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Effects of Out-of-Home Mental Health Treatment on Probability of Criminal Charge During the Transition to Adulthood

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Abstract

Criminal justice-related 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 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 during treatment, but it had no relationship to post-treatment probability. Longitudinal probability of being charged was moderated by gender; females did not experience a peak probability time whereas 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. Evidence indicated that out-of-home treatment was used as an alternative to detention and incarceration for both juveniles and adults.

Keywords

young adults; juvenile offenders; out-of-home treatment; residential treatment; inpatient hospitalization; justice system; mental health treatment; substance abuse treatment

It is well established that young adults receiving mental health services are disproportionately likely to have contact with the justice system, and that juveniles in the justice system have disproportionately high rates of mental health diagnoses and mental health service utilization (Aarons, Brown, Hough, Garland, & Wood, 2001; Cocozza & Skowrya, 2000; Davis, Banks, Fisher, & Grudzinskas, 2004; Graves, Frabutt, & Shelton, 2007; Pullmann et al., 2006). Young adults with mental and behavioral health problems who receive highly restrictive out-of-home treatment (OHT) such as residential treatment or inpatient hospitalization may be at an especially high risk for involvement with the justice system. As evidenced by the serious nature of the services they receive, individuals who receive OHT have more severe and chronic problems when compared to their peers, which may be related to an increased likelihood of intervention and placement in secure environments, including detention and jail (Cropsey, Weaver, & Dupre, 2008). Compounding the likelihood of crossover between mental health treatment and the justice system, OHT is sometimes used as an alternative to detention for youth with serious mental health problems.

Questions remain, however, about the effectiveness of OHT as a treatment for the type of behavioral health problems likely to cause problems with the law. There are strong

theoretical arguments both for and against whether OHT is an effective treatment for deviant behavior. Those opposed to OHT argue that the institutional nature of residential treatment may be ineffective at preparing people for community living and that it may isolate individuals from natural supports. They also argue that 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). Additionally, restrictive services come with an opportunity cost, as young adults are institutionalized during the time that their noninstitutionalized peers are acquiring skills for adulthood and independent living. In other words, not only are these services likely indicative of a delay in the youth's development, they might actually contribute to further problems.

On the other hand, these treatment settings may perform exactly as they are intended: they may therapeutically address problematic behavioral health problems such as externalizing disorders or substance use disorders, which would logically be related to a decrease in criminal actions. Unfortunately, despite the fact that residential treatment and inpatient hospitalization are the two most intensive and expensive services for youth with mental health problems (Stevens, Ruiz, Bracamonte-Wiggs, & Shea, 2006), there is surprisingly limited and inconsistent research on the long-term criminal justice outcomes for youth who have been treated for mental health problems in OHT (Barth, 2002).

The few studies that have been conducted have had mixed results (Cathcart-Shabat, Lyons, & Martinovich, 2008; Hooper, Murphy, Devaney, & Hultman, 2000; Huefner, Ringle, Chmelka, & Ingram, 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, youth improve in a variety of domains (Hair, 2005), but treatment effects may decline over time post-discharge (Hooper et al., 2000). Other studies have found worse outcomes from OHT when compared to other forms of treatment. 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. These studies were limited due to their short follow-up periods, use of imprecise outcome measures, and lack of control over multiple periods of OHT.

The current study addresses these limitations while contributing a fresh analytic approach to the topic. The impact of OHT is explored by statistically modeling the longitudinal, time-varying probabilities of being charged with a crime for young adults who received OHT while controlling for several other factors known to be related to offending. Although there are dozens 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 current analysis uses age, gender, past indicators of criminal offense, history of mental illness, race, and life events.

Age is highly correlated with criminal and deviant behavior. Studies consistently indicate that criminal behavior peaks during late adolescence and young adulthood, from approximately 16 to 25 years of age (Ellis, 1990; 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).

