

PREDICTORS OF CRIMINAL CHARGES FOR YOUTH IN PUBLIC MENTAL  
HEALTH SERVICES DURING THE TRANSITION TO ADULTHOOD

By

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS ..... ii

LIST OF TABLES ..... v

LIST OF FIGURES .....vi

Chapter

I. INTRODUCTION..... 1

II. PREDICTORS OF CRIMINAL CHARGES FOR YOUTH IN PUBLIC MENTAL HEALTH DURING THE TRANSITION TO ADULthood .....9

    Chapter Abstract .....9

    Literature Review .....10

    Methods.....14

        Research Questions .....14

        Data Source .....15

        Sample.....19

        Institutional Human Subjects Research Protections .....20

    Results.....23

        Predicting female dual system involvement.....25

        Predicting male dual system involvement.....28

    Discussion .....31

        Limitations .....37

        Implications .....38

III. OUT-OF-HOME OR OUTPATIENT MENTAL HEALTH TREATMENT DURING THE TRANSITION TO ADULthood: COMPARING LONGITUDINAL RATES OF CRIMINAL CHARGES .....41

    Chapter Abstract .....41

    Literature Review .....42

    Methods.....48

        Research Questions .....48

        Data Source .....48

        Sample.....51

        Institutional Human Subjects Research Protections .....53

    Analyses .....54

    Results.....55

    Discussion .....59

        Implications .....61

Limitations .....	63
Future Research .....	64
IV. LOCALIZED EFFECTS OF OUT-OF-HOME MENTAL HEALTH TREATMENT ON PROBABILITY OF CRIMINAL CHARGE IN ADOLESCENCE AND YOUNG ADULTHOOD .....	65
Chapter Abstract .....	65
Literature Review .....	66
Methods.....	72
Study Purpose and Hypotheses .....	72
Data Source .....	72
Sample.....	76
Institutional Human Subjects Research Protections .....	77
Analysis.....	78
Results.....	82
Model 1 through Model 3 .....	82
Model 4 .....	83
Discussion .....	86
Limitations .....	89
Implications .....	90
V. CONCLUSIONS .....	93
APPENDIX A.....	99
APPENDIX B .....	103
REFERENCES.....	106

## LIST OF TABLES

Table		Page
1.1	Descriptive Statistics.....	21
1.2	Percentage of Males and Females with Charges, 16 to 25 Years of Age....	23
1.3	Characteristics of those who were Charged with a Crime Versus those not Charged with a Crime, Reported in Percentages.....	25
1.4	Logistic Regression Predicting Female Criminal Charge, Final Models....	27
1.5	Logistic Regression Predicting Male Criminal Charge, Final Models.....	29
2.1	Descriptive Statistics.....	52
2.2	Descriptive Statistics by Service Type.....	53
3.1	Variables Included in Modeling.....	75
3.2	Descriptive Statistics.....	77
3.3	Hierarchical Generalized Linear Model Predicting Being Charged with a Crime.....	84
A.1	Phi Coefficients among Independent Variables for Females.....	99
A.2	Phi Coefficients among Independent Variables for Males.....	100
A.3	Phi Coefficients between Independent and Dependent Variables for Females.....	101
A.4	Phi Coefficients between Independent and Dependent Variables for Males.....	102
B.1	Annual Criminal Charge Incidence by Gender and Service Type.....	103
B.2	Cumulative Criminal Charge Prevalence by Gender and Service Type.....	104
B.3	Annual Incidence and Cumulative Prevalence of Youth Charged with a Crime at Each Age for Youth with a Diagnosis of Conduct Disorder or Substance Use Disorder.....	105

## LIST OF FIGURES

Figure		Page
2.1	Annual Criminal Charge Incidence by Gender and Service.....	56
2.2	Cumulative Criminal Charge Prevalence by Gender and Service Type.....	57
2.3	Incidence and Prevalence of Criminal Charge for People Diagnosed with Conduct Disorder or Substance Use Disorder.....	59
3.1	Estimated Growth Models.....	85

## CHAPTER I

### INTRODUCTION

There is a well-established overlap between youth who received mental health services and youth who have contact with the justice system. An analysis at a juvenile court in Washington State found that of the top 20% of users of juvenile detention days in one year, more than 70% of had received public mental health services within the same year (Pullmann et al., 2006). A study of youth who received publicly-funded mental health services found 69% of males and 46% of females were arrested before the age of 25 (Davis, Banks, Fisher, Gershenson, & Grudzinskas, 2007). Rosenblatt, Rosenblatt, and Biggs (2000) found that 20% of the youth in their study who had been served by the public mental health system at any time over the course of 38 months were also arrested at some point during that period.

Of particular concern in terms of contact with criminal justice are young adults with mental health problems who are transitioning into adulthood, because they face a combination of challenges. Criminal behavior peaks from 16 to 25 years of age (Ellis, 1990; Laub & Sampson, 2003), supportive youth-focused mental health services end at 18 or 19 years of age, and social policy for adults who violate social norms tends to be more punitive and reliant on the criminal justice system (Altschuler, 2005; Cooper, Puritz, & Shang, 1998). Hence, young adults with mental health problems are at a heightened risk of involvement with the legal system at the same time that they are losing other forms of support and are expected to demonstrate increased independence in living.

Social policy would therefore benefit from an identification of the additional criminal risk factors for young adults receiving mental health services in order to better target intervention and prevention efforts.

A review of the research literature in this area is more thoroughly discussed in each of the three following chapters. As these chapters will illustrate, the existing research on criminal contact for youth and young adults with mental health problems is scarce and incomplete. Existing research tends to lack information about the years of transition to adulthood and gendered patterns of offending, both of which have been well-established as important covariates when considering criminality. Additionally, most studies lump various types of criminal behaviors into one dependent variable, despite the likelihood that different types of crimes (for instance, violent crimes vs. property crimes) may have different predictors. Another gap in existing research is that it has rarely considered the predictive value of mental health treatment type. In particular, the relationships between forms of out-of-home treatment such as residential treatment and inpatient hospitalization with being charged with a crime are not well established. Finally, as discussed below, most research in this area has not utilized available analytical techniques to more fully describe and examine underlying longitudinal relationships. Few studies have taken a truly longitudinal approach to analysis. This dissertation is an attempt to address some of these gaps.

The following three chapters of this dissertation are stand-alone entities, intended as three individual articles worthy of publication in peer-reviewed journals. They address a related collection of research questions for youth receiving mental health services,



beginning with the overall question, “What variables are related to being charged with a crime during the transition to adulthood?,” and including several sub-questions, such as:

- How do these relationships differ for males and females?
- Do these relationships differ by offense type?
- What is the relationship between out-of-home services and being charged with a crime?
- How does the probability of being charged with a crime change with age and maturation?
- How do events such as entering and exiting out-of-home services affect the probability of being charged with a crime?

There is overlap among the questions and results within the following three chapters. This overlap is intended, as it is an attempt to examine the impact that choice of analytical methodology has on research results. The synthesis of these three papers, aside from their topical research question, also attempts to answer an implicit question: what happens when different analytical techniques and procedures (such as forms of statistical testing, sample selection, specificity of research question, and operationalization of variables) are applied to a collection of similar research questions?

Aside from the obvious differences among the analyzes in the following three chapters in terms of specific research question, sample selection, and analytical approach, lies a more subtle difference in terms of the definition and operationalization of *time*. A consideration of time and the discrete and continuous phenomena that occur within the context of time—beginning stages of a phenomenon, changes, growth, decline, ending—adds a deep complexity to any form of analysis. Since the 1980’s, social science has been

able to utilize truly longitudinal methods such as hierarchical linear modeling (Singer & Willett, 2003). Unfortunately the actual use of these methods has spread slowly. While we are currently witnessing growth in the application of truly longitudinal analytical methods in social science, certain topical areas that lend themselves to these forms of analysis, such as children's mental health, lag in application behind other areas such as education, which adopted these forms of analyses early and has instituted them in complex ways (see Raudenbush & Bryk, 2002 for a review). Hence, while the main goal of the three papers in this dissertation is to answer the collection of research questions generally under the umbrella of "What predicts being charged with a crime during the transition to adulthood for youth receiving mental health services?," a more subtle, meta-goal of this dissertation is to challenge children's mental health research to more appropriately consider the impact of time, and to address the possibly disparate and divergent findings that result from utilizing truly longitudinal methods. Additionally, by engaging in three different approaches, two of which had some prior application to the general research question, I intended to develop my own understanding of the impact of these approaches on the final product.

Research in the area of children's mental health and contact with the law has taken at least two general approaches to analysis. In the first general approach, researchers have applied cross-sectional techniques to large portions of time. For instance, Graves, Frabutt, and Shelton (2007) examined predictors of past contact with criminal courts for youth who were currently receiving mental health services. This study and others like it are discussed in more detail in the chapters below. Since this data was treated as cross-sectional, research opportunities to study the rate of and kind of change

over time are lost. There is no information on the youths' rates of contact with the courts over time, whether this was related to age, and whether it was related to receipt of mental health services. We only learn that youth who are in mental health services who possess certain characteristics (male, externalizing behaviors, etc.) were more likely to have had contact with the courts at some point prior in their lives. Although this approach is clear and easy to understand, it fails to utilize the richness of longitudinal data (Raudenbush, 2005; Singer & Willett, 2003).

In the second approach, a series of essentially cross-sectional analyses are repeated over time to assume a quasi-longitudinal analysis. For instance, repeated-measures ANOVAs have been used in the past in order to measure relationships between variables within persons while controlling for correlations between timepoints. Another interesting approach for dichotomous dependent variables has been to examine predictors for smaller periods of time over the course of several waves of data. Davis and colleagues (Davis et al., 2007) used this approach to examine the annual incidence of being charged with a crime for males and females in mental health services. This study is discussed in more detail in the chapters below. For now, what is important to convey is that, as in the cross-sectional analyses critique above, these forms of analysis say little about the rate and form of change over time both in the aggregate and for individual variation in growth trajectories. For example, Davis and colleagues were able to indicate the peak ages of being charged with a crime as indicated by total proportions of people, but in this study they were unable to describe or model the individual growth trajectories, or to indicate how these trajectories are concurrently related to static variables such as demographic factors or dynamic variables such as receipt of mental health services. Earlier work by

these researchers did establish truly longitudinal trajectory patterns of arrest among the sample (Davis, Banks, Fisher, & Grudzinskas, 2004), but this approach, too, was unable to model possible changes in trajectories due to individually time-varying events.

These two approaches are beneficial in that they are easier to complete and interpret than more complex longitudinal approaches, and they can validly answer certain research questions. However, as these examples are intended to demonstrate, these general approaches restrict the specific research questions that can be answered. With cross-sectional studies, we cannot examine the rate of change over time, whether these rates are linear or curvilinear, whether they vary among the population or are uniform, whether these rates are related to static variables or dynamic events, and whether these relationships are consistent or vary over time. It may be, for instance, that as a person ages the possible relationship between receipt of mental health treatment and being charged with a crime varies. No existing study examines this possibility.

Many variables that are treated as static within cross-sectional studies can be more flexibly applied in longitudinal studies. For instance, several studies (e.g. Graves et al., 2007; Rosenblatt et al., 2000; Scott, Snowden, & Libby, 2002) generally treat the receipt of mental health treatment as a static variable or as a static condition for sample selection—in other words, the youth either did or did not receive services, and was considered a “mental health utilizer” and selected for the study. However, youth often oscillate in and out of behavioral health services (Pullmann, Heflinger, & Satterwhite, unpublished manuscript), and this dynamic change in circumstance may be uniquely related to criminal contact—a possibility not considered by any existing study.

The three following chapters each take a different approach to specifying and answering the collection of research questions described above. Chapter II replicates and extends past work by modeling the cross-sectional relationships between demographic and clinical characteristics and being charged with a crime from age 16 to 25 years old. This chapter extends past work in several ways, including by building several models to predict several specific types of criminal charges. This analytical approach reveals the dual involvement of young adults in the mental health and criminal justice systems. Its correlational nature easily portrays the gross characteristics associated with criminal involvement for youth in the mental health system. However, this analysis does not provide any sort of examination of longitudinal change. Relationships among variables appear as static statistics, rather than the surely dynamic and complex relationships latent in the data.

The analytical approach in Chapter III more narrowly examines time through a quasi-longitudinal series of cross-sectional analyses. These analyses compare the group who had received out-of-home treatment while 16, 17, or 18 years old to the group who had not received this treatment on the annual proportion and cumulative annual proportion of youth who were charged with any crime. This analysis provides easy-to-understand and interpret empirical results. However, the complexity of longitudinal relationships are watered down; while in this chapter we gain an increased understanding of peak ages of offending, we do not have much sense of the rates of change, how these rates vary among individuals, and whether these rates of change are related to static and dynamic variables.

Chapter IV addresses some of these issues by utilizing hierarchical generalized linear modeling to model the predicted probabilities of being charged with a crime, week-by-week from age 16 to age 25. The main research question for this study examines whether there is a relationship between entering, being in, or exiting out-of-home treatment on probability of being charged with a crime. However, since this is a longitudinal model, it also examines the shape of the probability trajectories based on demographics, diagnoses, and age. This analysis considers how changes in probability of arrest are due to static factors and dynamic life events. This paper concludes with a model of hypothetical individuals' probabilities of offense from age 16 to 25 based on several interrelated factors.

The three analytical chapters of this dissertation provide a clear illustration of the varied and nuanced findings that result from applying different analytic methodology to answer a collection of important, rarely asked, and related research questions for youth receiving mental health services. Chapter V provides a conclusion, synthesizing the research findings and discussing their implications in light of the different analytical approaches.

## CHAPTER II

### PREDICTORS OF CRIMINAL CHARGES FOR YOUTH IN PUBLIC MENTAL HEALTH DURING THE TRANSITION TO ADULTHOOD

#### Chapter Abstract

Dual involvement with the mental health system and justice system is relatively frequent for young adults with mental health problems, yet the research on factors predictive of dual involvement is incomplete. This study extends past research on predictors of criminal charges for people in the public mental health system in four ways. First, this study expands the longitudinal study period to include the time of transition to adulthood, from 16 to 25 years of age. Second, this study separately predicts specific types of criminal charges, including violent, property, drug, and nuisance charges. Third, this study examines whether residential treatment or inpatient hospitalization are predictive of criminal charges. Fourth, this study stratifies prediction by gender. Findings indicated high levels of dual involvement during this time period. In general, males and people diagnosed with substance use disorder or conduct disorder were more likely to have a criminal charge. Other predictors of specific criminal charges varied by gender. Residential treatment, inpatient hospitalization, and anxiety disorder were generally not related to criminal charges. Implications for cross-system collaboration and early intervention are discussed.

## Literature Review

Youth who are receiving or who have received mental health services are at high risk of contact with the juvenile justice system. For instance, a study of youth who received publicly funded mental health services found 69% of males and 46% of females were arrested before the age of 25 (Davis et al., 2007). In another study by Rosenblatt, Rosenblatt, and Biggs (2000), 20% of the youth served by the public mental health system at any time over the course of 38 months were also arrested at some point during that period. An analysis at one juvenile court in Washington State found that of the top 20% of users of juvenile detention days in one year, more than 70% of them had received public mental health services within the same year (Pullmann et al., 2006).

Of particular concern are adolescents and young adults in the mental health and juvenile justice systems who are transitioning into adulthood. Criminal behavior peaks during late adolescence and young adulthood, roughly from 16 to 25 years of age (Ellis, 1990; Laub & Sampson, 2003; Stolzenberg & D'Alessio, 2007). Often, the institutional rules and regulations governing supportive services such as community mental health or child welfare are restricted by age. These services may end at 18 or 19 years of age, forcing an unwelcome institutional transition prior to the developmental transition into emotional maturity. Young adults in these situations are extremely vulnerable to negative influences from their neighborhood and peers, and developmentally are less able to control their impulses or plan for the future (Baltodano, Mathur, & Rutherford, 2005; Chung, Little, & Steinberg, 2005; Davis, 2003). During this time, the repercussions of violating the law suddenly become much more severe, as social policy for adults who



exhibit problematic behavior tends to be more punitive and reliant on the criminal justice system (Altschuler, 2005; Cooper et al., 1998).

Therefore, social policy would benefit from an identification of the risk factors for dual mental health and justice system involvement in order to better target intervention and prevention efforts. There have only been a few studies examining the longitudinal predictors of juvenile or adult justice system contact for youth who had received or were receiving services from the public mental health system. These studies have been inconsistent in their operationalization of dependent variables. Dependent variables generally indicating “criminal behavior” have included contact with the police, arrest, being detained or incarcerated, self-reported number of times they were asked to appear in court, and number of formal charges (often grouped together in the paper below under the term “offense” to facilitate discussion of consistent findings among the published research). These studies consistently report higher rates of offense in samples of youth who had received public mental health services when compared to the general population. Estimates range from 20% to 64% (Davis et al., 2007; Davis et al., 2004; Evens & Vander Stoep, 1997; Graves et al., 2007; Rosenblatt et al., 2000; Scott et al., 2002).

These six studies also found that, among youth with a history of mental health services, there were specific factors that predicted dual involvement. Just like in the general population, these studies generally found that males, African-Americans, Hispanics, older youth, and those with less education were more likely to offend. Within the mental health populations, disruptive disorders (conduct disorder and oppositional defiant disorder) and substance use were related to increased likelihood of offending.

Two studies found that, of youth who were receiving mental health services, those who had anxiety disorders were less likely to have criminal justice involvement (Evens & Vander Stoep, 1997; Rosenblatt et al., 2000), as opposed to studies of youth in juvenile detention, which found that youth with anxiety disorders were overrepresented in this population (Teplin, Abram, McClelland, Dulcan, & Mericle, 2002).

One other area of interest is whether dual involvement is more likely for people who received specialized, intensive out-of-home treatment such as inpatient hospitalization and residential treatment. Only one of the studies of the publicly-funded mental health population included these variables in their analysis. Davis and colleagues (2004) included the number of out-of-home placements and the number of hospitalizations as potential predictors of arrest, but found no relationships. However, a study of youth in an inpatient hospitalization program found that 44% had a history of juvenile justice involvement (Cropsey, Weaver, & Dupre, 2008). This study also found predictors of past juvenile justice involvement similar to those described above. Among other variables, these included being male, using drugs, and being diagnosed with conduct disorder or oppositional defiant disorder.

In general, findings on the short- and long-term justice system involvement for youth who have been served in out-of-home treatment are unclear and contradictory. There are no major studies from the United States that examine whether youth served by the justice system are more likely to have received or to receive out-of-home treatment for mental health problems. A few studies have found improvements in violent and criminal behavior after receiving residential treatment (Cathcart-Shabat, Lyons, & Martinovich, 2008; Hooper, Murphy, Devaney, & Hultman, 2000; Huefner, Ringle,

Chmelka, & Ingram, 2007; Lee & Thompson, 2008). Conversely, some empirical evidence demonstrates negative outcomes from out-of-home care when compared to other forms of care, including increased problems with the law, increased arrests, increased criminal referrals, and increased time in detention (Barth et al., 2007; Chamberlain & Reid, 1998; Ryan, Marshall, Herz, & Hernandez, 2008). However, these studies suffer from methodological issues and selection criteria that limit the conclusions regarding long-term results for youth in out-of-home mental health treatment. This work came from populations and settings that may be quite different than mental health treatment—specifically, residential treatment facilities that were designed to provide an alternative to detention for youth in juvenile justice.

