0.95%
Att-Deficit Hyper Disorder Nos	ADHD	3	0.09%
Att-Deficit Hyper Inatten Type	ADHD	3	0.09%
Autistic Disorder	Other	4	0.11%
Bereavement	Other	4	0.11%
Bipol Dis Depress Unspec	Bipolar-related Disorders	77	2.21%
Bipol Disor Depress Mild	Bipolar-related Disorders	9	0.26%
Bipol Disor Depress Moderate	Bipolar-related Disorders	66	1.89%
Bipol Do/ Nos-Inactive	Bipolar-related Disorders	1	0.03%
Bipol I/ Manic/ Mild	Bipolar-related Disorders	6	0.17%

Bipol I/ Manic/ Moderate	Bipolar-related Disorders	35	1.00%
Bipol I/Depr/Sevr/W/Psychotic	Bipolar-related Disorders	72	2.07%
Bipol I/Manic/In Full Remissio	Bipolar-related Disorders	1	0.03%
Bipol I/Manic/Or Hypomanic	Bipolar-related Disorders	18	0.52%
Bipol I/Manic/Sevr/W/O Psychot	Bipolar-related Disorders	9	0.26%
Bipol I/Manic/Sevr/W/Psychotic	Bipolar-related Disorders	60	1.72%
Bipolar Disorder/ Nos	Bipolar-related Disorders	296	8.49%
Bipolar I Depressed Severe	Bipolar-related Disorders	47	1.35%
Bipolar I Deprsd In Part Remis	Bipolar-related Disorders	4	0.11%
Bipolar I Manic/ In Part Remis	Bipolar-related Disorders	1	0.03%
Bipolar I Manic/ Severe W/Out	Bipolar-related Disorders	8	0.23%
Bipolar I Manic/ Severe W/Psy	Bipolar-related Disorders	36	1.03%
Bipolar I Mixed In Full Remiss	Bipolar-related Disorders	2	0.06%
Bipolar I Mixed In Part Remiss	Bipolar-related Disorders	2	0.06%
Bipolar I Mixed Mild	Bipolar-related Disorders	14	0.40%
Bipolar I Mixed Moderate	Bipolar-related Disorders	193	5.54%
Bipolar I Mixed Sevr W/Psychot	Bipolar-related Disorders	107	3.07%
Bipolar I Mixed Svr W/O Psycho	Bipolar-related Disorders	39	1.12%
Bipolar I Mixed Unspecified	Bipolar-related Disorders	19	0.55%
Bipolar I Single Manic/ Mild	Bipolar-related Disorders	1	0.03%
Bipolar I Single Manic/ Unsp	Bipolar-related Disorders	2	0.06%
Bipolar I/ Most Recent Unspec	Bipolar-related Disorders	8	0.23%
Bipolar Ii Disorder	Bipolar-related Disorders	139	3.99%
Borderline Intellectual Funct	Other	1	0.03%
Cannabis Abuse	Substance Use-related Disorders	1	0.03%
Cannabis Dependence	Substance Use-related Disorders	3	0.09%
Cocaine Abuse	Substance Use-related Disorders	3	0.09%
Cocaine Dependence	Substance Use-related Disorders	14	0.40%
Conduct Do Child-Onset Type	Other	4	0.11%
Conduct Do - Adol-Onset Type	Other	4	0.11%
Conduct Do - Unspec Onset	Other	1	0.03%
Conduct Do Group Type-Inactive	Other	2	0.06%
Cyclothymic Disorder	Bipolar-related Disorders	1	0.03%
Delusional Disorder	Schizophrenia-related Disorders	10	0.29%

Dementia Due To Gmc-Inactive	Other	1	0.03%
Dementia Due To(Med Cond)Behav	Other	2	0.06%
Depressive Disorder Nos	Depression-related Disorders	68	1.95%
Depressive Do Nos-Inactive	Depression-related Disorders	2	0.06%
Diag Deferred On Axis I Or Ii	Diagnosis Deferred or No Diagnosis	14	0.40%
Disruptive Behavior Do Nos	Other	2	0.06%
Drug Induce Psychot Do W/Delus	Schizophrenia-related Disorders	1	0.03%
Drug Induced Mood Disorder	Substance Use-related Disorders	1	0.03%
Drug Induced Pychot Do W/Hallu	Substance Use-related Disorders	3	0.09%
Dysthymic Disorder	Depression-related Disorders	14	0.40%
Expressive Language Do	Other	1	0.03%
Generalized Anxiety Disorder	Anxiety-related Disorders	6	0.17%
Impulse Control Do Nos	Other	2	0.06%
Inactive - Dysthymia	Depression-related Disorders	3	0.09%
Inactive - Psychotic Do Nos	Schizophrenia-related Disorders	1	0.03%
Inactive-Adjust Do/W Dep Mood	Adjustment Disorders	3	0.09%
Inactive-Adjust React-Oth Spec	Adjustment Disorders	2	0.06%
Inactive-Conduct Do/ Undiffer	Other	2	0.06%
Inactive-Dx Cond Defer Axis I	Diagnosis Deferred or No Diagnosis	4	0.11%
Inactive-Oth Spe Family Cir	Other	3	0.09%
Inactive-Schizoph Undif Chron	Schizophrenia-related Disorders	1	0.03%
Inactive-Subst Withdraw Syn	Substance Use-related Disorders	1	0.03%
Intermittent Explosive Do	Other	2	0.06%
Learning Disorder Nos	Other	1	0.03%
Maj Dep Partial Remissio	Depression-related Disorders	2	0.06%
Maj Dep Recur Epi Unspecified	Depression-related Disorders	29	0.83%