Gender is a major predictor—males commit crimes at rates far surpassing females, even in adolescence (Stahl, 2008; Stahl et al., 2007). 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, Banks, Fisher, Gershenson, & Grudzinskas, 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 (Aarons, et al., 2001; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002). There are also well-established racial differences. Compared to their White peers, Black young adults are proportionally more involved in the justice system (Snyder & Sickmund, 2006; Stahl, 2008).

Life events such as changes in employment, marital status, or living situation, can have a large impact on criminal behavior. In a classic study of the impact of life events, Horney, Osgood, and Marshall (1995) tracked the longitudinal offending patterns and life changes of 658 convicted felons. They found significant intra-individual variation in offense patterns which were strongly related to life changes, which provided evidence that person-level factors are not wholly determinant of criminal behavior. Life changes associated with increased levels of social control (e.g., admission to OHT) are particularly related to a decreased likelihood of offending while in that situational context (Hirschi, 2008; Horney et al., 1995; Sampson & Laub, 2005).

Present Study

The current study is a secondary data analysis of a subset of existing data that has been described elsewhere (Davis et al., 2007; Davis, Fisher, Gershenson, Grudzinskas, & Banks, 2009; Pullmann, in press). The current study builds on and expands previous work conducted with this dataset in several important and distinctive ways, and it also makes several new contributions to the broader literature base. Most significantly, this study takes a long-term, fully longitudinal approach to the analysis of change during the transition to adulthood, a period of life which is considered of critical importance to long-term functioning but during which mental health service delivery is often plagued by problems related to policy and isolated funding streams (Hoffman, Heflinger, Athay, & Davis, 2009).

This study is the first to address this particular research question while utilizing a hierarchical growth modeling approach to examine and control for the impact of demographic factors such as gender, race, previous involvement with the law, and psychiatric diagnosis and time-varying factors including age and placement in OHT. This analysis is also the first to include characteristics of the effects of time, including an examination of rate and form of change of probability of being charged with a crime, rather than simple pre-post comparisons or tallies over a cross-sectional time window.

Additionally, the study is unique in its exploration of a wide array of possible interaction effects among demographic and time-varying factors, including the possible moderating effects of age, gender, current placements in OHT, immediate and decaying effects post-OHT, and psychiatric diagnoses. Unlike all existing studies, this analysis includes and controls for multiple episodes of OHT, which are likely to reduce opportunities to offend, and which may have confounded previous studies and led to inappropriate conclusions.

Finally, the current study specifies the population as mental health utilizers, rather than juvenile detention populations for whom OHT is 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, Marshall, Herz, & Hernandez, 2008), and it specifies the

dependent variable as being charged with a crime rather than a composite measure of several factors (e.g. Barth et al., 2007).

Hence, this study is unique in that it examines whether there is an impact on likelihood of being charged with a crime before, during, or after a placement in OHT, and if so, whether this impact is sustained or decays, all while controlling for other important factors. This study also explores the possible moderating impact of these other factors on probability of criminal charge and changes in probability of criminal charge.

Methods

Data Source

The current data are from a statewide cohort of people born in 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 25th birthday by the time data were collected from the justice system.

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. The second source was the state of Massachusetts' Criminal Offender Record Information system (CORI). CORI contains juvenile and adult justice system data, including all data generated up to the age of 25 for each person in the system.

Variables—Variables used in this analysis are depicted in Table 1. The variable from the CORI database was date of any charge. Status offenses were not included. Variables used from the DMH database were 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. All out-of-home placements were focused on mental health and/or substance abuse treatment. Neither residential treatment nor inpatient hospitalization was court mandated or an alternative to detention. Unfortunately, the dataset does not provide more detail on the type of OHT provided or the clinical rationale for the referral to treatment.

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 16th birthday and continuing to the person's 25th birthday, for a total of 467 week-long periods.

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 1. Level-1 included rate-of-change variables, such as the indicator for time (e.g., WEEK, a linearly increasing indication of time), curvilinear representations of time (i.e., 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 (Black 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: a) substance use disorders, including abuse or dependence on any drug, excluding nicotine, and; b) conduct disorder and oppositional defiant disorder, which were grouped together and listed as *conduct disorder*, due to low rates of ODD and the similarity of these diagnoses. Diagnoses of substance abuse were always co-occurring with other mental health diagnoses.