To summarize, there have been a few studies of predictors of dual involvement in the mental health and juvenile justice system for youth with mental health problems. There has also been some contradictory work examining the criminal contact for youth who experienced out-of-home treatment. Clearly, there are gaps in this research and there is a need for further work to confirm and extend these findings. Only two of the studies predicting dual involvement considered the years of transition into adulthood, a period of heightened risk that needs increased attention. Though research consistently indicates gendered patterns of offending and expression of mental health problems, only two of the studies analyzed genders separately. Finally, none of the studies considered the likely possibility that predictors varied by type of crime. Violent crimes, property crimes, drug crimes, and nuisance crimes, as four examples, are very different expressions of behavior that are likely tied to different antecedents.

The purpose of the current study is to extend past work on the predictors of dual mental health system and justice system involvement for young adults in the mental health population in the following ways: 1) confirm past findings using a new dataset; 2) include the years of transition to adulthood up to age 25; 3) include inpatient hospitalization and residential treatment as possible predictors of criminal charge; 4) conduct analyses stratified by gender; 5) conduct analyses separately by type of charge.

## Methods

### *Research Questions*

This study examines the relationship between receipt of mental health services during the transition to adulthood and criminal charges over the same period of time. Specifically,

1. Do the previously established relationships between the characteristics of people receiving mental health services and their involvement in the justice system replicate in this sample such that:
  - a. Males and African-Americans are more likely to be charged with a crime; and,
  - b. Those diagnosed with conduct disorder or a substance use disorder are more likely to be charged with a crime, and those diagnosed with anxiety disorder are less likely to be charged with a crime.

2. Are those who received residential treatment and/or inpatient hospitalization during the transition to adulthood any more likely to be charged with a crime over the same period of time?

3. What demographic and diagnostic variables are related to specific categories of charges, including violent charges, drug charges, nuisance charges, and property charges?

The current study examines these questions stratifying by gender, because the published literature has consistently revealed that pathways to offending, experiences with the justice system, and expression of mental health problems are influenced by gender (Feld, 2009; Graves et al., 2007; Johansson & Kempf-Leonard, 2009; Ritakallio, Kaltiala Heino, Kivivuori, Luukkaala, & Rimpela, 2006; Teplin et al., 2002; Tracy, Kempf-Leonard, & Abramoske-James, 2009).

#### *Data Source*

This study is a secondary analysis of existing data. Utilizing the existing public mental health and justice system datasets that have been developed since computers became commonly available is an excellent option for examining longitudinal system contact (Saunders & Heflinger, 2004). The current data are from a statewide cohort of people born between 1978 and 1979 who received publicly-funded mental health and case management services through the Massachusetts DMH at some point in 1994, 1995, or 1996, and who had a recorded diagnosis for a mental health disorder ( $N = 423$ ). Participants were selected from 1994 to 1996 because this was considered a period during which this dataset was well maintained, and it allowed a proportionally high number of

clients to reach their 25<sup>th</sup> birthday by the time data were collected from the justice system. This is a subset of a dataset that has been described elsewhere (Davis et al., 2007; Davis, Fisher, Gershenson, Grudzinskas, & Banks, in press).

The data for this study came from two sources. The first source was the Massachusetts Department of Mental Health (DMH) management information system. This is the system used by the DMH to monitor client eligibility, service usage, and other records. In 1994 there was a statewide overhaul and improvement of the system's data recording procedures; hence, this study utilizes DMH data from 1994 through March of 2006, and filters these data to only include information for each individual from ages 16 to 25. For the purposes of this study, the DMH dataset provided data on the participant's gender, birthday, ethnicity, diagnosis, service type, and service date. The second source was the state of Massachusetts' Criminal Offender Record Information system (CORI), which recorded juvenile and adult justice system data. CORI includes data on charges and arraignment, also filtered for this analysis to only contain information from when the person was 16 to 25 years old. These data were from the same time period as the mental health system data, so justice system involvement could have occurred prior to or concurrent with mental health system involvement. Because the mental health system data prior to the 16<sup>th</sup> birthday is inconsistent, we cannot know whether the individual received mental health or justice system services first. However, since youth were identified through the mental health system, the vast majority of criminal contact that is included in this dataset occurred after initial mental health system involvement. This approach is similar to that taken in prior research (e.g. Davis et al., 2004; Evens & Vander Stoep, 1997; Graves et al., 2007; Rosenblatt et al., 2000).

*Variables.* The variable from the CORI database that used in this analysis was type of charge. Charges were included as any charge, and were broken up into four categories including serious violent charges, drug charges, serious property charges, and nuisance charges. Status offenses were not included. Variables from the DMH database used in this analysis include gender, date and type of services received, DSM-IV diagnoses (American Psychiatric Association, 2000), and date of diagnosis. Service type was categorized into inpatient hospitalization, residential treatment, and non-out-of-home service. Service types are treated as individual variables, so participants could have both inpatient and residential treatment. Residential treatment has been defined many ways in the literature. In this study, residential treatment consisted of long term placements in group homes, short term crisis placements in group homes, and therapeutic foster care. Inpatient hospitalization included hospitalizations for mental health or substance use treatment. Neither residential treatment nor inpatient hospitalization was court mandated or an alternative to detention.

Diagnosis was grouped into several categories: 1) mood disorders included diagnoses such as major depressive disorder, dysthymic disorder, and bipolar disorder; 2) a substance use disorder (SUD) included abuse or dependence on any drug excluding nicotine (because mental health treatment was only provided in cases with a mental health diagnosis, diagnoses of substance abuse were always co-occurring with mental health diagnoses); 3) impulse control disorders included all impulse disorders not classified elsewhere in the DSM-IV, such as intermittent explosive disorder, kleptomania, and pyromania; 4) personality disorders included diagnoses such as borderline personality disorder, paranoid personality disorder, and obsessive-compulsive personality

disorder; 5) anxiety disorders included diagnoses such as generalized anxiety disorder and panic disorder; 6) developmental disorders included diagnoses such as mental retardation and autism; 7) learning disorders included diagnoses such as reading disorder or mathematics disorder; 8) attention deficit disorder and attention deficit hyperactivity disorder were grouped together; 9) conduct disorder (CD) and oppositional defiant disorder were grouped together as “conduct disorder”; 11) adjustment disorders were grouped into one category; and 12) post traumatic stress disorder had its own grouping. While the diagnostic variables were useful, this data did have some idiosyncrasies limiting their utility. First, diagnoses were made by clinical staff at mental health service provider agencies as part of billing and record management; hence this data is likely influenced by human biases and subjective interpretations of behavior. As in any public mental health system, diagnoses may have been given prior to a full and considered assessment period in order to obtain public funding for services. Second, diagnoses may have been given at any point in the timeframe, so they may have occurred long before or after being charged with a crime. Third, while data from the majority of service providers contained diagnostic information during the entire timeframe, a few providers may have overwritten previous diagnoses when new diagnoses were made. Unfortunately, due to the limitations of utilizing existing datasets it is difficult to ascertain the extent of this problem, although exploration of the data indicated that the vast majority of the sample had recorded diagnoses on multiple occasions, and it appeared that this issue was minor.



## *Sample*

Participants were eligible for services through DMH if they were under age 19 and a determination was made that they had a diagnosis that affected their functioning in at least two life domains (for instance, home, school, or employment) that had lasted, or was expected to last, at least a year (Davis et al., 2007). Eligibility criteria changed slightly in 1996 to also require a score of 80 or higher on the Child and Adolescent Functional Assessment Scale (Hodges, 2005). Descriptive statistics for the sample are depicted in Table 1.1. Individuals could have multiple diagnoses or services, so these columns add to more than 100%. Pearson chi-square tests were run in order to emphasize variables on which genders differed. The overall sample was approximately 77% white, 9% African-American, 9% Hispanic, 5% another race, and 0.5% of the data on race was missing. There were 211 females and 212 males. The most common diagnostic category was mood disorders, with 83% of females and 62% of males receiving a diagnosis in this category. Of those diagnoses that have been found to be related to criminal offense in other analyses, 23% of males and 11% of females had been diagnosed with CD or oppositional defiant disorder, 23% of males and 17% of females had been diagnosed with a SUD, and 11% of males and 6% of females had been diagnosed with an anxiety disorder. Between 16 and 25 years old, approximately the same proportion of females and males received only non-out-of-home services (37% of females and 31% of males), residential treatment (47% of females and 53% of males), inpatient hospitalization (48% for females and 51% for males), and both residential and inpatient (33% for females and 35% for males).<sup>1</sup>

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<sup>1</sup> A total of 21.3% of the cases are missing any data on specific service utilization, although these cases do have demographic and other information in the dataset. Through conversations with the data manager at the

*Institutional Human Subjects Research Protections*

The initial study in which the data were collected received review and approval by three bodies, including Vanderbilt University's Institutional Review Board, the University of Massachusetts medical school institutional review board, the DMH Central Office Research Review Committee (for DMH data retrieval), and the Massachusetts Criminal History Systems Board (for CORI data retrieval).

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Department of Mental Health, it was determined that these cases had entered DMH, but not received inpatient hospitalization, residential treatment, or case management. This was a result of early conversions to the new computerized record system, a brief period of time when inpatient hospitalization, residential treatment, and case management were the only services that were specifically recorded. They had received unrecorded, less-intensive services through the public school system, private mental health treatment, or the Department of Social Services. Analyses indicated that these cases were significantly more likely to have a diagnosis related to learning disorders and significantly less likely to have been diagnosed with severe disorders such as thought disorders, personality disorders, and substance use disorders. This lends support to the idea that these youth likely received services through the public school system or less-intensive alternatives. Thus, these youth were classified as receiving only non-out of home services.

Table 1.1. Descriptive Statistics

Variable	Female <i>n</i> (%) ( <i>n</i> = 211)	Male <i>n</i> (%) ( <i>n</i> = 212)	Total <i>n</i> (%) ( <i>N</i> = 423)
<b>Race/Ethnicity</b>			
White	167 (79.1)	158 (74.5)	325 (76.8)
African American	17 (8.1)	20 (9.4)	37 (8.8)
Hispanic	13 (6.2)	23 (10.8)	36 (8.5)
Other	14 (6.6)	9 (4.2)	23 (5.4)
Unknown/missing	0 (0)	2 (0.9)	2 (0.5)
<b>Diagnosis 16-25</b>			
Mood disorder***	176 (83.4)	131 (61.8)	307 (72.6)
PTSD***	108 (51.2)	48 (22.6)	156 (36.9)
Thought disorder***	30 (14.2)	74 (34.9)	104 (24.6)
Conduct disorder/ODD**	24 (11.4)	48 (22.6)	72 (17.0)
ADD/ADHD***	19 (9.0)	53 (25.0)	72 (17.0)
Substance use disorder	36 (17.1)	49 (23.1)	85 (40.2)
Impulse control disorder	11 (5.2)	18 (8.5)	29 (6.9)
Personality disorder*	39 (18.5)	23 (10.8)	62 (14.7)
Anxiety disorder*	12 (5.7)	24 (11.3)	36 (8.5)
Developmental disorder*	10 (4.7)	21 (9.9)	31 (7.3)
Adjustment disorder	13 (6.2)	10 (4.7)	23 (5.4)
Learning disorder*	1 (0.5)	9 (4.2)	10 (2.4)
Eating disorder***	10 (4.7)	0 (0)	10 (2.4)
Other diagnosis	26 (12.3)	38 (17.9)	64 (15.1)
<b>MH Services received 16-25</b>			
Non-out-of-home only	79 (37.4)	67 (31.6)	146 (34.9)
Residential	99 (46.9)	112 (52.8)	211 (49.9)
Inpatient hospitalization	102 (48.3)	107 (50.5)	209 (49.4)
Residential and Inpatient	69 (32.7)	74 (34.9)	143 (33.8)

Between-gender  $\chi^2$  tests: \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

### Analysis

Standard univariate and bivariate data screening and examination preceded analysis.<sup>2</sup> Several bivariate crosstabulations with chi-square tests were run examining the relationship of any charge to the independent variables described above. All of these

<sup>2</sup> Phi coefficients (analogous to correlations between two bivariate variables) were run for all combinations of dependent and independent variables by gender in order to describe the interrelationships among these variables. These phi coefficients are depicted in the Appendix in Table A.1 through Table A.4. As described in the text, crosstabulations were also run. These crosstabulations do not differ from the phi coefficients in terms of significance. Both were run, however, because the phi coefficients express the relationships in a more concise manner and are easier to depict in a single table for purposes of data screening, while the crosstabulations replicate previously published work by other projects.

analyses were stratified by gender. Variables that were significant at  $p < .15$  in the bivariate analyses were included in separate logistic regression models to predict any criminal charge. The reason for this relatively lenient level of significance was to strike a compromise between the possibility of two undesirable actions: a) overfitting the model by including all possible predictors, or b) not statistically controlling for potentially confounding variables (Hosmer & Lemeshow, 2000). This compromise assisted in the creation of parsimonious, yet acceptably fitting, models.

After the multivariate model was fit, each variable was examined to ensure that its individual Wald statistic was significant, and to compare each coefficient in the multivariate model to the coefficient from a model containing only that variable. Based on these statistics, variables not contributing to the data at least at the significant  $p$ -value of .15 were removed from the multivariate model and the model re-run. Any coefficients that changed dramatically in magnitude between the new and old model were examined carefully for the possibility that an excluded variable was important to the analysis. This process was repeated until a preliminary main effects model was developed for each dependent variable, stratified by gender, maximizing fit while minimizing the risk of overfitting the data.

Standard diagnostics were performed on the preliminary final model to assess its fit, including the Hosmer-Lemeshow goodness-of-fit measure and the area under the Receiver Operating Characteristic (ROC) curve (Hosmer & Lemeshow, 2000).<sup>3</sup>

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<sup>3</sup> The Hosmer-Lemeshow goodness-of-fit measure is a statistic of the difference between the observed and predicted values. It has a chi-square distribution, so it can be used to test whether the observed and predicted values significantly differ from each other. A significant Hosmer-Lemeshow goodness-of-fit statistic indicates a poorly fitting model. The area under the Receiver Operating Characteristic (ROC) curve was also calculated. This measure ranges from zero to one, and indicates the model's ability to discriminate those who were charged with a crime from those who were not. A score of .5 would indicate 50/50 odds of discriminating, hence a model which is no better than chance at predicting offense. ROC scores of .7 or

Coefficients for the final models are presented as Odds Ratios (OR) rather than Wald statistics in order to ease interpretation.<sup>4</sup>

## Results

As indicated in Table 1.2, and consistent with past research, males were significantly more likely to be charged overall and for all subtypes of charges. Overall, 59% of males and 46% of females were charged with a crime at least once from 16 to 25 years of age.

Table 1.2. Percentage of Males and Females with Charges, 16 to 25 Years of Age

	Female <i>n</i> (%) ( <i>n</i> = 211)	Male <i>n</i> (%) ( <i>n</i> = 212)	Total <i>n</i> (%) ( <i>N</i> = 423)
Any Charge**	97 (46.0)	125 (59.0)	222 (52.5)
Serious Violent Charge***	42 (19.9)	78 (36.8)	120 (28.4)
Drug Charge*	25 (11.8)	44 (20.8)	69 (16.3)
Serious Property Charge**	47 (22.3)	72 (34.0)	119 (28.1)
Nuisance Charge***	40 (19.0)	75 (35.4)	115 (27.2)

\*  $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

Table 1.3 indicates the characteristics of males and females who were charged with a crime, compared to males and females who only received mental health services.

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higher are considered acceptable discrimination; scores of .9 or higher are considered outstanding. Ideal models are well-calibrated (as indicated by the goodness-of-fit statistic) and have good discrimination (as indicated by the area under the ROC curve).

<sup>4</sup> The OR indicates the odds of an event occurring (in this case, being charged with a crime) to an individual within a group (for instance, having a certain diagnosis) in relation to the odds of the event occurring to people not within the group (Hosmer & Lemeshow, 2000). An OR of 1.5 for a group would indicate that members of that group have an odds of being charged with a crime which is 1.5 times or 50% higher than the odds of being charged with a crime for non-members. Odds ratios below 1.0 indicate that being charged with a crime is less likely to happen for members of that group, and these OR's are interpreted with a slight difference. An OR of .25 means that the odds of being charged for members of the group are 75% less than the odds of being charged for non-members. The scale of change in effect size below 1.0 is different than the scale of change above 1.0—numbers below 1.0 represent increasingly large effect sizes as they decrease. Hence, an OR of .75 is equal in effect size to an OR of 1.33, an OR of .5 is equal in effect size to an OR of 2.0, and an OR of .25 is equal in effect size to an OR of 4.0.

In general, the within-gender groups were fairly similar to each other. There were no significant differences on race or on types of mental health services received from ages 16 to 25. For both females and males, having been in residential treatment, inpatient hospitalization, or both was not related to being charged with a crime. Males and females diagnosed with CD and a SUD were significantly more likely to be charged with a crime. Males, but not females, diagnosed with impulse control disorders were significantly more likely to be charged with a crime. And males, but not females, diagnosed with anxiety disorders were significantly less likely to be charged with a crime. Very few females were diagnosed with a learning disorder, and no males were diagnosed with eating disorders, so these variables were removed from further analyses respective to gender. Similar bivariate analyses were conducted for all types of charges and these bivariate analyses were used to determine initial predictors in the model building process; because of space considerations these bivariate results are not described here but can be found in Appendix A in Tables A.1 through A.4.

As described above, model building proceeded through an iterative process, beginning with bivariate analyses and continuing through building multivariate logistic regression models, individually removing variables not contributing to the model based on their individual coefficients, the model  $\chi^2$  change, and the strength of their influence on coefficients for other variables in the model. Because it is a primary focus of this study, it should be emphasized that residential treatment, inpatient hospitalization, and non-out-of-home treatment were not included in most models due to insignificance at  $p > .15$  in the bivariate analyses. In other words, receiving out-of-home treatment was generally not related to being charged with any crime or specific types of crimes.

Residential treatment and inpatient hospitalization variables were included in the initial and final models for female drug charge and the initial model for male nuisance charge.

Table 1.3. Characteristics of those who were Charged with a Crime Versus those not Charged with a Crime, Reported in Percentages

Variable	Females		Males	
	Mental Health Only % (n = 114)	Any Charge % (n = 97)	Mental Health Only % (n = 87)	Any Charge % (n = 125)
<b>Race</b>				
White	80	78	72	76
African American	9	7	8	10
Hispanic	6	6	13	10
Other	5	8	6	3
<b>Diagnosis</b>				
Mood disorder	83	85	60	63
PTSD	48	55	23	22
Thought disorder	16	12	41	30
Conduct disorder/ODD	7	17*	14	28*
ADD/ADHD	11	7	22	27
Substance use disorder	11	24*	14	30*
Impulse control disorder	5	5	2	13*
Personality disorder	19	18	10	11
Anxiety disorder	6	5	17	7*
Developmental disorder	3	7	13	8
Adjustment disorder	6	6	6	4
Learning disorder	1	0	5	4
Eating disorder	7	2	-	-
<b>MH Services 16-25</b>				
Non-out-of-home only	40	35	31	32
Residential	46	49	53	53
Inpatient hospitalization	47	50	51	50
Residential and Inpatient	33	33	35	35

\*Within-gender  $\chi^2$  significant,  $p < .05$

### *Predicting female dual system involvement*

Table 1.4 depicts four final models predicting female criminal charge. The model for one dependent variable, serious property charge, is not depicted here because the best

model had a poor fit and poor discrimination, with not a single independent variable significantly related at  $p < .05$ .