Maj Dep Recur Sevr W/O Psychot	Depression-related Disorders	179	5.14%
Maj Dep Recurrent Mild	Depression-related Disorders	33	0.95%
Maj Dep Sin Epis Sev W/O Psych	Depression-related Disorders	24	0.69%
Maj Dep Sin Epis Severe W/Psyc	Depression-related Disorders	25	0.72%
Maj Dep Sing Epis Partial Remi	Depression-related Disorders	2	0.06%
Maj Depr Do Recurrent Moderate	Depression-related Disorders	322	9.24%
Maj Depr Recur Svr With Psycho	Depression-related Disorders	107	3.07%
Maj Depres Dis Single Ep	Depression-related Disorders	8	0.23%
Major Dep Single Episode Moder	Depression-related Disorders	42	1.21%
Primary Diagnosis	Category	N	%
Major Depress/ Sing Eps Mild	Depression-related Disorders	3	0.09%
Malingering	Other	1	0.03%
Mood Do In Conditions Classifi	Bipolar-related Disorders	4	0.11%
Mood Do/ Unspec/ Episodic	Bipolar-related Disorders	79	2.27%
Neglect Of Child-Nutritional	Other	1	0.03%
No Diags/Condition On Axis 1-2	Diagnosis Deferred or No Diagnosis	22	0.63%
Obsessive-Compulsive Disorder	Anxiety-related Disorders	1	0.03%
Opioid Dependence	Substance Use-related Disorders	28	0.80%
Oppositional Defiant Disorder	Other	14	0.40%
Other Mixed/Unspec Drug Abuse	Substance Use-related Disorders	1	0.03%
Other Or Unk Substance Dependence	Substance Use-related Disorders	4	0.11%
Pain Do/Psychological Factors	Other	1	0.03%
Panic Disorder/W/O Agoraphobia	Anxiety-related Disorders	8	0.23%
Parent-Child Relational Prob	Other	1	0.03%
Personality Change Due To...	Other	1	0.03%

Polysubstance Dependence	Substance Use-related Disorders	23	0.66%
Posttraumatic Stress Disorder	Anxiety-related Disorders	36	1.03%
Psychotic Do W/Hallucinations	Schizophrenia-related Disorders	5	0.14%
Psychotic Disorder/ Nos	Schizophrenia-related Disorders	79	2.27%
Psychotic W/Delusions	Schizophrenia-related Disorders	5	0.14%
Reading Disorder/ Unspec	Other	1	0.03%
Relat Prob R/To Mental Disorde	Other	1	0.03%
Schiz Paran Chronic Type-Inact	Schizophrenia-related Disorders	2	0.06%
Schizoaffective Disorder	Schizophrenia-related Disorders	400	11.48%
Schizophrenia Disorganize Type	Schizophrenia-related Disorders	16	0.46%
Schizophrenia Undifferentiated	Schizophrenia-related Disorders	68	1.95%
Schizophrenia/Catatonic Type	Schizophrenia-related Disorders	3	0.09%
Schizophrenia/Paranoid Type	Schizophrenia-related Disorders	257	7.37%
Schizophrenia/Residual Type	Schizophrenia-related Disorders	3	0.09%
Schizophreniform Disorder Unsp	Schizophrenia-related Disorders	2	0.06%
Sedative Hypnot Anx Abuse Uns	Substance Use-related Disorders	1	0.03%
Separation Anxiety Disorder	Anxiety-related Disorders	1	0.03%
Sexual Abuse Of Child- Victim	Other	1	0.03%
Unspec Transient Mental Do In	Other	4	0.11%
Unspecified Drug Disorder	Substance Use-related Disorders	1	0.03%
Zz Conduct Do - Inactive	Other	2	0.06%
Total		3485	100.00%

Appendix D. Primary Axis I DSM-IV-TR Diagnosis Category by Intervention

Intervention	Primary Diagnosis Category	<i>N</i>	%
EMCOT	ADHD	7	1.25%
EMCOT	Adjustment Disorders	6	1.08%
EMCOT	Anxiety-related Disorders	18	3.23%
EMCOT	Bipolar-related Disorders	185	33.15%
EMCOT	Depression-related Disorders	133	23.84%
EMCOT	Diagnosis Deferred or No Diagnosis	10	1.79%
EMCOT	Other	16	2.87%
EMCOT	Schizophrenia-related Disorders	159	28.49%
EMCOT	Substance Use-related Disorders	24	4.30%
Total EMCOT		558	100.00%
MCOT	ADHD	7	1.65%
MCOT	Adjustment Disorders	10	2.36%
MCOT	Anxiety-related Disorders	4	0.94%
MCOT	Bipolar-related Disorders	153	36.08%
MCOT	Depression-related Disorders	108	25.47%
MCOT	Diagnosis Deferred or No Diagnosis	5	1.18%
MCOT	Other	8	1.89%
MCOT	Schizophrenia-related Disorders	125	29.48%
MCOT	Substance Use-related Disorders	4	0.94%
Total MCOT		424	100.00%
PES	ADHD	25	1.00%
PES	Adjustment Disorders	32	1.28%
PES	Anxiety-related Disorders	44	1.76%
PES	Bipolar-related Disorders	1,018	40.67%
PES	Depression-related Disorders	622	24.85%
PES	Diagnosis Deferred or No Diagnosis	25	1.00%
PES	Other	51	2.04%
PES	Schizophrenia-related Disorders	569	22.74%
PES	Substance Use-related Disorders	117	4.67%
Total PES		2503	100.00%

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