This data had some idiosyncrasies limiting the utility of the diagnostic variables. First, diagnoses were made by clinical staff at mental health service provider agencies and were likely influenced by human biases and subjective interpretations of behavior. As with any mental health condition, diagnoses may have been assigned prior to a full and considered assessment period. Second, diagnoses may have occurred at any point during the study window, possibly before or after being charged with a crime. This was done as a necessary compromise due to the lack of an “end date” for diagnoses, and the fact that the “start date” for diagnosis is not necessarily when the mental health problems may have begun. Unfortunately, this implies that diagnoses are permanent traits when clearly they are not; however, it should be noted that prior studies of the relationship of mental health diagnoses or problems to criminal contact have this same limitation, where diagnosis at one point in time is treated for purposes of analysis as stable throughout a longer period of time (e.g. Cathcart-Shabat et al., 2008; Cauffman et al. 2005; Graves et al., 2007; Rosenblatt, Rosenblatt & Biggs, 2000).

Sample

Table 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). Participants spent a widely varying percentage of time in OHT over the 467 weeks of the study, and the distribution of amount of time spent in OHT was positively skewed, $M = 20\%$ (93 weeks total per person), $Mdn = 13\%$ (56 weeks total per person) spent in OHT. Similarly, participants had a widely varying percentage of weeks during which they were charged with a crime, $M = 1.04\%$ (4.8 weeks total per person), $Mdn = 0.68\%$ (3.2 weeks total per person).

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 week-long data periods for individuals 16 to 25 years of age. 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 was used in this case because the non-independence of observations (time periods nested within youth) and the binary outcome (arrest vs. no arrest) would violate ordinary least squares regression 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 because level-1 does not contain an error term and the logistic model is inherently probabilistic (Horney et al., 1995). 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 in out-of-home treatment (INOHT) and gender to this time-based model, as the principal research question was whether the probability of being charged with a crime differed if an individual was in OHT. 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 control variables: number of charges by 16 years of age, race, diagnosis, and several possible interaction variables. Throughout model building, several interaction variables were included at appropriate times, though these variables are not depicted in Table 1 due to space considerations. These variables included level-2 $\times$ level-1 interactions for all variables representing a rate of change. For instance, models were run including FEMALE $\times$ WEEK, FEMALE $\times$ AGE19+, FEMALE $\times$ INOHT, and so forth. These tested for the possibility that slopes or intercepts were differentially related to gender. For example, FEMALE $\times$ WEEK tested 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 testing of coefficients, change in model variance and chi-square, and the impact of variable inclusion on other variables in the model. Variables related to rate of change were allowed to randomly vary, as it was expected that the time slopes varied across individuals, 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.

Results

Model 1 through Model 3

Results for some illustrative preliminary models and the final model are shown in Table 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 $.068$ through the logit-link function). Model 2 built time trends into the model. Although quadratic and cubic polynomials of WEEK significantly contributed to the model, 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 that 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:

$$\begin{aligned} \text{Level-1 model: } \eta &= \pi_0 + \pi_1 (\text{WEEK}) + \pi_2 (\text{AGE19+}) + \pi_3 (\text{POST19}) + \pi_4 (\text{INOHT}) + \\ &\quad \pi_5 (\text{STRTWEEK}) \\ \text{Level-2 models: } \pi_0 &= \beta_{00} + \beta_{01} (\text{SUBUSE..}) + \beta_{02} (\text{NUMCH16..}) + r_0 \\ \pi_1 &= \beta_{10} + \beta_{11} (\text{GENDER}) + r_1 \\ \pi_2 &= \beta_{20} + \beta_{21} (\text{GENDER}) \\ \pi_3 &= \beta_{30} + \beta_{31} (\text{GENDER}) \\ \pi_4 &= \beta_{40} \\ \pi_5 &= \beta_{50} \end{aligned}$$

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

There are several important findings from this model. Because it 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. Hence, Table 3 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 1 depicts modeled probabilities for three hypothetical “types.” These probabilities have been converted from the log-odds model coefficients through a logit-link function.