The final model predicting any charge for females was significant ( $\chi^2_{(3, 211)} = 14.8, p = .002$ ). Females diagnosed with CD had an odds of receiving any charge which was three times greater than females not so diagnosed. Females diagnosed with a SUD had nearly three times the odds of a charge compared to those without this diagnosis. Being diagnosed with a developmental disorder was not statistically significant at  $p < .05$ , but it did add value to the overall utility of the model. Receiving inpatient hospitalization and residential treatment was not significantly related to being charged with a crime. None of the variables on race and no other diagnostic indicators were significant.

The final model predicting being charged with a violent crime was significant ( $\chi^2_{(3, 211)} = 28.6, p < .001$ ). Being diagnosed with CD increased the odds of receiving a charge for a violent crime by more than five times, a SUD diagnosis by more than five times, and a developmental disorder by nearly nine times. Receiving inpatient hospitalization and residential treatment was not significantly related to being charged with a violent crime. None of the variables on race and no other diagnostic indicators were significant.



Table 1.4. Logistic Regression Predicting Female Criminal Charge, Final Models

Variable	Any charge		Violent charge		Drug charge		Nuisance charge	
	OR <sup>1</sup>	95% CI <sup>2</sup>	OR	95% CI	OR	95% CI	OR	95% CI
Conduct dx	3.14*	1.26, 7.86	5.42***	2.02, 14.54				
Substance use dx	2.92**	1.37, 6.23	5.37***	2.27, 12.70	3.61*	1.33, 9.82	3.18**	1.43, 7.11
Developmental dx	2.98	0.73, 12.26	8.79**	2.14, 36.04				
Inpatient hospitalization					0.35*	0.14, 0.90		
Post traumatic stress dx							1.83	.89, 3.78
$\chi^2$ statistic		14.84		28.60		8.99		10.07
<i>df</i>		3		3		2		2
-2 log-likelihood		276.3		182.0		144.57		194.85
Model significance		.002		<.001		.011		.006
H-L test ( $\chi^2, p$ )	.023	.88	.033	.86	.005	.998	.379	.827
Area under ROC ( <i>se</i> )		.62 (.04)		.71 (.05)		.66 (.06)		.65 (.05)

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

<sup>1</sup> Odds Ratio

<sup>2</sup> Confidence Interval

The final model predicting being charged with a drug crime was significant, ( $\chi^2_{(2, 211)} = 8.99, p = .011$ ). Being diagnosed with a SUD increased the odds of receiving a charge for a drug crime by more than three times. Having received inpatient hospitalization treatment decreased the odds by 65%. Receiving residential treatment was not significantly related to being charged with a drug crime. None of the variables on race, and no other diagnostic or service variables were significant.

The final model predicting being charged with a nuisance crime was significant, ( $\chi^2_{(2, 211)} = 10.07, p = .006$ ). Being diagnosed with a SUD increased the odds of receiving a charge for a nuisance crime by more than three times. Being diagnosed with PTSD was not statistically significant at .05, but did improve the overall model. Receiving inpatient hospitalization and residential treatment was not significantly related to being charged with a nuisance crime. No other variables on race or diagnoses were significant.

#### *Predicting male dual system involvement*

Table 1.5 depicts four models predicting male criminal charge. As with females the model for one dependent variable, serious property charge, is not depicted here. In this case, the best model had a poor fit and poor discrimination, and only a single independent variable significantly, developmental disabilities, related (negatively) at  $p < .05$ .

Table 1.5. Logistic Regression Predicting Male Criminal Charge, Final Models

Variable	Any charge		Violent charge		Drug charge		Nuisance charge	
	OR <sup>1</sup>	95% CI <sup>2</sup>	OR	95% CI	OR	95% CI	OR	95% CI
Conduct dx	2.89**	1.36, 6.16	2.24*	1.13, 4.41				
Substance use dx	3.35**	1.58, 7.09	2.33*	1.17, 4.63	3.48***	1.62, 7.47	2.56**	1.32, 4.97
Developmental dx							0.22*	0.49, 0.98
Impulse control dx	7.65**	1.66, 35.3	3.42*	1.21, 9.61				
Anxiety dx	0.42	.17, 1.08			0.15	0.02, 1.15		
ADD/ADHD			1.72	0.88, 3.33				
African-American					3.39*	1.12, 10.3		
Thought disorder					0.37*	0.16, 0.86		
$\chi^2$ statistic		30.41		16.66		22.90		16.00
<i>df</i>		4		4		4		2
-2 Log-likelihood		256.63		262.27		193.63		259.49
Model significance		<.001		.002		<.001		<.001
H-L test ( $\chi^2, p$ )	3.74	.44	0.93	.92	0.70	.952	0.01	.999
Area under ROC ( <i>se</i> )		.71 (.04)		.67 (.04)		.71 (.04)		.63 (.04)

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\* $p < .001$

<sup>1</sup> Odds Ratio

<sup>2</sup> Confidence Interval

The model predicting any charge for males was significant, ( $\chi^2_{(4, 212)} = 30.4, p < .001$ ). Males diagnosed with impulse control disorders had more than seven times the odds of any offense. Males diagnosed with a SUD had more than three times the odds of any charge. Males diagnosed with CD had nearly three times the odds of any charge. Anxiety disorder was negatively related to any charge, though not at the .05 level, although it did contribute to the fit and discrimination of the model. Receiving inpatient hospitalization or residential treatment was not significantly related to being charged with a crime. No other race or diagnosis variables were significant.

The model predicting violent charge was significant ( $\chi^2_{(4, 212)} = 16.7, p = .002$ ). Males diagnosed with impulse control disorders had more than three times the odds of being charged with a violent crime. Males diagnosed with a SUD or CD had more than two times the odds of being charged with a violent crime. ADD/ADHD contributed to the fit and discrimination of the final model, though it was not significant at the .05 level. Receiving residential treatment or inpatient hospitalization was not significantly related to being charged with a violent crime. No variables on race and no other diagnosis variables were significant.

The model predicting being charged with a drug crime was significant ( $\chi^2_{(4, 212)} = 22.9, p < .001$ ). Males diagnosed with a SUD were more than three times as likely to be charged with a drug crime. African-American males had three times greater odds of being charged with a drug crime than all other races in the study. Being diagnosed with a thought disorder decreased the odds of being charged with a drug crime by 63%. Anxiety disorder contributed to the fit and discrimination of the final model and appeared to be related to decreased odds of being charged with a drug crime, though it was not

significant at the .05 level. Receiving inpatient hospitalization and residential treatment was not significantly related to being charged with a drug crime. No other diagnosis variables were significant.

The model predicting being charged with a nuisance crime for males was significant ( $\chi^2_{(2, 212)} = 16.0, p < .001$ ). Males diagnosed with a SUD had more than twice the odds of being charged with a nuisance crime. Males diagnosed with developmental disorders had odds of being charged with a nuisance crime less than 78% that of males not diagnosed with developmental disorders. No other diagnosis variables were significant. Receiving inpatient hospitalization and residential treatment was not significantly related to being charged with a nuisance crime.

Every model described above revealed poor to borderline acceptable discrimination as indicated by the area under the receiver operating characteristic (AUROC) curve. These statistics are depicted in the tables. More saturated models that were run earlier in the model-building process (not shown) were slightly better at discriminating offenders from non-offenders. However, these models were considered no better fitting in terms of likelihood-change statistics, and the individual variables were often not significant even at the  $p < .15$  level. Hence, the final models depicted in Tables 1.4 and 1.5 were considered the most parsimonious and useful models possible given this particular data and modeling approach.

## Discussion

The current study supports and extends prior research examining the relationship between receipt of mental health services during the transition to adulthood and criminal

charges over the same period of time. This paper is the first analysis of dual involvement in the public mental health and justice system in the United States that accomplishes four goals: 1) follows all individuals from adolescence into young adulthood (16 to 25 years old), the most common offense period, 2) includes inpatient hospitalization and residential treatment as potential predictive factors, 3) stratifies analyses by gender, and 4) predicts subcategories of criminal charges.

For the first research question, this study examined whether previously established predictors of justice system involvement replicated in this sample. The third research question extended this work by asking about specific charges, including violent, drug, nuisance, and property charges. Past research has indicated that, for the population of people receiving mental health services, predictors of any criminal involvement include being male, being African-American, being diagnosed with CD, and using substances or having a SUD, while being diagnosed with anxiety disorder decreased the risk of criminal involvement (Davis et al., 2007; Evens & Vander Stoep, 1997; Graves et al., 2007; Rosenblatt et al., 2000; Scott et al., 2002).

Many of these relationships replicated in this sample. Males were much more likely to be charged with a crime overall. The most commonly predictive variable for both genders was substance use disorders. Not surprisingly, having been diagnosed with a SUD was significantly related to an increased odds of a drug charge, but it was also related to an increased odds of most types of charges for both genders, including violent charges, and nuisance charges (property charges were not satisfactorily modeled, so the discussion below concerns the bivariate relationships with property charge). Substance use disorders were unrelated to property charges. Conduct disorder was related to any

charge or to violent charges for both males and females, but surprisingly was not related to drug charges or nuisance charges for either gender, even in bivariate analyses. In bivariate analyses, it was positively related to property charge for males but not females. These results may challenge a growing belief that CD is the best diagnostic predictor of offense, as it was not predictive for all offense types. Substance use and conduct disorder may be related to criminal involvement for many reasons. Clearly, the use of illicit substances is illegal (drug charges), but substance use may be related to aggressive behavior (violent charges) or lapses in judgment and decision-making (nuisance charges). Additionally, being diagnosed with a SUD may be related to severity of disorder; all cases diagnosed with SUD in this dataset were co-occurring with other mental health diagnoses. Finally, because diagnosis was made by a clinician, SUD and CD may be indicative of the clinician's belief that the youth has had problems with law enforcement or is likely to have problems with law enforcement. In other words, since diagnosis may have occurred at any time during the timeframe, these variables may have been related to criminal charge retrospectively, or as a result of clinician's knowledge of past criminal behavior, rather than being predictive of future behavior.

Other diagnoses not consistently found to be related to justice system involvement were found to be significant in this study. Impulse control disorders (excluding ADD and ADHD) were significantly predictive of increased odds of any charges and violent charges for males. These disorders were not related to any female offending, and were not related to any other type of charge for males. Developmental disorders were differentially related to offense by gender. For females, developmental disorders strongly increased the odds of violent charge. For males, being diagnosed with a developmental

disorder decreased their odds of receiving a nuisance charge. However, these results need to be considered with extreme caution as they may be spurious, as supported by the large confidence intervals for that variable and the consideration that only a few females had a diagnosis of developmental disorder.

Research on juvenile mental health populations has found that non-whites are more likely to have criminal involvement (Evens & Vander Stoep, 1997; Scott et al., 2002). One study found ethnicity to be predictive of criminal involvement for females in the mental health system but not for males (Graves et al., 2007). In the current study, the only significant factor related to race was that male African Americans had increased odds of receiving a drug charge. Additionally, two studies have shown anxiety disorder to be related to decreased odds of offense (Evens & Vander Stoep, 1997; Rosenblatt et al., 2000). In the current study, being diagnosed with an anxiety disorder was not a significant predictor in any of the models at .05, although it did have a nonsignificant negative effect for males in regards to any charge and drug charge.

The second research question asked whether inpatient hospitalization and residential treatment were predictive of dual involvement, and the third research question asked if these were related to specific categories of charges. This study also adds to the limited and contradictory findings on the criminal outcomes of youth who received residential treatment or inpatient hospitalization. This study indicates that youth who received these out-of-home treatments are of no greater risk of being charged with a crime than youth in the general mental health population. Residential treatment was not significantly related to criminal charges for either gender. Inpatient hospitalization was only significant in one model. It was related to *decreased* odds of being charged with a



drug crime for females. In the bivariate analysis, inpatient hospitalization was related to increased odds of being charged with a nuisance crime for males, but this relationship did not remain when controlling for other variables in the model. No other charges were related to inpatient hospitalization. Since this may be the first study of this relationship into adulthood it is unclear why these results were found, but there may be several reasons. It may be that the types of problems and events that steer a person into hospitalization or residential treatment are not strongly related to law breaking, and vice-versa. Or, the intensive treatment offered in these settings could be effective at improving functioning post-discharge. A review of the research has concluded that youths' functioning improves after receiving residential treatment (Hair, 2005), though alternative forms of treatment often show better outcomes (Barth et al., 2007; Ryan et al., 2008). Criminal outcomes following inpatient hospitalization have received little attention (Cropsey et al., 2008). Another possible reason for these findings is that the restrictiveness of these settings could act to isolate these individuals from opportunities to offend.

While all of the models in this study were well-calibrated, as indicated by the non-significant Hosmer-Lemeshow statistics and the significant model  $\chi^2$ s, all of the models had borderline acceptable or relatively poor discrimination at predicting whether individuals would be charged as indicated by the AUROC. The AUROC scores ranged from .63 to .71, essentially indicating that the models correctly predicted between 63% and 71% of those who were charged with a crime, which is slightly better than chance. While initially this may seem discouraging, it is on par with existing published research. Of the six studies described earlier that model dual system involvement, only three do so

in ways predicting that involvement, and only two of these present data on discriminatory ability. Graves, Frabutt, and Shelton (2007) provided statistics on the AUROC curve for their study. Though their models included a much larger sample size and many more variables, discrimination was roughly equivalent to the current study. Their models correctly predicted 68% of dually-involved males and 74% of dually involved females, compared to correctly predicting any charge in 71% of males and 62% of females in the current study. Similarly, Evens and Vanderstoep (1997) provided sensitivity and specificity detail at three possible cutpoints for prediction of any contact with the juvenile justice system, while grouping males and females. Using these same cutpoints, the current study approaches their predictive levels for females and surpasses it for males.

The discriminatory ability in all of these studies is likely due to a number of reasons. In the current study, all predictors were dichotomous, limiting the possible range of predictive factors into categorical groupings. Diagnoses were made by individual therapists rather than standardized instruments, likely contributing to significant error variance (although grounding the data in real-world practice). A standardized, continuous measure of functioning would have added significant statistical value to this study. However, few public mental health catchment areas have engaged in long-term standardized data collection procedures that include such measures. Therefore, this study may be more useful to policy makers and practitioners than highly controlled studies with elaborate measures, as the current study utilizes real-world data likely to be present in any modern public mental health system. The most likely cause of poor discriminatory ability for the current and past studies, however, is the simple fact that change occurs over time. In other words, the broad timeline in all of these studies results in weak

predictive ability, similar to how predicting the weather becomes more difficult within a long timeframe. Prediction suffers from a lengthening causal or correlational chain after mental health contact and other potential antecedents to criminal contact occur.

### *Limitations*

There are limitations of this dataset, as in any secondary analysis of existing data obtained through management information systems. This study may not be generalizable to other states, as there is great variability in criminal justice policy and mental health service provision across the United States. The DMH data prior to a 1994 overhaul were inconsistently collected and reported by the myriad of individual service providers throughout the state; hence, the current study does not use any DMH data prior to 1994. Therefore, there is no way of ensuring whether the true “first contact” with the system was through mental health or criminal justice. Due to this, reciprocal referrals, such as a court referral to residential treatment or hospitalization, cannot be fully isolated. As described above, five of the six published studies that examine predictors of justice system contact for youth in the mental health system have this same limitation.

This dataset only contains information on publicly-funded mental health services. If the client received services through insurance or private pay it would not be contained in this dataset. For these reasons, this study may also not be generalizable to users of privately-funded mental health services. This allows a potential confound with variables such as parental employment, socioeconomic status, or family income. Charges or mental health services that occurred in states other than Massachusetts are not contained in this dataset, resulting in likely underestimates of these events. Underestimates of these events

may also occur because of the limits of matching datasets based on unique identifiers. Names change or might be misspelled and birthdays can be entered incorrectly, likely resulting in an underestimate of the number of youth in both systems.

### *Implications*

A number of important implications arise from this study. As indicated by much previous work (e.g. Davis et al., 2007; Graves et al., 2007; Rosenblatt et al., 2000), this research supports the need for cross-system collaboration among various child- and adult-serving agencies. Research indicates that collaboration through the use of multidisciplinary teams and mental health staff placed within juvenile justice facilities is beneficial to reduce recidivism and improve functional outcomes (Henggeler, Cunningham, Pickrel, & Schoenwald, 1996; Lipsey, 1995; Pullmann et al., 2006). These staff can assist justice facilities in assessing the mental health needs of these young adults to better respond to their behaviors (Herz, 2001; Jenson & Potter, 2003; Quist & Matshazi, 2000; Stewart & Trupin, 2003; Thomas, Gourley, & Mele, 2004), and in preparing more appropriate treatment planning during the transition from detention back into the community (Trupin, Turner, Stewart, & Wood, 2004). The current study indicates that cross-system collaboration should not end at the transition to adulthood; rather, an increased emphasis needs to be placed upon collaboration through the years of late adolescence and into early adulthood.

This article also identifies indicators for prevention and intervention. Given the overlap between specific disorders—in particular, CD and SUDs—youth with these problems deserve increased attention, and their families may need support and

preparation appropriate to the potential for later criminal involvement. Mental health workers who are well-versed in the juvenile and adult justice systems could perform valuable roles as liaisons. There is little existing research on the potential preventative role for mental health staff with experience and knowledge in juvenile justice. More research needs to be done on the preventative aspects of mental health treatment in regards to future offending. This study helps identify some factors that indicate intervention is warranted. Future researchers and clinicians can use this information to identify those most at risk in order to plan experimentally-based early interventions with those not yet in contact with the justice system. These may be based on several empirically based interventions currently available, such as Multisystemic Treatment, Functional Family Therapy, or wraparound treatment planning (Henggeler et al., 1996; Pullmann et al., 2006; Sexton & Alexander, 2002).

Additionally, the disparate findings for males and females builds on the growing understanding that most analyses within the justice system need to be completed separately by gender. As has been illustrated by many other authors (e.g. Davis et al., 2007; Graves et al., 2007; Johansson & Kempf-Leonard, 2009; Tracy et al., 2009; Zahn, Day, Mihalic, & Tichavsky, 2009), while males and females share much in common, they also have different predictors of justice involvement, commit different types of crimes, experience justice system processing differently, and have different experiences within secure confinement. The current study contributes to an increased understanding of the common and divergent predictors of dual-system involvement between the genders.

The results presented in this article indicate that youth within the mental health service population are at a high risk of justice system involvement throughout the

transition to adulthood. Males and those diagnosed with SUDs or CD are at particular risk, although other diagnoses also seem to indicate risk for particular types of offenses. Within the population of youth with mental health problems in this dataset, those served in out-of-home treatment appear to be at no greater risk of dual system involvement. Continued work on identifying and isolating risk factors for specific types of offenses can assist in identifying those and need and designing programs that provide preventative efforts throughout the transition to adulthood.