Being in OHT significantly reduced the probability of being charged with a crime. When in OHT, the odds of criminal charge were 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, being in OHT provided a protective role, but did not significantly affect an individual’s likelihood of being charged with a crime after discharge, and there was no longer term decay effect or lagged improvement. 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. Beyond age 19 the slope for males was reduced, though it remained slightly increasing, and the slope for females remained essentially flat. Polynomic functions of time, however, were also significant but not retained because the sudden “drop” in probability of charge at age 19 modeled the data best. Therefore it is possible that this change was actually a more gradual process from age 18 through 21.

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 Black 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.

Estimated protective impact—Because this model demonstrated that currently living in OHT was related to a decreased probability of offense, a post-hoc analysis was completed to determine the size of the estimated protective impact while living in OHT. In order to avoid unreliable estimates, two cases were removed because those individuals spent all or nearly all of the study period in some form of OHT. An estimate of the additional number of weeks with a charge which would be expected for each individual, had they not been placed in OHT, was derived. This was done by applying the estimated probability of criminal charge for each individual when not in OHT to the amount of time they were in OHT, and subtracting the actual number of weeks with charges for each individual while in OHT from this estimated score.

Findings indicated that living in OHT may have prevented an estimated mean of 0.4 weeklong periods with criminal charges per person, though this distribution was positively skewed, $MDN = .16$. For 80% of the sample, the estimated number of reduced weeks with charges was considered negligible (i.e., less than one week) or negative (i.e., the participant had more charges while in OHT than predicted if they were not in OHT). Hence, although this model predicts that the overall estimated odds of being charged with a crime during any week is reduced by 43% while in OHT, the combination of three factors produced a relatively small estimated protective impact of OHT: a) many youth were still charged with a crime while in OHT, b) being charged with a crime was relatively rare no matter the living situation, and c) most individuals spent only a limited time in OHT.

Discussion

Residential treatment and inpatient hospitalization have fallen out of favor (Chorpita & Donkervoet, 2005; Huang et al., 2005; Stroul & Friedman, 1994; Stroul & Manteuffel, 2007). This is likely due to their expense and lack of consistent evidence of long-term benefits (Barth et al., 2007; Hoagwood, Burns, Kiser, Ringeisen, & Schoenwald, 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 to be a need for secure psychiatric facilities. Other countries have witnessed negative consequences from closing OHT facilities before the availability of more positive alternatives. In Australia, for instance, closure of OHT facilities has been attributed to

increases in juvenile detention, homelessness, emergency room visits, and crisis foster care (Ainsworth & Hansen, 2005). It seems self-evident that sometimes people need to be in highly contained, structured, and safe environments in order to avoid causing harm to themselves or others.

The current study revealed that OHT can play a role in the temporary prevention of criminal charge. Living in OHT was related to a 43% decreased odds of being charged with a crime during any week. It is likely that OHT provides a protective role by limiting opportunities for people to commit a crime. 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). Of course, it is also likely that many offenses that occur within an OHT environment are dealt with internally and not reported to the police, though several youth were charged with a crime while in OHT.

This finding does not necessarily lend support to the use of OHT, as *preventative* confinement without due process is illegal in the United States and has serious ethical implications. Also, it is important to consider that the size of any preventive impact was relatively small, with estimates indicating that an average of only 0.4 weeks with criminal charges per person were avoided over an average of 93 weeks per person of OHT. This represents an average of approximately one criminal event avoided for every *four years* a person spent in OHT. In addition, OHT had no relationship to the subsequent risk of being charged with a crime immediately after discharge, and hence, no *decay effect* over a longer time period. There was also no ramped or lagged improvement after discharge. This lack of association between receipt of OHT and change in probability of subsequent criminal charge was not differentiated by gender, number of prior offenses, or a diagnosis of SUD or CD. Hence, the principal finding is that people were less likely to offend while in OHT, but after discharge they were no “better” or “worse” than prior to treatment. In terms of criminal charge, OHT effectively contained young adults but it did not appear to be effective in treating problems related to future criminal offending. For this particular outcome variable, OHT may be better termed *out-of-home containment*.

Policy makers should balance this estimated impact with the costs of other forms of care, containment, or supervision. OHT is costly, with inpatient hospitalization and residential treatment constituting the two most expensive forms of care for adolescents with mental health problems. When compared to the daily costs of housing a young adult in juvenile detention, residential treatment costs nearly twice as much, and inpatient hospitalization is between 3 and 4 times as expensive (Stevens et al., 2006). The cost of intensive in-home treatment or other alternatives such as treatment foster care can be roughly the same or less expensive than more restrictive placements, and have demonstrated equivalent or better effects on adolescent functioning in a variety of domains (Barth, 2002; Barth et al., 2007; Stevens et al., 2006). The results from these studies, combined with findings from the current study, suggest that for treating and preventing behaviors related to delinquent and criminal activity in the general population of youth with mental health disorders, OHT may not be worth the cost. Future research should focus more explicitly on the ability of intensive in-home treatment and other alternatives to OHT to prevent criminal behavior, in addition to the studies on general functioning that have already been conducted.

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. Community-based transition supports and services could include activities with an increased emphasis on social control, such as in-home visits or community based mental health check-in centers.

Other findings from this study confirmed established research. Males exhibited the inverse U-shaped trajectory in which offending peaks in young adulthood (Ellis, 1990; Laub & Sampson, 2003; Stolzenberg & D'Alessio, 2007), though in this study at age 19 the polynomial (U-shaped) functions were also significant. The offense probability trajectory for females was flatter, but also peaked at 19. This finding of differential involvement and gender-based interactions with time is consistent with the published literature on gendered pathways to offending and experiences with the justice system (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).

Other variables related to increased probability of offense included higher number of charges prior to 16 years of age and being diagnosed with a SUD. While being diagnosed with CD was not significant, 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 are illegal, and substance use may be related to aggression 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, 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 has been well-documented (Hawkins, Laub, & Lauritsen, 1998; Snyder & Sickmund, 2006; Stahl, 2008).

Limitations

There are limitations to this dataset, as in any secondary analysis of existing data obtained through management information systems. Primarily, this study was not controlled through randomized design and was limited to the variables available. Causality (or lack thereof) is impossible to determine with certainty, though statistical controls were used. It is also important to emphasize that this study makes no claim as to the quality or approach of individual treatment facilities. 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. Underestimates of these events may also occur because of the limits of matching datasets based on unique identifiers. Additionally, diagnoses were made by clinical staff and not by empirically-based measures, so they may be subject to error due to bias and subjectivity. Notably, it seems probable that staff with knowledge about a client's contact with the law would be more likely to diagnose CD or substance abuse. Diagnosis was not analyzed as a time-varying covariate, essentially treating it as an aspect of the individual that endures throughout the entire timeframe. Though this is a similar approach to most, if not all, previous studies that examine the relationship between diagnosis and criminal contact, it should be noted that this is a limitation of the study and that diagnoses are not actually conceptualized as permanent traits.

Despite these limitations, this study significantly adds to the research base by focusing precisely on the empirical relationship of OHT to criminal charge across a lengthy period of time, for a population of concern—young adults with mental health problems who are transitioning to adulthood. Modeling techniques such as HGLM are excellent tools for appropriately studying longitudinal change and continuity. It would be helpful for future researchers to use more refined measures of offending and change, going beyond service receipt to include specific types of services and other 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.

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Figure 1.
Estimated growth models. SUD = substance use disorder.