## CHAPTER III

### OUT-OF-HOME OR OUTPATIENT MENTAL HEALTH TREATMENT DURING THE TRANSITION TO ADULTHOOD: COMPARING LONGITUDINAL RATES OF CRIMINAL CHARGES

#### Chapter Abstract

While it is well-established that youth served in public mental health systems have high rates of contact with the criminal justice system, researchers have not thoroughly examined the long-term arrest rates of youth specifically served in out-of-home treatment for mental health problems. Our knowledge of the longitudinal criminal involvement for these people is surprisingly sparse, existing research is inconsistent, and researchers disagree about the effectiveness of out-of-home treatment. This study documented the annual incidence and cumulative prevalence of being charged with a crime from ages 13 to 25 for people served in out-of-home treatment while 16, 17, or 18 years old, stratifying by gender. Additionally, this study compared this group of young adults to young adults who only received non-out-of-home public mental health services during that time. Results indicated that both males and females served in out-of-home treatment had relatively high annual incidence and cumulative prevalence rates of being charged with a crime into young adulthood. However, people served in non-out-of-home treatment had similarly high rates. These groups did not significantly differ in annual or cumulative charge rates before 16, when 16 to 18, or from 18 to 25 years old. Implications and future directions for research are discussed.

## Literature Review

There is a well-established overlap between youth who received mental health services and youth who have contact with the justice system. Rosenblatt, Rosenblatt, & Biggs (2000) found that 20% of the youth served by the public mental health system were arrested during the course of 38 months. An analysis at a juvenile court in Washington State found that of the top 20% of users of juvenile detention days in one year, more than 70% of them had received public mental health services within the same year (Pullmann et al., 2006). However, researchers have not thoroughly examined the long-term rates of criminal justice contact specifically for youth served in out-of-home treatment for mental health problems. Our knowledge of the longitudinal criminal involvement for these youth is surprisingly sparse, and existing research has inconsistent findings.

Young adults who receive highly restrictive services such as residential treatment or inpatient hospitalization might be at an especially high risk for contact with the justice system during and after the transition to adulthood. The age of transition to adulthood corresponds with the ages at which criminal behavior peaks, roughly from 16 to 25 years old (Ellis, 1990; Laub & Sampson, 2003; Stolzenberg & D'Alessio, 2007). During these ages people are more vulnerable to negative peer influences, less able to control their impulses, and less able to plan for the future (Baltodano et al., 2005; Chung et al., 2005; Davis, 2003). Supportive services such as public mental health, child welfare, and public education generally have age criteria, ending at age 18 or 19 and imposing an institutional transition before young adults have completed the developmental transition to adulthood (Mallory, 1995). For youth exiting highly restrictive mental health services such as inpatient hospitalization or residential treatment, transitioning to adulthood may



be fraught with additional challenges. Youth in residential treatment and inpatient hospitalization exhibit more severe and chronic problems when compared to others in the public mental health system (Atkins et al., 1999; Cropsey et al., 2008; Lee & Thompson, 2008). Youth in inpatient hospitalization (Cropsey et al., 2008) and residential treatment (Chamberlain & Reid, 1998; Lee & Thompson, 2008) are more likely than youth in other forms of mental health services to have a history of involvement with the justice system. Likely, those youth who receive multiple episodes of out-of-home treatment are suffering from the most problems and are at an especially high risk for negative outcomes. This study documents the annual incidence and cumulative prevalence of being charged with a crime from ages 13 to 25 for people who received out-of-home mental health treatment while 16, 17, or 18 years old. It compares these rates to people who only received non-out-of-home mental health treatment during that time period.

The short- and long-term outcomes for youth who have been served in out-of-home treatment are unclear, there are mixed opinions on its costs and benefits, and empirical research reveals contradictory findings. Discussed below are the differences in these viewpoints. Supporters of out-of-home treatment believe that residential treatment and inpatient hospitalization may be beneficial because they can provide specialized services within a consistent, safe environment, while relieving exhausted caregivers (Ainsworth & Hansen, 2005; Hair, 2005). A review of the research from 1993 to 2003 concluded that residential treatment can be beneficial when delivered in ecological, multi-modal ways (Hair, 2005). When outcomes are collected at discharge, this research generally indicates that youth improve. However, treatment effects decline over time post-discharge, while the individual lives in less restrictive treatments. For instance,

Hooper, Murphy, Devaney and Hultman (2000) followed 111 adolescents for 6, 12, 18, or 24 months after discharge from a residential treatment facility. At 12 months, 84% reported no new illegal activity, and at 24 months, 65% reported no new illegal activity. Though these rates of illegal activity seem fairly high, the authors conclude that these represent a decrease in criminal behavior from a period prior to treatment. However, these rates increased as time since discharge increased.

As pointed out by Hair (2005), many of the studies in their review suffer from the choice of counterfactual; most compare outcomes pre/post out-of-home treatment, rather than comparing outcomes following out-of-home treatment to outcomes following some other possible form of treatment. Most of the studies that show improvement resulting from residential treatment are hampered by a lack of matched comparison groups served in alternative settings. This limits the studies to a within-program, between-subject design that is incapable of evaluating effectiveness, which has been a long-time criticism of the bulk of research on residential treatment (Curry, 1991). Though there may be some benefits to out-of-home treatment, it does not preclude the possibility that much greater benefits would have accrued from alternatives. However, one of the few studies of criminal outcomes for youth in out-of-home treatment that attempted to address this weakness found no differences between treatment foster care and residential treatment. In this study, Lee and Thompson (2008) used propensity score matching to create two comparable samples of youth, following up with 558 youth served in residential care and 86 youth served in treatment foster care. They found similar rates of self-reported contact with the law—about 11% for both groups—six months after discharge. This study and

most others suffer from a lack of long-term follow-up, which would ideally be conducted into adulthood.

Conversely, there are several reasons why out-of-home treatment may lead to poorer outcomes when compared to other types of treatment. Youth in out-of-home treatment are often isolated from their family and community and may suffer from the loss of positive social ties. There may be an opportunity cost as these young adults are institutionalized during the time that the rest of their typically-developing cohort are developing skills for adulthood such as learning about employment, preparing for higher education, and navigating romantic relationships. Out-of-home facilities can sometimes be dangerous places that unintentionally facilitate violence by staff or other residents (Ainsworth & Hansen, 2005; Barth et al., 2007; Dishion & Dodge, 2005; Lyons & Schaefer, 2000). Concentrating several youth with behavioral problems in one area may lead to peer contagion, when the negative influence of deviant peers overwhelms the positive influence of the intervention (Dishion & Dodge, 2005; Lee & Thompson, 2009).

Some empirical evidence demonstrates negative outcomes from out-of-home care when compared to other forms of care. Barth and colleagues (2007) used propensity score matching to compare youth in residential care to youth who received intensive in home therapy. At one year post-discharge, they found that youth in residential care were more likely to have negative outcomes, including more trouble with the law. In another study, Chamberlain and Reid (1998) randomly assigned boys who had been referred to out-of-home treatment by the juvenile court to either residential treatment or multidimensional treatment foster care. They found that boys in residential treatment were more likely to run away during treatment and less likely to complete treatment. During the year after

referral, boys referred to residential care had significantly more criminal referrals and spent more time in secure detention. Similarly, Ryan, Marshall, Herz, and Hernandez (2008) used propensity score matching on a sample of youth in child welfare to compare youth served in group homes to youth in foster care. They concluded that youth in group homes were 2.4 times more likely to be arrested than youth in foster care.

Unfortunately, these studies suffer from methodological issues that limit the conclusions regarding long-term results for youth in out-of-home treatment for mental health. Two of the studies followed youth for only one year post-discharge (Barth et al., 2007; Chamberlain & Reid, 1998). The other two studies employ selection criteria that limits generalizability to the population of youth who are in residential treatment due to mental health problems; one study examined residential treatment as an alternative to detention for youth from juvenile justice (Chamberlain & Reid, 1998), and one study used a population referred through child welfare (Ryan et al., 2008). Finally, few studies include a lengthy period of follow-up. The fact is, we know little about long-term outcomes of adolescents served in out-of-home treatment for mental health problems, including contact with the justice system adult criminal outcomes. We have a very incomplete understanding of the longitudinal patterns of adult contact with the criminal justice system for adolescents who have been served in out-of-home treatment.

When considering contact with the justice system as an outcome following out-of-home treatment, it may be important to consider the potential moderating effect of other predictors of criminal involvement. Conduct disorder (CD) and substance use disorders (SUD) are the psychological diagnoses most related to arrest (Evens & Vander Stoep, 1997; Graves et al., 2007; Pullmann & Davis, 2008; Rosenblatt et al., 2000; Scott et al.,

2002). There is some research supporting the idea that CD moderates improvement in residential treatment. For instance, Cathcart-Shabat, Lyons, and Martinovich (2008) examined differential outcomes for 457 youth diagnosed with CD in residential treatment when compared to youth not diagnosed with CD. They used assessments at intake, 7 months after intake, and at discharge to examine changes over time. They found disproportionate improvements for youth with CD in several areas of psychosocial functioning, leading the researchers to conclude that youth with CD show similar to better outcomes than other youth in residential treatment. However, these youth did not show disproportionate improvements in psychosocial areas that are likely related to later arrest, including substance use, security management needs, being a danger to others, or socio-legal problems, and most importantly, youth in the CD group were more likely to be discharged to the Department of Corrections.

Researchers have not thoroughly studied the long term criminal justice contacts for people who received out-of-home mental health treatment. The purpose of the current study is to expand the work on outcomes of out-of-home treatment, specifically by comparing rates of being charged with a crime for youth in the public mental health system who received residential treatment and/or inpatient hospitalization during the transition to adulthood, to youth in the public mental health system who did not receive out-of-home services. This study is also intended to explore possible disproportionate outcomes for youth diagnosed with CD or a SUD, who are likely to be at a higher risk for criminal charge.

## Methods

### *Research Questions*

This study examines the relationship between receipt of mental health services during the transition to adulthood and juvenile and adult criminal charges. Research questions include the following. In a cohort of people who received publicly-funded mental health services, and stratifying by gender, what were the annual incidence and cumulative prevalence rates of being charged with a crime for people who had been served in out-of-home treatment during the transition to adulthood? When comparing those who did and did not receive out-of-home treatment, did their charge rates differ in the years leading up to, including, and following out-of-home treatment? Were there differential charge patterns for people with a diagnosis of CD or SUD when comparing those served in out-of-home treatment to those only receiving non-out-of-home services?

### *Data Source*

This study is a secondary analysis of existing data. Utilizing the existing public mental health and justice system datasets that have been developed since computers became commonly available is an excellent option for examining longitudinal system contact (Saunders & Heflinger, 2004). The current data are from a statewide cohort of people born between 1978 and 1979 who received publicly-funded mental health and case management services through the Massachusetts Department of Mental Health (DMH) at some point in 1994, 1995, or 1996, and who had a recorded diagnosis for a mental health disorder ( $N = 423$ ). Participants were selected from 1994 to 1996 because

this was considered a period during which this dataset was well maintained, and it allowed a proportionally high number of clients to reach their 25<sup>th</sup> birthday by the time data were collected from the justice system. This is a subset of a dataset that has been described elsewhere (Davis et al., 2007; Davis et al., in press).

The data for this study came from two sources. The first source was the Massachusetts DMH management information system. This is the system used by the DMH to monitor client eligibility, service usage, and other records. In 1994 there was a statewide overhaul and improvement of the system's data recording procedures; hence, this study utilizes DMH data from 1994 through March of 2006, and filters this data to only include information for each individual from ages 16 to 25. For the purposes of this study, the DMH dataset provided data on the participant's gender, birthday, ethnicity, diagnosis, service type, and service date. The second source was the state of Massachusetts' Criminal Offender Record Information system (CORI), which recorded juvenile and adult justice system data. CORI includes data on charges and arraignment, also filtered for this analysis to only contain information from when the person was 16 to 25 years old.

*Variables.* The variable from the CORI database that was used in this analysis was date of criminal charge. Variables from the DMH database used in this analysis include gender, date and type of services received, DSM-IV diagnoses of conduct disorder/oppositional defiant disorder (jointly referred to below as conduct disorder or CD) or a SUD, excluding nicotine-related (American Psychiatric Association, 2000), and date of diagnosis. Because mental health treatment was only provided in cases with a mental health diagnosis, diagnoses of substance abuse were always co-occurring with

mental health diagnoses. Service type was categorized into out-of-home treatment (including inpatient hospitalization and residential treatment), and non-out-of-home service.

Residential treatment has been defined many ways in the literature. In this study, residential treatment consisted of long term placements in group homes, short term crisis placements in group homes, and therapeutic foster care. Inpatient hospitalization included hospitalizations for mental health or substance use treatment. Neither residential treatment nor inpatient hospitalization was court mandated or a formal alternative to detention.

While the diagnostic variables were useful, this data did have some idiosyncrasies limiting their utility. First, diagnoses were made by clinical staff at mental health service provider agencies as part of billing and record management; hence this data is likely influenced by human biases and subjective interpretations of behavior. As in any public mental health system, diagnoses may have been given prior to a full and considered assessment period in order to obtain public funding for services. Second, diagnoses may have been given at any point in the timeframe, so they may have occurred long before or after being charged with a crime. Third, while data from the majority of service providers contained diagnostic information during the entire timeframe, a few providers may have overwritten previous diagnoses when new diagnoses were made. Unfortunately, due to the limitations of utilizing existing datasets it is difficult to ascertain the extent of this problem, although exploration of the data indicated that the vast majority of the sample had recorded diagnoses on multiple occasions, and it appeared that this issue was minor.



### *Sample*

Descriptive statistics for the sample are depicted in Table 2.1 and Table 2.2. Individuals could have multiple diagnoses or services, so these columns add to more than 100%. Pearson chi-square tests were run between gender on Table 2.1 in order to emphasize variables on which genders differed and within gender on Table 2.2 in order to emphasize on which variables service groups differed. The overall sample was approximately 77% white, 9% African-American, 9% Hispanic, 5% another race, and 0.5% of the data on race was missing. There were 211 females and 212 males. Twenty-three percent of males and 11% of females had been diagnosed with conduct disorder or oppositional defiant disorder, and 23% of males and 17% of females had been diagnosed with a substance use disorder. When 16, 17, or 18 years old, slightly more males than females received out-of-home treatment, though this was not statistically significant. For females, those in out-of-home treatment were more likely to be diagnosed with post traumatic stress disorder, a thought disorder, a SUD, or a personality disorder, and less likely to be diagnosed with CD or anxiety disorder when compared to females only served in non-out-of-home treatment. For males, those served in out-of-home treatment were more likely to be diagnosed with a thought disorder, a SUD, a personality disorder than males only served in non-out-of-home treatment.

Table 2.1. Descriptive Statistics

Variable	Female <i>n</i> (%) ( <i>n</i> = 211)	Male <i>n</i> (%) ( <i>n</i> = 212)	Total <i>n</i> (%) ( <i>N</i> = 423)
<b>Race/Ethnicity</b>			
White	167 (79.1)	158 (74.5)	325 (76.8)
African American	17 (8.1)	20 (9.4)	37 (8.8)
Hispanic	13 (6.2)	23 (10.8)	36 (8.5)
Other	14 (6.6)	9 (4.2)	23 (5.4)
Unknown/missing	0 (0)	2 (0.9)	2 (0.5)
<b>Diagnosis 16-25</b>			
Mood disorder***	176 (83.4)	131 (61.8)	307 (72.6)
PTSD***	108 (51.2)	48 (22.6)	156 (36.9)
Thought disorder***	30 (14.2)	74 (34.9)	104 (24.6)
Conduct disorder/ODD**	24 (11.4)	48 (22.6)	72 (17.0)
ADD/ADHD***	19 (9.0)	53 (25.0)	72 (17.0)
Substance use disorder	36 (17.1)	49 (23.1)	85 (40.2)
Impulse control disorder	11 (5.2)	18 (8.5)	29 (6.9)
Personality disorder*	39 (18.5)	23 (10.8)	62 (14.7)
Anxiety disorder*	12 (5.7)	24 (11.3)	36 (8.5)
Developmental disorder*	10 (4.7)	21 (9.9)	31 (7.3)
Adjustment disorder	13 (6.2)	10 (4.7)	23 (5.4)
Learning disorder*	1 (0.5)	9 (4.2)	10 (2.4)
Eating disorder***	10 (4.7)	0 (0)	10 (2.4)
Other diagnosis	26 (12.3)	38 (17.9)	64 (15.1)
<b>MH Services received 16-25</b>			
Non-out-of-home only	101 (47.9)	84 (39.6)	185 (43.7)
Residential or Inpatient	110 (52.1)	128 (60.4)	238 (56.3)

Between-gender  $\chi^2$  tests: \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

Table 2.2. Descriptive Statistics by Service Type

Variable	Female <i>n</i> (%)		Male <i>n</i> (%)	
	Non-out-of-home	Out-of-home	Non-out-of-home	Out-of-home
<b>Race/Ethnicity</b>				
White	115 (81)	52 (75.4)	108 (78.3)	50 (67.6)
African American	10 (7.0)	7 (10.1)	9 (6.5)	11 (14.9)
Hispanic	8 (5.6)	5 (7.2)	13 (9.4)	10 (13.5)
Other	9 (6.3)	5 (7.2)	7 (5.1)	2 (2.7)
Unknown/missing	0	0	1 (.7)	1 (.7)
<b>Diagnosis 16-25</b>				
Mood disorder	114 (80.3)	62 (89.9)	86 (62.3)	45 (60.8)
PTSD <sup>a</sup>	65 (45.8)	43 (62.3)	29 (21.0)	19 (25.7)
Thought disorder <sup>ab</sup>	14 (9.9)	16 (23.3)	29 (21.0)	45 (60.8)
Conduct disorder/ODD <sup>a</sup>	21 (14.8)	3 (4.3)	34 (24.6)	14 (18.9)
ADD/ADHD	13 (9.2)	6 (8.7)	35 (25.4)	18 (24.3)
Substance use disorder <sup>ab</sup>	19 (13.4)	17 (24.6)	20 (14.5)	29 (39.2)
Impulse control disorder	10 (7.0)	1 (1.4)	11 (8.0)	7 (9.5)
Personality disorder <sup>ab</sup>	16 (11.3)	23 (33.3)	10 (7.2)	13 (17.6)
Anxiety disorder <sup>a</sup>	12 (8.5)	0	15 (10.9)	9 (12.2)
Developmental disorder	6 (4.2)	4 (5.8)	15 (10.9)	6 (8.1)
Adjustment disorder	9 (6.3)	4 (5.8)	7 (5.1)	3 (4.1)
Learning disorder	1 (.7)	0	8 (5.8)	1 (1.4)
Eating disorder	5 (3.5)	5 (7.2)	0	0
Other diagnosis <sup>ab</sup>	9 (6.3)	17 (24.6)	19 (13.8)	19 (25.7)

Within-gender  $\chi^2$  tests: <sup>a</sup>  $p < .05$  for females, <sup>b</sup>  $p < .05$  for males

### *Institutional Human Subjects Research Protections*

The initial study in which the data were collected received review and approval by Vanderbilt University's Institutional Review Board, the University of Massachusetts medical school institutional review board, the DMH Central Office Research Review Committee (for DMH data retrieval), and the Massachusetts Criminal History Systems Board (for CORI data retrieval).