Table 1

Variables Included in Modeling

Variable	Description	Purpose
Level-1	Rate of change and time-varying	Models linear probability of charge over time and change due to events
CHARGE	Charged with any crime, week-specific	Dependent variable
WEEK	Linear change trajectory	Linearly increasing indication of time beginning at 16 th birthday and continuing to 25 th birthday for 467 week-long periods
WEEK ²	Quadratic change trajectory	Models curvilinear (quadratic) probability slopes
WEEK ³	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 OHT)	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
Level-2	Person-level	Models the probability of charge intercepts due to person-level factors
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 disorder
SUBUSE	1 = Substance use disorder	Models intercepts by substance use disorder
RACEWH	1 = White	Models intercepts by White
RACEAA	1 = African American	Models intercepts by African American

Note. OHT = out-of-home treatment.

Table 2

Descriptive Statistics

Variable	n/M	Valid %/ <i>SD</i>	Missing <i>n</i>
Level-2, Person Level (<i>N</i> = 143)			
Female	61	42.7	
<i>M</i> number of charges before age 16	2.2	4.0	
Race is White	103	72.0	
Race is Black	17	11.9	
Race is other	23	16.1	
Conduct disorder	32	22.4	
Substance use disorder	51	35.7	
Level-1, Time-Variant (<i>N</i> = 66,453)			
Weeks charged with a crime	686	1.04	
Median weeks charged		0.68	
Weeks in OHT	13,469	20.3	328
Median weeks in OHT		12.8	
Weeks began OHT	377	0.6	328

Note. OHT = out-of-home treatment

Table 3

Hierarchical Generalized Linear Model Predicting Being Charged With a Crime

	Model 1		Model 2		Model 3		Model 4		Model 4 OR	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	OR	95% CI
Intercept	-4.5544*	.0680	-4.7433*	0.0855	-4.6027*	0.1027	-4.6704*	0.1040	0.0093	0.008, 0.012
Number of charges by 16							0.0263*	0.0105	1.0267	1.006, 1.048
Substance use disorder (Grand <i>M</i> centered)							0.4682*	0.0914	1.5971	1.333, 1.913
In out-of-home treatment					-0.5459*	0.1071	-0.5687*	0.1107	0.5662	0.456, 0.703
STARTWEEK					0.9570*	0.2383	0.9431*	0.2709	2.5679	1.510, 4.367
WEEK ^a			0.4311*	0.0101	0.5897*	0.1213	0.5963*	0.1245	1.8154	1.420, 2.321
FEMALE in WEEK					-0.6810*	0.1425	-0.6560*	0.1466	0.5189	0.389, 0.683
AGE19+ ^a			-0.4451*	0.1081	-0.7148*	0.1393	-0.7143*	0.1448	0.4894	0.369, 0.650
FEMALE in AGE19+					0.9441*	0.2383	0.9380*	0.2549	2.5550	1.550, 4.210
POST19			-0.3587*	0.1091	-0.4888*	0.1352	-0.5003*	0.1396	0.6063	0.461, 0.797
FEMALE in POST19					0.5195*	0.1722	0.5017*	0.1752	1.6515	1.172, 2.328
Not significant										
POSTOUT					NS					
MNPSOUT					NS					
Conduct disorder									NS	
Race—White									NS	
Race—Black									NS	
Interactions with all time variables:										
In out-of-home treatment					NS					
Conduct disorder									NS	
Substance use disorder									NS	
Number of charges by 16									NS	
Variance Components										
Intercept, u0			0.8436*		0.7291*		0.6725*			

	Model 1		Model 2		Model 3		Model 4		Model 4 OR	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	OR	95% CI
WEEK			0.0987*		0.0894*		0.0893*			

Note. OHT = out-of-home treatment. POST19 = linearly increasing indicator of number of weeks since turning 19. WEEK = linear change trajectory. STARTWEEK = linearly increasing indicator of number of weeks since discharge from last OHT, resets when new treatment begins. POSTOUT = Linearly increasing indicator of number of weeks since discharge from last OHT, resets when new treatment begins. MNPSOUT = indicates weeks that fall within one month of discharge from last OHT, resets when new treatment begins.

^aWEEK and POST19 were transformed to be more interpretable by dividing by 100.

*
p < .01