## *Analyses*

There were three sets of analysis. The first set of analyses compared the annual rates of criminal charge for those who received outpatient services (*non-out-of-home services*) to those who had received either inpatient hospitalization, residential treatment, or both (*out-of-home services*) when 16, 17, or 18 years old. Charge rates were calculated for each age from 13 through 24, and stratified by gender and type of service received during 16-18 years of age. Chi-square tests were calculated at each age comparing out-of-home service users to non-out-of-home service users. This set of analyses captured the annual incidence of criminal charge. Arrest data was included for 13 to 24 years of age for all analyses for two reasons: first, this allows examination of whether differences in rates of being charged with a crime existed prior to transition-aged services; and second, this approach helps indicate whether there was a discontinuous break in charge rates among the groups after receiving services.

The second set of analyses captured the cumulative prevalence of criminal charge during these same ages. For these analyses, cumulative percentages of charges, by age, were calculated for the two service groups, again stratified by gender. As above, chi-square tests were used to compare out-of-home service users to non-out-of-home service users. This analysis was performed as an important comparison to the first set of analyses to explore for differences in the concentration of offenders between these service groups. It may be, for instance, that annual rates of criminal charge are similar between the two service groups, but that these charges are occurring repeatedly to the same set of individuals in one group while being spread more evenly throughout the population in the

other group. In that case, the first group would show no rise in cumulative prevalence of charge year-to-year, but the second group would.

The third set of analyses examined whether there was differential change for those diagnosed with the disorders most related to criminal offending—conduct disorder and substance use disorders—when comparing those served in residential treatment or inpatient hospitalization to those who received out-of-home treatment. Similar to the analyses above, chi-square tests compared these groups on annual arrest incidence and cumulative arrest prevalence.

## Results

Results for the first set of analyses are depicted in Figure 2.1 and in Appendix B in Table B.1. Overall, consistent with established research, males had a consistently higher incidence of being charged with a crime. The percentage of females who were charged peaked with 16% of out-of-home service users charged at age 19 and 21% of non-out-of-home service users charged at age 20. Male charge incidence peaked at age 18 with 27% of out-of-home service users and 33% of non-out-of-home service users.

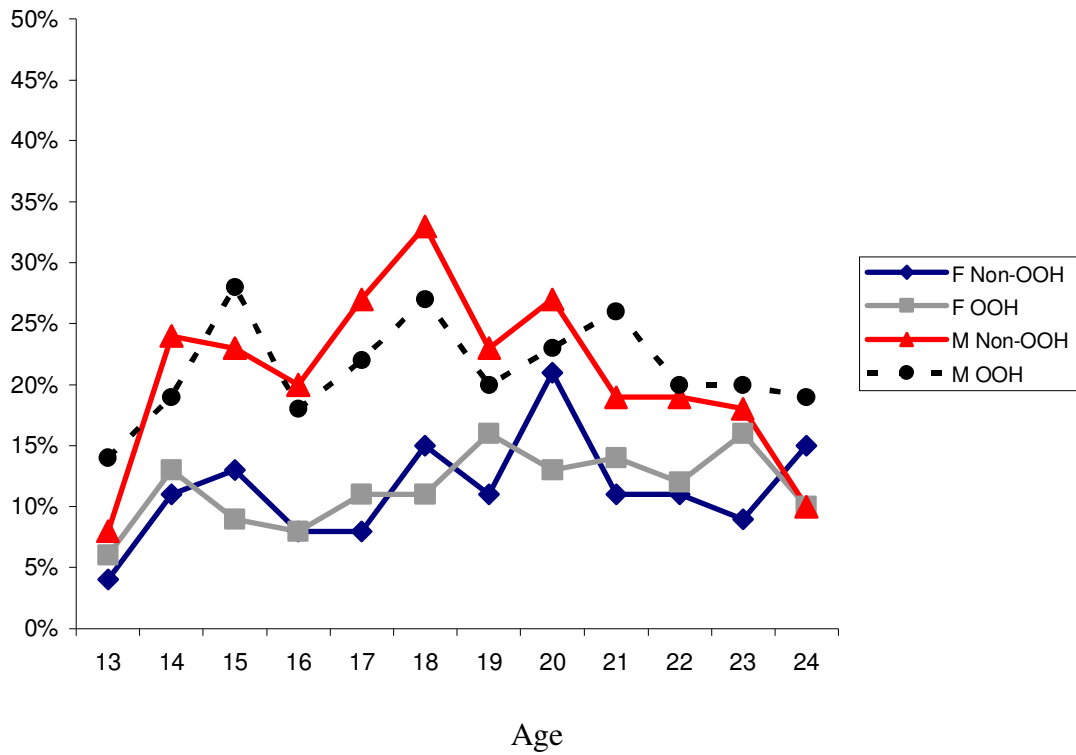


Figure 2.1. Annual Criminal Charge Incidence by Gender and Service Type (Out-of-Home vs. Non-Out-of-Home)

Regarding the first research focus, both males and females who were served in out-of-home treatment while 16, 17, or 18 years old were charged with a crime through young adulthood at relatively high rates. Of those who experienced out-of-home treatment during young adulthood, between 19% to 26% of males and 10% to 16% of females were charged with a crime every year from age 19 through 24. However, regarding the second research focus, these high rates were no different depending on type of service received. There were no statistically significant differences between those who received out-of-home services and those who received non-out-of-home services in annual incidence of criminal charge during any year from age 13 to age 24. Therefore,

these groups did not differ in their charge rate prior to, while receiving, or after receipt of transition-aged out-of-home services. Longitudinal rates of criminal charge appeared unrelated to entry into out-of-home treatment during these years or subsequent progression into adulthood.

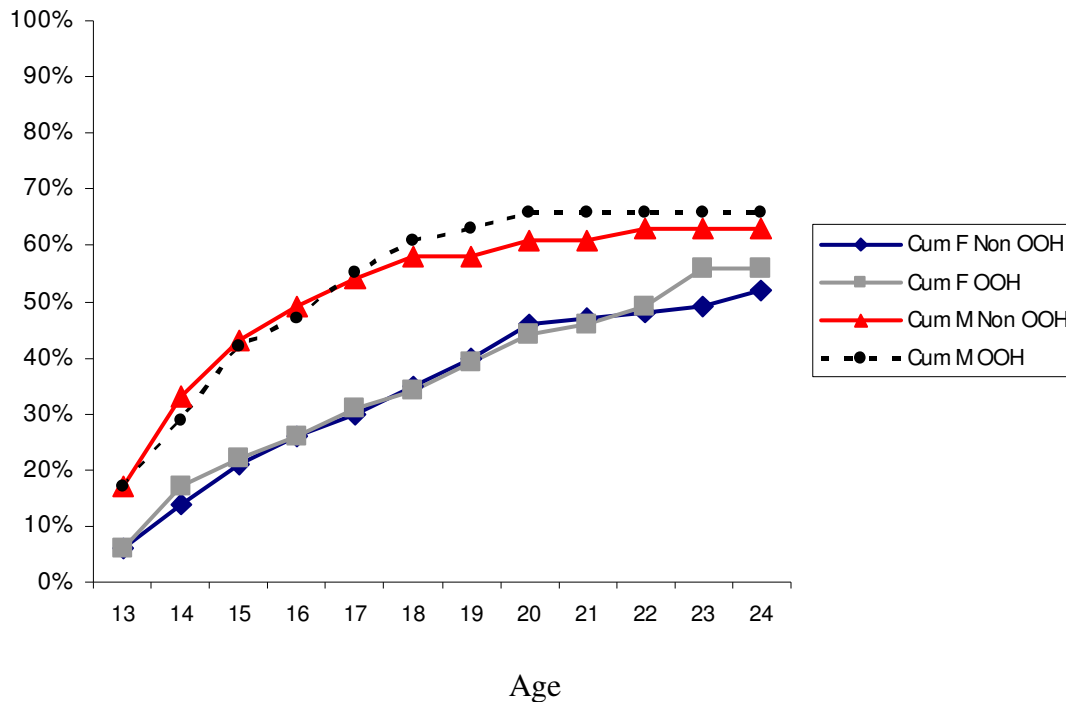


Figure 2.2. Cumulative Criminal Charge Prevalence by Gender and Service Type (Out-of-Home vs. Non-Out-of-Home)

Results for the second set of analyses are depicted in Figure 2.2 and in the Appendix in Table B.2. Again, consistent with prior research, males had a higher cumulative prevalence of criminal charge, with 66% of out-of-home males and 63% of non-out-of-home males experiencing at least one charge by age 25, compared to 56% of out-of-home females and 52% of non-out-of-home females. There were no statistically

significant differences in cumulative prevalence of charge between those served in out-of-home treatment while 16-18 years old and those who only received non-out-of-home services.

Figure 2.3 and Table B.3 in the Appendix depict the results for the third set of analyses, which examine those with a diagnosis of CD or SUD. Overall, 108 youth received one of these diagnoses. Though there were only a few statistically significant differences, the statistical power was relatively low. For nearly every age, the non-cumulative percentage of out-of-home services who were charged was higher, although it was only significantly higher for age 24. The cumulative percentage of out-of-home service users arrested was also consistently higher at all ages, though this difference was only statistically significant at ages 18 and 19. This means that more *individuals* in out-of-home treatment had been charged with a crime at some point during the entire study period. Figure 2.3 indicates that this cumulative difference begins to appear before the age of 16.



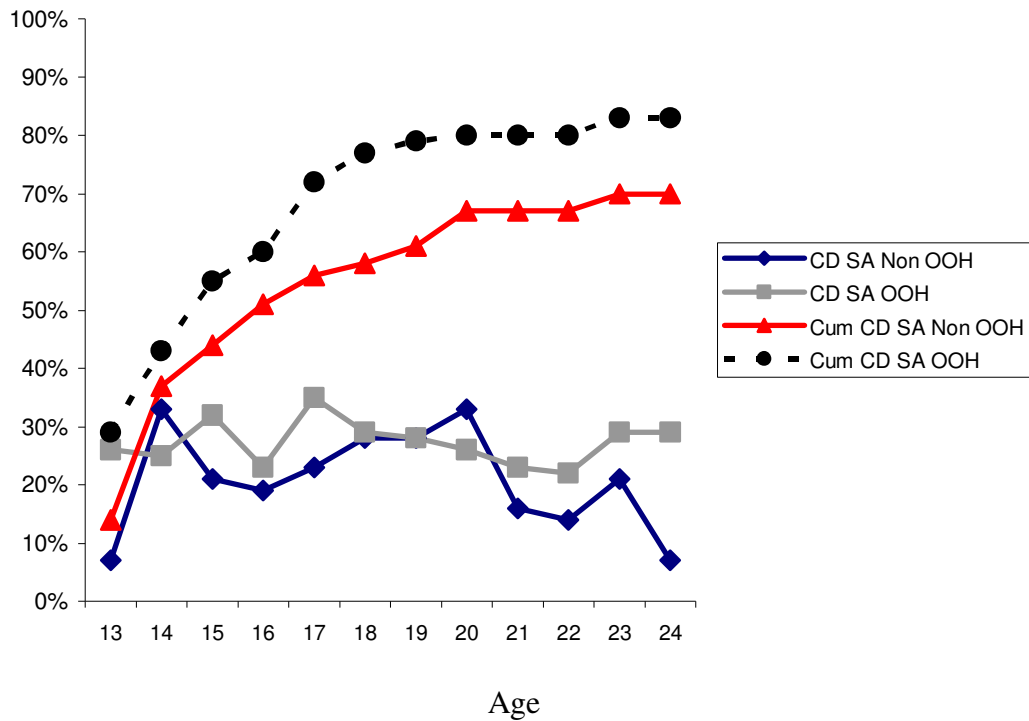


Figure 2.3. Incidence and Prevalence of Criminal Charge for People Diagnosed with Conduct Disorder or Substance Use Disorder (Out-of-Home vs. Non-Out-of-Home)

### Discussion

Our knowledge of the long-term criminal justice system contact for people who had been served in out-of-home treatment is vague and inconsistent. This paper expands current evidence on criminal charge patterns through the transition to adulthood. It does this by comparing longitudinal incidence and prevalence rates for criminal charge from age 13 to 25 for people who had received out-of-home treatment at some point while 16, 17, or 18 years old. The main focus research is an exploratory analysis of the longitudinal charge rates into adulthood for youth who had received out-of-home treatment.

Secondary foci included comparing those who did and did not receive out-of-home treatment during the transition to adulthood during the years leading up to, including, and

following out-of-home treatment, and examining whether there were differential charge patterns by service type for youth who had CD or a SUD.

Results indicated that youth served in out-of-home treatment during the transition to adulthood have high rates of being charged with a crime well into young adulthood. At least a fifth of males who had received out-of-home treatment were charged with at least one crime nearly every year from their 19<sup>th</sup> birthday to their 25<sup>th</sup> birthday. Females served in out-of-home treatment also had relatively high rates, with 10% to 16% charged every year. However, these high rates were not unique to those people who received out-of-home treatment. Results indicated that there were no relationships between receiving out-of-home services during ages 16-18, and rates of criminal charge at any age from 13 to 24. This was true for both males and females. Therefore, longitudinal rates of criminal charge during 13-16 appeared unrelated to entry into out-of-home treatment, and experiencing out-of-home treatment during 16-19 appeared unrelated to criminal charge 16-25. These findings contradict established research indicating that people served in out-of-home treatment are more likely to have had problems with the law (e.g. Cropsey et al., 2008; Lee & Thompson, 2008).

For the last research focus, this study found that there may be no practically significant better or worse criminal outcomes for young adults served in out-of-home treatment who had been diagnosed with CD or a SUD. While the sample size was too small to draw definitive conclusions, the results on prevalence indicate that slightly more individuals in out-of-home treatment offended at some point in the study period. However, examining Figure 2.3 reveals that this difference likely began before age 16. These results also indicated that young adults with CD or SUD did not demonstrate

increased improvement while in out-of-home treatment, which is somewhat inconsistent with the findings of Cathcart-Shabat, Lyons, and Martinovich (2008), who concluded that youth with CD improved more in residential treatment than youth with other diagnoses treated in residential treatment. However, these authors did not examine youth with a SUD.

### *Implications*

Overall these results are surprising because it is believed that youth in out-of-home treatment have problems that are more severe and more pervasive than youth not in out-of-home treatment. This leads to the conclusion that those served in out-of-home treatment are at a greater risk of problems with the law. There may be several reasons why the hypotheses were not confirmed. It may be that out-of-home treatment is effective and successfully improves people's functioning and risk of committing a crime, although these results do not indicate any differences between youth in service categories.

Alternatively, youth served in out-of-home treatment may have had problems unique to out-of-home treatment and not related to likelihood of offense when compared to others receiving mental health services. This may be the case for this study, as we saw little indication that those served in out-of-home treatment from 16-19 years of age were differentially charged during younger ages. An alternative explanation is that out-of-home treatment provides a preventive role. While placed out-of-home, youth do not have as many opportunities to offend and be arrested. Many criminal offenses that occur within the confines of out-of-home treatment (for instance, assault on staff members or stealing from other residents) may be likely to be dealt with internally and unlikely to be

reported to the criminal justice system. It is true that people who received out-of-home treatment were likely to receive this treatment before and after the transition to adulthood, so this potentially preventative role may extend to those timeframes as well.

As mental health administrations across the country increasingly endorse community-based, least-restrictive treatment options, residential treatment and inpatient hospitalization have fallen out of favor (Chorpita & Donkervoet, 2005; Huang et al., 2005; Stroul & Friedman, 1986; Stroul & Manteuffel, 2007). This is not surprising, as out-of-home services are highly expensive, some evidence that psychological improvements made in out-of-home treatment do not last for significant periods after discharge (Barth et al., 2007; Hoagwood, Burns, Kiser, Ringeisen, & Schoenwald, 2001), there may be negative effects from concentrating behaviorally disordered youth together (Dishion & Dodge, 2005; Lee & Thompson, 2009), and investments in community-based alternatives to out-of-home care can create cost savings by decreasing the need for more restrictive sectors of care (Foster & Connor, 2005). Regardless, until other, better alternatives become available, there will continue to be a need for secure psychiatric facilities. In Australia, for instance, at least one research team has argued that the unintended consequences of the closure of out-of-home treatment facilities included increases in juvenile detention, homelessness, emergency room visits, and crisis foster care (Ainsworth & Hansen, 2005). The current study indicates that for one type of negative outcome—being charged with a crime—secure, restrictive treatments such as inpatient hospitalization and residential treatment may have little relationship. How this balances with other outcomes in a sweeping evaluation of the benefits and costs of out-

of-home treatments, and how it is to be considered in light of alternatives to out-of-home treatments, is yet to be determined.

### *Limitations*

Because youth were not randomly assigned to service types, this study likely suffers from selection bias. Due to this, readers should understand that this study cannot evaluate the effectiveness of out-of-home treatment. The dataset did not allow the use of a control group or the creation of propensity scores to evaluate effectiveness. Rather, this study provides an important descriptive function which is currently lacking in the published literature by detailing the long-term charge rates for youth who experienced out-of-home treatment.

There are also limitations of this dataset, as in any secondary analysis of existing data obtained through management information systems. This study may not be generalizable to other states because statewide mental health and justice policy varies. This dataset only contains information on publicly funded mental health services. If clients received services through insurance or private pay they would be missing from this dataset. For these reasons, this study may not be generalizable to users of privately-funded mental health services. This allows a potential confound with variables such as parental employment, socioeconomic status, or family income. Arrests or mental health services that occurred in states other than Massachusetts are not contained in this dataset, resulting in likely underestimates of these events. Underestimates of these events may also occur because of the limits of matching datasets based on unique identifiers. Names

change or might be misspelled and birthdays can be entered incorrectly, likely resulting in an underestimate of the number of youth in both systems.

### *Future Research*

Researchers should continue to study out-of-home treatment for mental health problems, since it is unlikely that these practices will be discontinued. Future research on out-of-home treatment should continue the work that has begun on isolating and operationalizing the factors salient to measuring and defining how treatment is delivered. These may include such variables as levels of family involvement, type of milieu, philosophical approach, staff training, restrictiveness, staff-client rapport, educational programming, and more.

Additionally, we have little descriptive information on the long term outcomes of youth served in out-of-home care. Future researchers should track these youth far beyond the typical lengths of 6 months to a year, in order to gain an understanding of how these people ultimately function in multiple domains, including criminal justice, employment, education, and family. Qualitative work with adults who received out-of-home treatment would help to depict how they made meaning out of this treatment in their own lives, and to identify what factors of treatment they considered helpful. The evidence on out-of-home treatment remains unclear, and much more work is needed to provide a complete picture of its impact on individuals, families, and communities.

## CHAPTER IV

### LOCALIZED EFFECTS OF OUT-OF-HOME MENTAL HEALTH TREATMENT ON PROBABILITY OF CRIMINAL CHARGE IN ADOLESCENCE AND YOUNG ADULTHOOD

#### Chapter Abstract

The criminal justice outcomes for youth who have been served in out-of-home mental health settings such as residential treatment and inpatient hospitalization are unclear. This study longitudinally modeled the changing probability of being charged with a crime in relation to localized events from age 16 to 25, including being served in out-of-home treatment and aging into adulthood, while controlling for person-level covariates such as gender, race, past criminal charges, and mental health diagnoses. Results indicated that out-of-home treatment was related to a decreased probability of being charged with a crime while the person was in treatment, but that it had no effect on post-treatment probability. Longitudinal probability of being charged was moderated by gender; in general, females did not experience a peak probability time, while males peaked at age 19. Other significant contributors to being charged included having a substance use diagnosis, and having an offense record prior to age 16. Race was not related to probability of being charged. Implications for the evidence base regarding the use of out-of-home treatment are discussed.

## Literature Review

The criminal justice outcomes for youth who have been served in out-of-home mental health settings such as residential treatment and inpatient hospitalization are unclear. Previous research has established that youth who receive mental health treatment are at increased risk of involvement with the justice system (Cauffman, Scholle, Mulvey, & Kelleher, 2005; Davis et al., 2007; Pullmann et al., 2006; Rosenblatt et al., 2000). Research also indicates that youth served in out-of-home treatment (OHT) are more likely to have a history of involvement with the justice system when compared to those not in OHT (Cropsey et al., 2008). In regards to involvement with the justice system during or after discharge from OHT, the research is less clear. The purpose of the current study is to model the longitudinal, changing risk of being charged with a crime for adolescents and young adults who receive OHT.

A few studies have found a reduction in violent and criminal behavior after receiving OHT (Cathcart-Shabat et al., 2008; Hooper et al., 2000; Huefner et al., 2007; Lee & Thompson, 2008). A review of the research literature on residential treatment from 1995 to 2005 indicated that, when outcomes are collected at discharge, this research generally indicates that youth improve (Hair, 2005). However, treatment effects decline over time post-discharge. For instance, Hooper, Murphy, Devaney and Hultman (2000) followed 111 adolescents for 6, 12, 18, or 24 months after discharge from a residential treatment facility. At 12 months, 84% reported no new illegal activity (a decrease from prior to treatment), but at 24 months, only 65% reported no new illegal activity. While the authors concluded that the youth improved pre- to post- treatment, it is clear that these treatment effects declined over time.



Other studies have found worse outcomes from OHT when compared to other forms of treatment. The isolation of OHT can contribute to a break in positive ties with community and family, and OHT facilities can be physically dangerous places which unintentionally facilitate violence by staff or other residents (Ainsworth & Hansen, 2005; Barth et al., 2007; Dishion & Dodge, 2005; Lyons & Schaefer, 2000). “Peer contagion” is often mentioned in the literature as a possible unintended consequence of housing youth with behavioral problems in one area, as the negative influence of deviant peers negates the value of the intervention (Dishion & Dodge, 2005; Lee & Thompson, 2009). Barth and colleagues (2007) used propensity score matching to compare youth in residential care to youth who received intensive in-home therapy. At one year post-discharge, they found that youth in residential care were more likely to have negative outcomes, including more trouble with the law. Despite these examples, the current research base is sorely lacking, and most studies of OHT suffer from several methodological issues which limit their generalizability to the current research question.

First, no study exists which specifically estimates post-discharge rates of criminal justice contact for youth who were served in OHT. Second, the research that does exist is conducted with populations different from public mental health, such as juvenile detention populations for whom OHT was used as an alternative to incarceration (e.g. Chamberlain & Reid, 1998) or child welfare populations for whom OHT was used as a sheltered residence (e.g. Ryan et al., 2008). Third, the research that exists from the mental health population has rarely been truly longitudinal, instead relying on pre/post measures of improvement from two points in time, or from timeframes of two years or less (e.g. Hooper et al., 2000). Finally, existing research generally ignores the fact that many youth

experience multiple episodes of OHT and that this likely limits their longitudinal individual opportunities to offend. It has been established that higher levels of social control are related to a decreased likelihood of offending (Hirschi, 2008; Horney, Osgood, & Marshall, 1995; Sampson & Laub, 2005), and OHT represents an extreme form of social control. In other words, people served in OHT may show lower rates of longitudinal criminal justice contact because they are likely to return to OHT, and while in OHT they are under extreme social control and experience limited opportunities to offend. The current study intended to address these limitations and fill these gaps in research.

There are dozens, if not hundreds, of well-established predictors of offense for juveniles and adults (c.f. Akers, 1998; Ellis & Hoffman, 1990; Glueck & Glueck, 1950; Hirschi, 2008; Kelley, 1994; Shoemaker, 2000; Wikstrom, 2004). The discussion below considers those that were available for analysis in this study. Age is highly correlated with criminal and deviant behavior. Studies consistently confirm that criminal behavior peaks during late adolescence and young adulthood, roughly from 16 to 25 years of age (Ellis, 1990d; Laub & Sampson, 2003; Stolzenberg & D'Alessio, 2007). Explanations for the cause of this inverse U-shaped trajectory include biological development and maturation, a mastery of self control, changing peers, and positive “turning points” such as marriage or employment (Akers, 1998; Hirschi, 2008; Sampson & Laub, 2005b; Stolzenberg & D'Alessio, 2007). The development of the prefrontal cortex, which regulates emotion and drives decision-making and long-term planning, continues into early adulthood (Steinberg & Scott, 2003).

Gender is another major predictor of crime and delinquency. Males commit crimes and violence at rates far surpassing females, even in adolescence; in 2004, the national juvenile delinquency caseload was 73% male (Stahl, 2008; Stahl et al., 2007). Socialization and gendered social roles impact deviant behavior, but there is also evidence that the biology of males has a direct influence. Most of the biological correlates of offending are true for both males and females, but many of them happen to males at higher rates. Males are more likely to have the mesomorphic (large and muscular) body type that is positively correlated with offending in both genders (Shoemaker, 2000). The existence of the Y chromosome in male fetuses results in the production of chemicals such as testosterone, and these chemicals impact both brain and body development in ways that increase proclivity to offend (Bennett, Farrington, & Huesmann, 2005; Jeffery, 1994). Females have different pathways to offending and different experiences with the justice system (Feld, 2009; Graves et al., 2007; Johansson & Kempf-Leonard, 2009; Ritakallio et al., 2006; Teplin et al., 2002; Tracy et al., 2009). Researchers have found that the inverse U-shaped trajectory of offending described above is true for males served in the mental health system, but the trajectory for females is much flatter (Davis et al., 2007; Davis et al., 2004).

Past indicators of criminal offense such as arrests or being charged with a crime are excellent predictors of future offense (Davis et al., 2007; Lipsey & Derzon, 1998; Myner, Santman, Cappelletty, & Perlmutter, 1998). Similarly, mental health diagnoses that are related to offending, especially conduct disorder (CD), oppositional defiant disorder (ODD), and substance use disorders (SUD), are overrepresented in youth in juvenile detention. For instance, in one study of youth served in the juvenile justice

system in California between the ages of 13 and 18, 30% were assessed to have CD, 15% had ODD, and 62% had a SUD (Aarons, Brown, Hough, Garland, & Wood, 2001). In a study of incarcerated juveniles in Mississippi, 39% of females and 50% of males met criteria for CD, 25% of females and 14% of males met criteria for ODD, and 28% of females and 40% of males met criteria for a SUD (Robertson, Dill, Husain, & Undesser, 2004). A large scale study in Cook County, Illinois, found 46% of females and 41% of males met criteria for either CD or ODD, and 47% of females and 51% of males met criteria for any SUD (Teplin et al., 2002).

There are also well-established racial differences in both juvenile and adult justice contact. When compared to whites, people who are categorized as black or African American are proportionally more involved in the justice system (Snyder & Sickmund, 2006). In 2004 (which are the latest national juvenile court statistics available) white, black, and Asian youth made up 66%, 31%, and 1% of the juvenile court cases, respectively (Stahl, 2008), as compared to white, black, and Asian youth population percentages at 78%, 16%, and 4%, respectively. In other words, black youth were twice as common in the juvenile justice system as they were in the population.

While much of the work described above took cross-sectional, person-level approaches to prediction (where factors such as race or gender are correlated with offense rates), there is some work indicating that localized, time-level life changes can have a major impact on criminal offending. In a classic study of the impact of localized life events, Horney, Osgood, and Marshall (1995) tracked the longitudinal offending patterns and life changes of 658 convicted felons. Using hierarchical generalized linear modeling, they tracked the felons' month-by-month accounts of criminal offending and local life

circumstances, such as changing living situations, beginning or ending employment, and beginning or ending drug use. The specifics of their findings are not important for the current study; what is important is that this study documented a great deal of intra-individual variation in offense patterns, these patterns were strongly related to localized life changes, and these relationships were revealed through a hierarchical modeling approach. This provides evidence that person-level factors, such as a hypothetical latent construct of 'proclivity to offend,' are not wholly determinant of committing a crime. Rather, people vary through time in their probability of committing a crime, and this variance can be predicted through localized events.

The current study took a similar approach, but expanded it to integrate an examination of the effect of localized events within the broader context of the effect of the person-level factors described earlier. This study examined the longitudinal life circumstances of young adults from age 16 through 24 who were both served in OHT and charged with a crime at some point during the study time period. Based on the research described earlier, it was expected that OHT would provide a form of social control that helped to prevent criminal activity. It was also expected that discharge from OHT would represent a release of social control that would result in an increased probability of being charged with a crime.

## Methods

### *Study Purpose and Hypotheses*

The purpose of this study was to model longitudinal changes in probability of being charged with a crime from age 16 through 24 for youth who received out-of-home treatment. This approach captured the effect of static factors such as demographics, and time-variant factors such as aging into adulthood. A particular focus was placed upon the time-variant effects of being in and being discharged from OHT. There were several hypotheses. The first hypothesis was that there would be an immediate increase in the probability of being charged with a crime within the month following discharge from OHT, and over time this probability would decrease. Second, there would be a lessened probability of being charged with a crime while in OHT. Third, the probability of being charged with a crime for males would increase from age 16 into early young adulthood, and then decrease to age 25. However, females would have less probability of being charged with a crime throughout the timeframe.

### *Data Source*

This study is a secondary analysis of existing data. Utilizing the existing public mental health and justice system datasets that have been developed since computers became commonly available is an excellent option for examining longitudinal system contact (Saunders & Heflinger, 2004). The current data are from a statewide cohort of people born between 1978 and 1979 who received publicly-funded out-of-home mental health treatment services through the Massachusetts Department of Mental Health

(DMH) at some point in 1994, 1995, or 1996, and who were charged with a crime at some point between 16 and 25 years old ( $N = 143$ ). Participants were selected from 1994 to 1996 because this was considered a period during which this dataset was well maintained, and it allowed a proportionally high number of clients to reach their 25<sup>th</sup> birthday by the time data were collected from the justice system. This is a subset of a dataset that has been described elsewhere (Davis et al., 2007; Davis et al., in press).

The data for this study came from two sources. The first source was the DMH management information system, which is used to monitor client eligibility, service usage, and other records. In 1994 there was a statewide overhaul and improvement of the system's data recording procedures; hence, this study utilizes DMH data from 1994 through March of 2006, and filters this data to only include information for each individual from ages 16 to 25. The second source was the state of Massachusetts' Criminal Offender Record Information system (CORI), which recorded juvenile and adult justice system data, filtered for this analysis to only contain information from when the person was 16 through 24 years old.

*Variables.* Variables used in this analysis are depicted in Table 3.1. The variable from the CORI database that used in this analysis was date of any charge. Status offenses were not included. Variables from the DMH database used in this analysis include gender, race, date of out-of-home services received (inpatient hospitalization or residential treatment), and DSM-IV diagnoses (American Psychiatric Association, 2000). In this study, residential treatment consisted of long-term placements in group homes, short term crisis placements in group homes, and therapeutic foster care. Inpatient hospitalization included hospitalizations for mental health or substance use treatment.

Neither residential treatment nor inpatient hospitalization was court mandated or an alternative to detention. The dependent variable was CHARGE, an indicator of being charged for any crime. CHARGE was time-variant by week-long period, so it was represented as a binomial variable indicating whether any crime occurred during each one-week period beginning the week of the person's 16<sup>th</sup> birthday and continuing to the person's 25<sup>th</sup> birthday, for a total of 467 week-long periods.

This data did have some idiosyncrasies limiting the utility of the diagnostic variables. First, diagnoses were made by clinical staff at mental health service provider agencies as part of billing and record management; hence this data is likely influenced by human biases and subjective interpretations of behavior. As in any public mental health system, diagnoses may have been given prior to a full and considered assessment period in order to obtain public funding for services. Second, diagnoses may have been given at any point in the timeframe, so they may have occurred long before or after being charged with a crime. Third, while data from the majority of service providers contained diagnostic information during the entire timeframe, a few providers may have overwritten previous diagnoses when new diagnoses were made. Unfortunately, due to the limitations of utilizing existing datasets it is difficult to ascertain the extent of this problem, although exploration of the data indicated that the vast majority of the sample had recorded diagnoses on multiple occasions, and it appeared that this issue was minor.



Table 3.1. Variables Included in Modeling

Variable	Description	Purpose
<b>Level-1</b>	<b>Rate of change and time-varying</b>	<b>Models linear probability of charge over time and change due to events</b>
CHARGE WEEK	Charged with any crime, week-specific Linear change trajectory	Dependent variable Linearly increasing indication of time beginning at 16 <sup>th</sup> birthday and continuing to 25 <sup>th</sup> birthday for 469 week-long periods
WEEK <sup>2</sup>	Quadratic change trajectory	Models curvilinear (quadratic) probability slopes
WEEK <sup>3</sup>	Cubic change trajectory	Models curvilinear (cubic) probability slopes
AGE19+	Binomial indicator for 19 or older	Models a shift in change trajectory elevation after turning 19
POST19	Linearly increasing indicator of number of weeks since turning 19	Models a shift in change trajectory slope after turning 19
INOHT	Binomial indicator of in out-of-home treatment (1=in OH)	Models a shift in change trajectory elevation when in OHT
STRTWEEK	Binomial indicator of week starting OHT	Models a shift in change trajectory elevation when starting OHT
MNPSOUT	Indicates weeks that fall within one month of discharge from last OHT, resets when new treatment begins	Models a shift in change trajectory elevation when ending OHT
POSTOUT	Linearly increasing indicator of number of weeks since discharge from last OHT, resets when new treatment begins	Models a shift in change trajectory slope after discharge from OHT
<b>Level-2</b>	<b>Person-level</b>	<b>Models the probability of charge intercepts due to person-level factors</b>
FEMALE	1=Female	Models the change trajectory intercepts by gender
NUMCH16	Number of charges before age 16	Models intercepts by prior charges
CONDIS	1=Conduct disorder	Models intercepts by Conduct Dx
SUBUSE	1=Substance use disorder	Models intercepts by substance use dx
RACEWH	1=White	Models intercepts by White
RACEAA	1=African American	Models intercepts by African American

As described below, the analysis employed hierarchical generalized linear modeling (HGLM; Raudenbush, 2005; Raudenbush & Bryk, 2002; Singer & Willett, 2003), hence variables are divided into level-1 and level-2 as depicted in Table 3.1. Level-1 included rate-of-change variables, such as the indicator for time (WEEK, a linearly increasing indication of time), curvilinear representations of time (polynomials of WEEK, time-variant changes in slope such as indicators of age past 19 years old,

indicators of particular weeks that OHT began, particular weeks that the person was in OHT, and weeks since the last OHT ended). The age of 19 and older was chosen to model a shift in level and slope because preliminary analysis within this sample indicated this was a possibility, perhaps due to aging out of DMH youth services.

Level-2 variables included person-specific variables such as gender, number of charges prior to the age of 16, race (African American and white, with other races excluded from the analysis due to small sample sizes), and diagnosis. Two categories of diagnoses were used for this analysis based on past research indicating the importance of these variables: 1) Substance use disorders included abuse or dependence on any drug, excluding nicotine, and; 2) Conduct disorder and oppositional defiant disorder were grouped together and listed below as “conduct disorder,” due to low rates of ODD and the similarity of these diagnoses. Because mental health treatment was only provided in cases with a mental health diagnosis, diagnoses of substance abuse were always co-occurring with mental health diagnoses.

### *Sample*

Table 3.2 depicts the descriptive information for the sample. At level-2, which is person-specific, the sample size was 143. For level-1, the sample size included each week-long period (467 periods) for each of the 143 individuals. This provided a level-1 sample size of 66,453 after removing service use data from 328 missing timepoints (0.5%) for three individuals near the end of the observation period. Missing data of this amount within HGLM is of little consequence, and periods are modeled using all available data at each timepoint (Raudenbush & Bryk, 2002; Singer & Willett, 2003).

Table 3.2. Descriptive Statistics

Variable	n/M	Valid %/SD	Missing n
<i>Level-2, Person Level (N =143)</i>			
Female	61	42.7	-
Number of charges before age 16	2.2	4.0	-
Race is White	103	72.0	-
Race is African American	17	11.9	-
Race is other	23	16.1	-
Conduct disorder	32	22.4	-
Substance use disorder	51	35.7	-
<i>Level-1, Time-Variant (N=66,453)</i>			
	<i>n</i>	Valid %	Missing n
Charged with a crime	686	1.0	-
Weeks in OHT	13,469	20.3	328
Weeks started OHT	377	0.6	328

*Institutional Human Subjects Research Protections*

The initial study in which the data were collected received review and approval by three bodies, including Vanderbilt University's Institutional Review Board, the University of Massachusetts medical school institutional review board, the DMH Central Office Research Review Committee (for DMH data retrieval), and the Massachusetts Criminal History Systems Board (for CORI data retrieval).

## *Analysis*

A two-level HGLM (Raudenbush & Bryk, 2002; Singer & Willett, 2003), also referred to as a growth model, was used to model the probability of arrest during week-long periods over the course of 467 waves of data from age 16 through age 24.

Hierarchical modeling is a generalization on multiple regression for repeated measures or nested data. This technique can model binary outcomes using multiple time periods nested within persons. HGLM must be used because the non-independence of observations (time periods nested within youth) and the binary outcome (arrest vs. no arrest) would violate ordinary least squares regressions assumptions of independence and normality and HLM assumptions of normality. HGLM allows the inclusion of both time-dependent and static covariates within level-1 and level-2, respectively. Since the outcome variable was binomial (1 = criminal charge, 0 = no criminal charge), it was treated as a Bernoulli distribution; hence, outcome probabilities were obtained through a logit-link function, by transforming coefficients from log-odds (Raudenbush & Bryk, 2002).

Modeling proceeded in a manner consistent with standard practice (Singer & Willett, 2003). Estimations were fit using full maximum likelihood. A first “unconditional means” model contained only the outcome variable, and established the average probability of being charged with a crime during any week-long period. Since the outcome was binomial, variance could not be partitioned between and within people since level-1 does not contain an error term and the logistic model is inherently probabilistic (Horney et al., 1995). Similarly, interclass correlations could not be calculated. A second model was built using a series of models of different possibilities

for time trends within the data while building upon the linear predictor WEEK. Possible time trends included polynomial functions of WEEK, and time-varying covariates such as turning 19 and number of weeks since turning 19. A third model added INOHT and gender to this time-based model, as the two principal research questions were whether the probability of being charged with a crime differed whether one was in or out of OHT, and whether this trend was modified by gender. This model also controlled for STRTWEEK, a variable indicating week-long periods that OHT started. The fourth and final model was built through a series of models adding important covariates to control for, including week-long periods that OHT started, number of charges by 16 years old, race, diagnosis, and several possible interactions. Throughout model building, several interaction variables were included at appropriate times, though these variables are not depicted in Table 3.1 due to space considerations. These variables included level-2 x level-1 interactions for all variables representing a rate of change. For instance, models were run including FEMALE x WEEK, FEMALE x AGE19+, FEMALE x INOHT, and so forth. These tested for the possibility that slopes or intercepts were differentially related to gender. For example, FEMALE x WEEK tested whether gender was related to the slope of the linear change trajectory, or in other words, whether males and females differed in how their rates of being charged with a crime changed over time.

Variables were retained or rejected during model building based on several standard considerations (Raudenbush & Bryk, 2002; Singer & Willett, 2003), including the following. Individual coefficients were examined for the significance level of their t-ratio. However, given the very high sample size and high level of statistical power for level-1, this was considered a poor indicator of the value of the variable to the model.

Hence, the change in model variance and model  $\chi^2$  was also examined and variables were only kept if this variance and  $\chi^2$  decreased significantly, indicating that the variable was useful for prediction—some variables had significant coefficients but actually increased model variance and would have resulted in a more poorly-fitting model. The impact of each variable on the coefficient of other variables was also examined to protect against high multicollinearity and resulting implausible variance terms. Finally, during this process, the variables related to rate of change (i.e. WEEK, INOHT, etc.) were tested while allowed to randomly vary, as it was expected that the time slopes varied across individuals. This was consistent with previous publications utilizing a similar approach (e.g. Armstrong & Griffin, 2007; Horney et al., 1995). If these random variance terms were statistically significant and had adequate reliability estimates they were allowed to remain in the model, otherwise variables had their variance terms fixed at zero.

Table 3.3. Hierarchical Generalized Linear Model Predicting Being Charged with a Crime

	<i>Model 1</i>		<i>Model 2</i>		<i>Model 3</i>		<i>Model 4</i>	
	<i>Coeff.</i>	<i>SE</i>	<i>Coeff.</i>	<i>SE</i>	<i>Coeff.</i>	<i>SE</i>	<i>Coeff.</i>	<i>SE</i>
Intercept	-4.5544**	.0680	-4.7433**	0.0855	-4.6027**	0.1027	-4.6704**	0.1040
Number of charges by 16							0.0263**	0.0105
Substance use dx (Grand mean centered)							0.4682**	0.0914
In out-of-home treatment					-0.5459**	0.1071	-0.5687**	0.1107
STARTWEEK					0.9570**	0.2383	0.9431**	0.2709
WEEK <sup>a</sup>			0.4311**	0.0101	0.5897**	0.1213	0.5963**	0.1245
FEMALE in WEEK					-0.6810**	0.1425	-0.6560**	0.1466
AGE19+ <sup>a</sup>			-0.4451**	0.1081	-0.7148**	0.1393	-0.7143**	0.1448
FEMALE in AGE19+					0.9441**	0.2383	0.9380**	0.2549
POST19			-0.3587**	0.1091	-0.4888**	0.1352	-0.5003**	0.1396
FEMALE in POST19					0.5195**	0.1722	0.5017**	0.1752
<b>Not significant</b>								
POSTOUT					NS			
MNPSOUT					NS			
Conduct disorder							NS	
Race—white							NS	
Race—African-American							NS	
<i>Interactions with all time variables:</i>								
In out-of-home treatment					NS			
Conduct disorder							NS	
Substance use disorder							NS	
Number of charges by 16							NS	
<b>Variance Components</b>								
Intercept, u0			0.8436**		0.7291**		0.6725**	
WEEK			0.0987**		0.0894**		0.0893**	

<sup>a</sup> WEEK and POST19 were transformed to be more interpretable by dividing by 100

\*  $p < .05$

\*\*  $p < .10$

## Results

### *Model 1 through Model 3*

Results for illustrative preliminary and final models are shown in Table 3.3 and described here, though many more submodels were fit during the model-building process. Model 1 revealed that the probability of being charged with a crime during any week for the “typical” or population-average individual was 1.04%, with a 95% plausible value range from 0.91% to 1.19% (derived by transforming the log-odds coefficient of -4.55 and standard error of .068). Model 2 built time trends into the model. While model-building revealed that quadratic and cubic polynomials of WEEK significantly contributed to the model (sequentially and individually), close examination of model fit statistics revealed that the combination of a shift in level and a shift in slope at age 19 better modeled the time trends. Hence, polynomials of time were dropped from the model. Age 19 was chosen from among several age options as a result of preliminary inspection of the data. Model 2 indicated that there was a linear time-trend with steadily increasing probability of being charged with a crime from age 16 to age 19. At age 19, the probability of being charged made a swift drop, and the time slope also changed to roughly zero.

Model 3 revealed several important findings. Being in OHT significantly lowered the probability of being charged with a crime while in treatment. This effect on change in probability did not differ for males and females, as the gender variable was not significant within being in OHT. Gender did, however, shift the slopes and means for the three time trend variables. Additionally, an important control variable was discovered—



STARTWEEK, which was highly positively related to criminal charge. The implications of these findings are discussed in the final model.

*Model 4*

The final model was of the form:

$$\text{Level-1 model: } \eta = \pi_0 + \pi_1(\text{WEEK}) + \pi_2(\text{AGE19+}) + \pi_3(\text{POST19}) + \pi_4(\text{INOHT}) + \pi_5(\text{STRTWEEK})$$

$$\text{Level-2 models: } \pi_0 = \beta_{00} + \beta_{01}(\text{SUBUSE..}) + \beta_{02}(\text{NUMCH16..}) + r_0$$

$$\pi_1 = \beta_{10} + \beta_{11}(\text{GENDER}) + r_1$$

$$\pi_2 = \beta_{20} + \beta_{21}(\text{GENDER})$$

$$\pi_3 = \beta_{30} + \beta_{31}(\text{GENDER})$$

$$\pi_4 = \beta_{40}$$

$$\pi_5 = \beta_{50}$$

Where SUBUSE and NUMCH16 are grand-mean centered, and WEEK and POST19 are divided by 100, both done to aid in interpretability of the coefficients and improve the efficiency of model estimation.

Table 3.3. Odds Ratios for the Final Model

	<i>Odds Ratio</i>	
	<i>OR</i>	<i>95% CI</i>
	<i>Coefficient</i>	
Intercept	0.0093	0.008, 0.012
Number of charges by 16	1.0267	1.006, 1.048
Substance use dx (Grand mean centered)	1.5971	1.333, 1.913
INOHT	0.5662	0.456, 0.703
STARTWEEK	2.5679	1.510, 4.367
WEEK <sup>a</sup>	1.8154	1.420, 2.321
FEMALE in WEEK	0.5189	0.389, 0.683
AGE19+ <sup>a</sup>	0.4894	0.369, 0.650
FEMALE in AGE19+	2.5550	1.550, 4.210
POST19	0.6063	0.461, 0.797
FEMALE in POST19	1.6515	1.172, 2.328

<sup>a</sup> WEEK and POST19 were transformed to be more interpretable by dividing by 100

There are several important findings from this model. Because this model has several interactions, and because probabilities are not summative but are derived from the summative log-odds coefficients, changes in probabilities are difficult to explain even while examining Table 3.3. Hence, Table 3.4 provides individual odds ratios for each of the coefficients in the final model. Additionally, as suggested by Singer and Willet (2003) to assist with interpretation, Figure 3.1 depicts modeled probabilities for three hypothetical “types.” These probabilities have been converted from the log-odds model coefficients through a logit-link function.

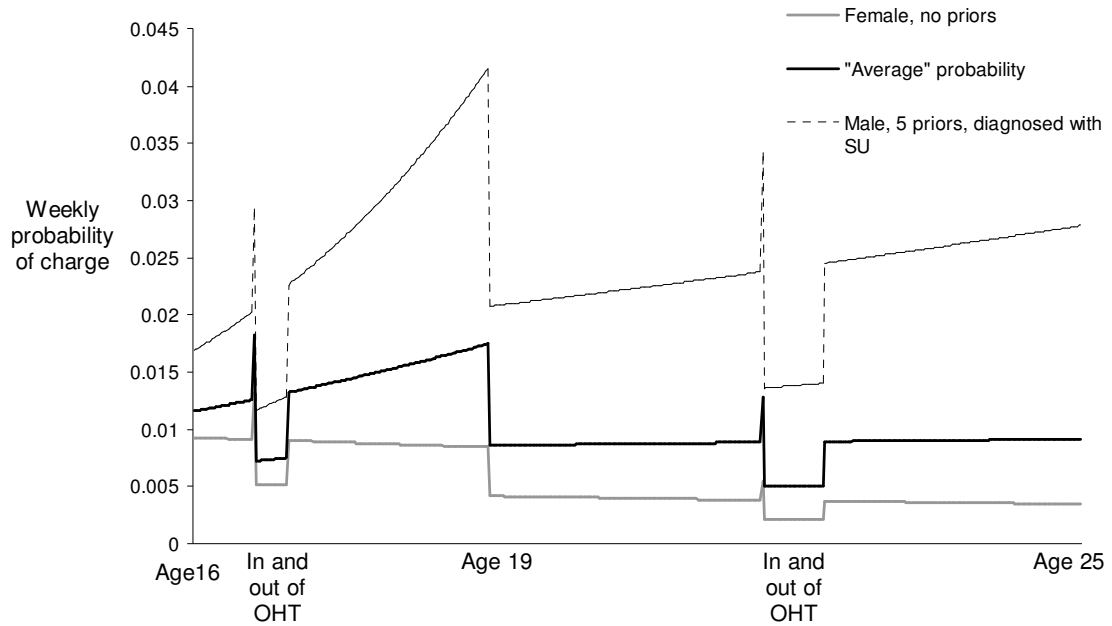


Figure 3.1. Estimated Growth Models

Being in OHT significantly reduced the probability of being charged with a crime. While in OHT, the odds of criminal charge was 43% lower than when out of OHT. However, because POSTOUT and MNPSOUT were not significant, the probability elevation and slopes did not change after discharge from OHT. In other words, while being in OHT appears to provide a protective role, the experience of being in OHT did not significantly affect an individual's likelihood of being charged with a crime after discharge. The linear slope of probability of criminal charge as youth aged from 16 to 19 was moderated by gender such that males increased in probability of charge during this time (modeled odds of charge increased 1.8% every week), but the slope for females remained essentially flat. At age 19 both males and females were predicted to have a sudden drop in their probability of criminal charge, however this drop is less for females.

Past age 19 the slope for males was reduced, though it remained slightly increasing, and the slope for females remained essentially flat.

The number of charges a person had by age 16 and being diagnosed with a SUD were positively related to average probability of criminal charge throughout the timeframe. Neither variable had an effect on slope through time or on slope changes at age 19. The final significant variable of note was STARTWEEK, which had a very strong positive relationship to being charged with a crime. Essentially, the odds of being charged with a crime increased more than two times during the week a person started OHT. It is highly probable that this result was due to reciprocal causation, whereby being charged with a crime results in OHT. This was a strong relationship and essential to include as a statistical control within the model.

Conduct disorder did not contribute to the predictive ability of any aspect of this model. Analytical exploration revealed this was likely due to the fact that this diagnosis was highly correlated to the number of charges before age 16 and gender, which were already controlled for in the model, and because the cell size for this diagnosis was relatively small. The race variables of White and African-American were also not statistically significant in this model, which is inconsistent with published research from other datasets, but consistent with past research on this particular dataset.

## Discussion

The current study modeled longitudinal changes in probability of being charged with a crime from age 16 through 24 for youth who received out-of-home treatment, with a particular focus on the effects of being in and being discharged from out-of-home

treatment. This was the first study of its kind, which modeled the relationship between OHT and being charged with a crime in a truly longitudinal fashion while controlling for static and dynamic factors.

The first hypothesis was not supported by the evidence; after controlling for the other variables in the model, there was no immediate increase (or decrease) in probability of being charged with a crime upon discharge from OHT, and the slope of probability change over time was not affected by having been served in OHT. In other words, having been in OHT had no effect on the subsequent risk of being charged with a crime. This lack of effect was not differentiated by gender, number of prior offenses, or a diagnosis of SUD or CD. This finding of “no effect” adds to the inconsistent literature about the relationship of OHT to subsequent criminal offending—while people did not get “better” after OHT in regards to contact with the justice system, they also did not get “worse.” It may be that, in regards to this outcome, there is no immediate treatment effect.

The second hypothesis received strong support. All other factors held constant, the odds of being charged with a crime while in OHT were nearly half the odds while not in OHT. It is likely that OHT provides a preventive role by limiting opportunities for people to commit a crime. It is also likely that many offenses that occur within an OHT environment are dealt with internally and not reported to the police. This is consistent with the viewpoint that one of the main benefits of OHT is that it can provide structured services within a contained, highly controlled environment (Ainsworth & Hansen, 2005). While testing this hypothesis, the results also indicated that people were very likely to be charged with a crime during weeks that they entered OHT—the odds of charge went up more than 2.5 times during weeks of admission into treatment. This is likely due to

reciprocal causation—people commit a crime and the response involves OHT. Hence, it appears that OHT was used as a de facto alternative to detention, though it was not considered a formal alternative to detention for this sample.

The third hypothesis was also confirmed. For males, the probability of being charged with a crime did increase from age 16 to age 19, at which point the probability of charge became sharply lower and the rate at which the probability increased was flattened. These findings for males are consistent with established research, which has established an inverse U-shaped trajectory in which offending peaks in young adulthood (Ellis, 1990; Laub & Sampson, 2003; Stolzenberg & D'Alessio, 2007). Females, however, exhibited consistently lower probability rates from age 16 to 19. They then saw a small drop in probability at age 19, and then the rate stayed consistently low. This finding of differential involvement and gender-based interactions with time is consistent with the published literature, which has documented that pathways to offending and experiences with the justice system (Feld, 2009; Graves et al., 2007; Johansson & Kempf-Leonard, 2009; Ritakallio et al., 2006; Teplin et al., 2002; Tracy et al., 2009).

Other findings were generally consistent with the literature. The average probability of being charged with a crime was highly related to the number of charges a person had experienced by the time they were 16 years old and being diagnosed with a SUD. While being diagnosed with CD was not significant, as described above this was likely due to multicollinearity and small cell sizes. Substance use and conduct disorder may be related to criminal involvement for many reasons. The sale, purchase, and use of illicit substances is illegal, and substance use may be related to aggressive or lapses in judgment and decision-making. Additionally, being diagnosed with a SUD may be

related to severity of disorder; all cases diagnosed with SUD in this dataset were co-occurring with other mental health diagnoses. Finally, because diagnosis was made by a clinician, SUD and CD may be indicative of the clinician's belief that the youth has had problems with law enforcement or is likely to have problems with law enforcement. In other words, since diagnosis may have occurred at any time during the timeframe, these variables may have been related to criminal charge retrospectively, or as a result of clinician's knowledge of past criminal behavior, rather than being predictive of future behavior.

Surprisingly, in this sample race was not related to probability of being charged with a crime, as this relationship is well-documented (Hawkins, Laub, & Lauritsen, 1998; Snyder & Sickmund, 2006; Stahl, 2008).

### *Limitations*

There are limitations of this dataset, as in any secondary analysis of existing data obtained through management information systems. This study may not be generalizable to other states because statewide mental health and justice policy varies. This dataset only contains information on publicly funded mental health services. If clients received services through insurance or private pay they would be missing from this dataset. For these reasons, this study may not be generalizable to users of privately-funded mental health services. This allows a potential confound with variables such as parental employment, socioeconomic status, or family income. Arrests or mental health services that occurred in states other than Massachusetts are not contained in this dataset, resulting in likely underestimates of these events. Underestimates of these events may also occur

because of the limits of matching datasets based on unique identifiers. Names change or might be misspelled and birthdays can be entered incorrectly, likely resulting in an underestimate of the number of youth in both systems.

### *Implications*

Residential treatment and inpatient hospitalization have fallen out of favor (Chorpita & Donkervoet, 2005; Huang et al., 2005; Stroul & Friedman, 1986; Stroul & Manteuffel, 2007). This is likely due to their expense and lack of consistent evidence of long-term benefits (Barth et al., 2007; Hoagwood et al., 2001). Researchers and policy makers argue that investments in community-based alternatives to OHT can create cost savings by decreasing the need for more restrictive sectors of care (Foster & Connor, 2005). Regardless, until other alternatives become widely available there will continue be a need for secure psychiatric facilities. Other countries have witnessed negative consequences from closing out-of-home treatment facilities before the availability of more positive alternatives. In Australia, closure of out-of-home treatment facilities has been attributed to increases in juvenile detention, homelessness, emergency room visits, and crisis foster care (Ainsworth & Hansen, 2005). The current study revealed that OHT can play a role in the temporary prevention of being charged with a crime. This does not necessarily lend support to the use of OHT, as “preventative” confinement without due process (whether intentional or de facto) is illegal in the United States and has serious moral repercussions.

The current study also found that youth discharged from OHT do not increase or decrease from their calculated probability of being charged with a crime had they not



received services. This evidence, combined with the evidence that OHT provides a preventative role during the delivery of services, must be weighed with the evidence that intensive in-home treatment can be more effective than residential care at prevention of conduct problems post-services (Barth et al., 2007). These are essential considerations in the debate on the utility and cost-effectiveness of OHT. A longitudinal study similar to the current study but comparing randomly assigned OHT to in-home treatment alternatives could be extremely useful in weighing the evidence to determine policy.

These results also suggest that the use of OHT should be supported by effective and intensive planning and coordination for transition out of OHT. The evidence that the continuity of probability of being charged with a crime is not affected after an OHT episode indicates that some intensive transitional support may be helpful by transferring the social control mechanisms of OHT into other living situations. This transition planning would ideally be done with the involvement of the family, neighbors, the community, and the school so that these sectors of care can better integrate support, guidance, and surveillance of the transitioning person.

A final implication is that this study serves to bolster the argument that local life circumstances influence long-term continuity in criminal offending, and that, “these tendencies interact with each other in complex ways and that contrasting continuity with change is a false dichotomy” (Horney et al., 1995, p. 670). Modeling techniques such as HGLM are excellent tools for truly studying longitudinal change while integrating longitudinal continuity. It would be helpful for future researchers to use more refined measures of offending and localized change, going beyond service receipt to include specific types of services and other seemingly important time-variant changes. These

could include variables such as peer interactions, drug use, parental involvement, and changes in education and employment. Further, three-level models could be constructed which take into account broader factors beyond the person-level, such as school and community contributions. Future researchers should continue to utilize these techniques to more thoroughly refine our understanding of longitudinal change processes.

## CHAPTER V

### CONCLUSIONS

The preceding three chapters address, in detail, the results and implications of each individual analysis. Therefore, this chapter will serve to synthesize these results and draw coherent, unified implications, where possible. These analyses re-affirmed that youth served in mental health treatment exhibit high rates of contact with the criminal justice system throughout the transition into adulthood. Males were more likely to be charged at all (65% were charged by age 25), but females also exhibited high rates of criminal charge (54% were charged by age 25). Longitudinally, two of the analyses revealed that males exhibited the inverse-U shaped trajectory of increasing criminal involvement into early adulthood, followed by decreasing criminal involvement, which is commonly documented in existing research (Ellis, 1990; Laub & Sampson, 2003; Stolzenberg & D'Alessio, 2007). Females had much flatter trajectories.

Predictors of criminal contact differed by gender. As has been illustrated by many other authors (e.g. Davis et al., 2007; Graves et al., 2007; Johansson & Kempf-Leonard, 2009; Tracy et al., 2009; Zahn et al., 2009), while males and females share much in common, they also have different predictors of justice involvement, commit different types of crimes, experience justice system processing differently, and have different experiences within secure confinement. Unfortunately, many of the studies completed thus far on the predictors of criminal involvement for youth in mental health have not isolated their findings by gender. While Chapter II indicates some variables that may be

uniquely predictive of specific charges by gender, due to small cell sizes within gender these results should be considered tentative until confirmed by future studies. In the meantime, these papers contribute to the general understanding that criminal charge is highly gendered.

Results from these papers consistently indicated that being diagnosed with a substance use disorder was highly related to criminal charges of nearly all types, for both males and females. This is consistent with prior research (Aarons, Brown, Garland, & Hough, 2004; Robertson et al., 2004; Teplin et al., 2002). Longitudinally, being diagnosed with a substance use disorder was related to a heightened risk of criminal charge, but this diagnosis did not affect the rate at which this risk changed over time. Substance use may pose multiple risks in that the purchase, sale, and use of substances is illegal by itself, substance addiction may lead to property crimes to fund the addiction, substance use can lead to criminal behaviors by impeding decision-making skills or encouraging externalizing and troublesome behaviors, and substance use can contribute to the progression of mental health problems. Substance use disorders are, therefore, a logical and empirical indicator of need for early intervention. Similarly consistent with past research (Robertson et al., 2004; Teplin et al., 2002), conduct disorder and oppositional defiant disorder were also related to being charged with a crime. Race was not related to criminal charge in any of the analyses with the exception that African American males were more likely to be charged with a drug crime.

Out-of-home treatment, especially inpatient hospitalization and residential treatment, has a complex relationship with being charged with a crime. In Chapters II and III, there were no significant relationships between receiving out-of-home treatment and

being charged with a crime. Chapter IV, however, revealed that there was a relationship that was more complex and subtle. Immediately concurrent with out-of-home treatment, people in this study exhibited a sharply increased probability of being charged with a crime. While in out-of-home treatment, people exhibited a sharply decreased probability of charge. Upon discharge, the probability of charge returned to its previous levels without any shift resulting from having been in treatment.

What seems to be occurring is that out-of-home treatment is sometimes used as a de facto alternative to incarceration. People are much more likely to begin out-of-home treatment the same week that they are charged with a crime. Probably the event that sparked the criminal charge also sparked the identification of need for out-of-home treatment. While in out-of-home treatment, people are much less likely to be charged with a crime. This is likely due to a combination of a preventative and protectionist role for treatment facilities, as these facilities provide an increase in social control, a decrease in the opportunities to offend, and these facilities are not likely to report minor criminal activities to the police. However, upon discharge people are no more or less likely to be charged with a crime than if they had never entered out-of-home treatment.

Aside from the topical applications of this finding, these results illustrate the benefit of applying longitudinal approaches to research and analysis to help understand the complexity of data, at the cost of increased effort and difficulty of interpretation. Chapters II and III represented cross-sectional and quasi-longitudinal analyses that are beneficial and accurate: in this dataset, a dichotomous measure of receiving out-of-home treatment is not strongly related to a dichotomous measure of ever being charged with a crime from 16 to 25 years old, and it is not related to a dichotomous measure of annually

being charged with a crime. This is an approach similar to many of the existing research articles studying the relationships between mental health services and criminal contact—cross-sectional studies employing dichotomous measures of services.

What these studies fail to consider is that the receipt of services and criminal contact are both dynamic phenomena. Many people repeatedly enter and exit mental health services throughout their lifetime. It may be that it is these localized events, spread on a longitudinal scale, are important contributors to the overall experience of criminal contact. For this dataset, out-of-home treatment does not have a significant relationship with later offense but is strongly related to being charged with a crime while in or out of treatment. Cross-sectional studies cannot illustrate the rate and form of change over time in the aggregate or in individual growth trajectories.

This research supports prior calls for cross system collaboration between the mental health and justice system (e.g. Davis et al., 2007; Graves et al., 2007; Rosenblatt et al., 2000). Collaboration can reduce recidivism and improve functional outcomes (Lipsey, 1995; Pullmann et al., 2006). Mental health staff can assist justice facilities in assessing the mental health needs of these young adults to better respond to their behaviors (Herz, 2001; Jenson & Potter, 2003; Quist & Matshazi, 2000; Stewart & Trupin, 2003; Thomas et al., 2004), and in preparing more appropriate treatment planning during the transition from detention back into the community (Trupin et al., 2004). The chapters above indicate that this collaboration should not end at the transition to adulthood; rather, an increased emphasis should be placed on collaboration through the years of late adolescence and early adulthood.

Residential treatment and inpatient hospitalization have fallen out of favor (Chorpita & Donkervoet, 2005; Huang et al., 2005; Stroul & Friedman, 1986; Stroul & Manteuffel, 2007). Regardless, until other alternatives become widely available there will continue be a need for secure psychiatric facilities. Chapter IV found that youth discharged from OHT do not increase or decrease from their calculated probability of being charged with a crime had they not received services. This evidence, combined with the evidence that OHT provides a preventative role during the delivery of services, must be weighed with the evidence that intensive in-home treatment can be more effective than residential care at prevention of conduct problems post-services (Barth et al., 2007). These are essential considerations in the debate on the utility and cost-effectiveness of OHT. A longitudinal study similar to the current study but comparing randomly assigned OHT to in-home treatment alternatives could be extremely useful in weighing the evidence to determine policy.

Finally, this dissertation has a major implication in terms of analytical methods. By employing a longitudinal method of analysis and considering “time” more flexibly, Chapter IV uncovered relationships previously hidden within the analyses of Chapters II and III. The broader field of children’s mental health often considers longitudinal questions such as the course and development of mental health problems, the effect of treatments which are sometimes administered irregularly, and the interacting effects of mental health treatment, home, education, and community over time. Additionally, the nature of mental health services often prevents the use of highly controlled studies that isolate individuals for broad lengths of time, requiring the use of techniques which can statistically control for time-varying events. And, because mental health services are

often documented by computerized management information systems, children's mental health researchers can access massive longitudinal datasets to help answer important research questions. All of these factors indicate that, as other fields such as education research have done long ago, children's mental health research should more fully embrace longitudinal analytic techniques such as hierarchical linear modeling, survival analysis, and trajectory analysis.



APPENDIX A

Table A.1. Phi Coefficients among Independent Variables for Females

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Race																	
White	.12	-.06	-.09	.04	.04	.05	.02	.06	.08	-.16*	.08	-.13	.06	.08	-.08	-.06	-.07
African Amer.	-.01	.08	.13	-.05	-.03	-.04	-.07	-.10	-.07	.18	.00	-.02	-.07	-.01	.07	-.01	.05
Hispanic	-.05	.05	.01	.03	-.08	-.01	-.06	.08	.02	.04	-.07	-.02	.04	-.16*	.04	.15*	.03
Other	-.14*	-.04	.00	-.03	.05	-.02	.11	-.08	-.07	.03	-.07	.26*	-.06	.03	.02	-.03	.02
Diagnosis																	
1. Mood dx	-	.02	-.18*	-.16*	-.04	.00	-.13	.05	-.06	-.14*	-.10	-.16*	-.02	.00	.01	.10	.12
2. PTSD	-	-	-.12	-.15*	-.26*	-.01	-.11	.10	-.21*	-.10	-.03	-.07	-.14*	-.07	.14*	.07	.16*
3. Thought dx	-	-	-	-.06	-.03	.00	-.10	.05	.02	.29*	.00	.17*	.04	-.15*	.11	.20*	.18*
4. CD/ODD	-	-	-	-	-.01	-.16*	-.08	-.02	-.09	.06	-.03	-.03	-.01	.00	.05	-.20*	-.15*
5. ADD/ADHD	-	-	-	-	-	-.14*	.00	-.11	-.01	-.07	-.08	.22*	-.07	-.04	.10	-.07	-.01
6. Sub. use dx	-	-	-	-	-	-	.06	.24*	.00	-.04	.15	-.03	-.10	-.14*	.08	.19*	.14*
7. Imp. con. dx	-	-	-	-	-	-	-	-.11	.13	-.05	-.06	-.02	-.05	.08	-.09	-.10	-.12
8. Personality dx	-	-	-	-	-	-	-	-	-.06	.01	.13	-.03	.01	-.29*	.23*	.30*	.27*
9. Anxiety dx	-	-	-	-	-	-	-	-	-	.04	.02	-.02	-.06	.06	-.23*	.01	-.17*
10. Develop. dx	-	-	-	-	-	-	-	-	-	-	.04	-.02	-.05	-.13	.10	.05	.04
11. Adj. dx	-	-	-	-	-	-	-	-	-	-	-	-.02	.04	-.04	-.04	.07	-.01
12. Learning dx	-	-	-	-	-	-	-	-	-	-	-	-	-.02	.09	-.07	-.07	-.05
13. Eating dx	-	-	-	-	-	-	-	-	-	-	-	-	-	.01	.01	.05	.08
MH Services 16-25																	
14. Non-OOH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-.72*	-.75*	-.54*
15. Residential	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.40*	.74*
16. Inpatient hosp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.72*
17. Res. and Inp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\*  $p < .05$

Table A.2. Phi Coefficients among Independent Variables for Males

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Race													-				
White	.14*	-.18*	-.19*	-.05	.01	.01	-.06	-.08	.00	.09	.13	.02	-	.21*	-.12	-.19*	-.12
African American	-.05	.02	.20*	.06	-.08	.05	-.04	.10	.04	.00	-.07	-.07	-	-.19*	.11	.19*	.14*
Hispanic	-.13	.21*	.13	.03	.01	-.05	.06	.03	-.03	-.12	-.08	.00	-	-.17*	.12	.10	.06
Other	-.03	-.06	-.06	-.06	.04	.00	-.06	.00	.00	.00	-.05	.07	-	.11	-.13	-.03	-.06
Diagnosis													-				
1. Mood dx	-	-.06	-.22*	.05	-.04	.06	.14*	-.04	.00	-.16*	-.05	-.03	-	.03	.00	-.04	-.02
2. PTSD	-	-	.03	-.05	-.03	-.19*	.04	-.01	-.09	-.10	.04	-.06	-	-.13	.17*	-.01	.05
3. Thought dx	-	-	-	-.21*	-.22*	.14*	-.12	.10	.02	-.01	-.07	-.01	-	-.30*	.24*	.43*	.40*
4. Conduct dx/ODD	-	-	-	-	.03	-.11	.04	.07	-.05	.01	-.07	-.06	-	.04	-.03	-.07	-.07
5. ADD/ADHD	-	-	-	-	-	-.11	.06	-.06	-.10	.10	-.03	.04	-	-.04	.04	-.02	-.01
6. Substance use dx	-	-	-	-	-	-	-.13	-.01	-.06	-.18*	-.12	-.12	-	-.23*	.16*	.32*	.28*
7. Impulse control dx	-	-	-	-	-	-	-	.11	-.06	-.04	-.07	.10	-	-.03	.08	-.04	.03
8. Personality dx	-	-	-	-	-	-	-	-	.02	.09	-.08	.00	-	-.07	.15*	.07	.16*
9. Anxiety dx	-	-	-	-	-	-	-	-	-	-.02	-.01	-.08	-	.01	-.05	.06	.02
10. Develop. dx	-	-	-	-	-	-	-	-	-	-	.00	.09	-	.05	-.07	-.02	-.04
11. Adjustment dx	-	-	-	-	-	-	-	-	-	-	-	-.05	-	-.10	-.01	.09	-.02
12. Learning dx	-	-	-	-	-	-	-	-	-	-	-	-	-	.06	-.01	-.17*	-.11
13. Eating dx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MH Services 16-25																	
14. Non-out-of-home	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-.72*	-.69*	-.50
15. Residential	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.33*	.69*
16. Inpatient hosp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.73*
17. Res. and Inp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\*  $p < .05$

Table A.3. Phi Coefficients between Independent and Dependent Variables for Females

Variable	Any Charge	Serious Violent Charge	Drug Charge	Serious Property Charge	Nuisance Charge
Race					
White	-.02	.02	.04	-.01	-.02
African American	-.03	.03	-.06	-.03	-.01
Hispanic	.00	-.03	-.03	.01	-.02
Other	.06	-.04	.02	.04	.07
Diagnosis					
1. Mood dx	.03	-.07	-.03	-.04	.02
2. PTSD	.07	.06	.01	-.02	.11*
3. Thought dx	-.05	.04	-.11*	.01	-.09
4. Conduct dx/ODD	.15**	.20**	.01	.13*	.06
5. ADD/ADHD	-.06	-.03	-.06	-.01	-.07
6. Substance use ds	.16**	.21**	.15**	.06	.20**
7. Impulse control dx	.00	.04	-.02	.03	-.01
8. Personality dx	-.02	.07	-.10*	.01	.05
9. Anxiety dx	-.02	-.07	.10*	.02	.04
10. Developmental dx	.10*	.22**	-.01	-.12*	.01
11. Adjustment dx	.00	.07	-.03	.05	.13*
12. Learning dx	-.06	-.03	-.03	-.04	-.03
13. Eating dx	-.12*	-.11*	-.08	-.07	-.05
MH services 16-25					
14. Non-out-of-home	-.05	-.02	.11*	-.06	.05
15. Residential	.03	-.04	-.11*	.00	-.04
16. Inpatient hosp.	.02	.09	-.12*	.05	-.06
17. Res. and Inp.	.01	.03	-.13*	.00	-.05

\*  $p < .15$ ; \*\*  $p < .05$

Table A.4. Phi Coefficients between Independent and Dependent Variables for Males

Variable	Any Charge	Serious Violent Charge	Drug Charge	Serious Property Charge	Nuisance Charge
Race					
White	.04	-.07	-.08	-.11*	-.07
African American	.04	.09	.11*	.04	.07
Hispanic	-.05	.02	.01	.07	.03
Other	-.06	-.02	.01	.05	.04
Diagnosis					
1. Mood dx	.04	-.04	.12*	-.01	.12*
2. PTSD	-.01	.03	.00	.09	-.02
3. Thought dx	-.11*	-.13*	-.10*	-.07	-.05
4. Conduct dx/ODD	.18**	.15**	.06	.09	.05
5. ADD/ADHD	.06	.10*	.00	.07	.03
6. Substance use ds	.18**	.12*	.22**	.13*	.23**
7. Impulse control dx	.19**	.15**	.01	.07	.06
8. Personality dx	.01	.02	.08	-.06	.06
9. Anxiety dx	-.16*	-.09	-.14**	-.10*	-.08
10. Developmental dx	-.07	-.06	-.17**	-.14**	-.18**
11. Adjustment dx	-.04	-.03	.00	.03	-.03
12. Learning dx	-.01	-.06	-.11*	.00	-.06
13. Eating dx	--	--	--	--	--
MH services 16-25					
14. Non-out-of-home	.01	.01	-.02	-.10*	-.10*
15. Residential	.00	.02	.00	.04	.07
16. Inpatient hosp.	.00	.01	.04	.09	.12*
17. Res. and Inp.	.01	-.01	.02	.04	.10*

\*  $p < .15$ ; \*\*  $p < .05$

APPENDIX B

Table B.1. Annual Criminal Charge Incidence by Gender and Service Type

Age	Females				Males			
	Non-out-of-home only N=101		Out-of-home services (16-18) N=110		Non-out-of-home only N=84		Out-of-home services (16-18) N=128	
	<i>n</i>	Arrest rate	<i>n</i>	Arrest rate	<i>n</i>	Arrest rate	<i>n</i>	Arrest rate
13	4	.04	7	.06	7	.08	18	.14
14	11	.11	14	.13	20	.24	24	.19
15	13	.13	10	.09	19	.23	3	.28
16	8	.08	9	.08	17	.20	23	.18
17	8	.08	12	.11	23	.27	28	.22
18	15	.15	12	.11	28	.33	34	.27
19	11	.11	17	.16	19	.23	25	.20
20	21	.21	14	.13	23	.27	29	.23
21	11	.11	15	.14	16	.19	33	.26
22	11	.11	13	.12	16	.19	26	.20
23	9	.09	17	.16	15	.18	25	.20
24	15	.15	11	.10	8	.10	24	.19

Note. No  $\chi^2$  tests between service types were significant during any year

Table B.2. Cumulative Criminal Charge Prevalence by Gender and Service Type

Age	Females				Males			
	Non-out-of-home		Out-of-home services		Non-out-of-home		Out-of-home services	
	<i>n</i>	Cum. % arrested	<i>n</i>	Cum. % arrested	<i>n</i>	Cum. % arrested	<i>n</i>	Cum. % arrested
13	6	.06	7	.06	14	.17	21	.17
14	14	.14	19	.17	28	.33	37	.29
15	21	.21	24	.22	36	.43	54	.42
16	26	.26	28	.26	41	.49	60	.47
17	30	.30	34	.31	45	.54	70	.55
18	35	.35	37	.34	49	.58	78	.61
19	40	.40	43	.39	49	.58	81	.63
20	46	.46	48	.44	51	.61	84	.66
21	47	.47	50	.46	51	.61	85	.66
22	48	.48	54	.49	53	.63	85	.66
23	50	.49	61	.56	53	.63	85	.66
24	52	.52	61	.56	53	.63	85	.66

Note. No  $\chi^2$  tests between service types were significant during any year

Table B.3. Annual Incidence and Cumulative Prevalence of Youth Charged with a Crime at Each Age for Youth with a Diagnosis of Conduct Disorder or Substance Use Disorder

Age	Non-out-of-home N=43		Out-of-home N=65		Non-out-of-home N=43		Out-of-home N=65	
	<i>n</i>	% arrested	<i>n</i>	% arrested	<i>n</i>	Cum. % arrested	<i>n</i>	Cum. % arrested
13	3	.07	17	.26	6	.14	19	.29
14	14	.33	16	.25	16	.37	28	.43
15	9	.21	21	.32	19	.44	36	.55
16	8	.19	15	.23	22	.51	39	.60
17	10	.23	23	.35	24	.56	47	.72
18	12	.28	19	.29	25	.58*	50	.77*
19	12	.28	18	.28	26	.61*	51	.79*
20	14	.33	17	.26	29	.67	52	.80
21	7	.16	15	.23	29	.67	52	.80
22	6	.14	14	.22	29	.67	52	.80
23	9	.21	19	.29	30	.70	54	.83
24	3	.07*	19	.29*	30	.70	54	.83

\*  $p < .05$ ,  $\chi^2$  test between service user groups

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