



Research and Evaluation

Probability of Commitment to the Oregon Youth Authority among Children and Youth Receiving Mental Health Treatment Services

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Introduction

Presented below is the second of three brief reports on the latest findings from the Oregon Youth Authority's (OYA) ongoing juvenile justice feeder system research (e.g., Braun 2014, 2015a, 2015b). OYA's feeder system work focuses on identifying youth at risk of becoming involved with the juvenile justice system using individual and family-level data from partnering social service agencies. OYA's preliminary feeder system analysis (Braun, 2014) determined whether future OYA involvement could be prevented through identifying opportunities to intervene earlier in the lives of at-risk children and youth. Results showed that such prevention opportunities do exist; indeed 90% of youth committed to OYA between 2000 and 2013 were involved with at least one Department of Human Services (DHS) or Oregon Health Authority (OHA) program an average of 6 years before commitment. The next feeder system study identified agencies whose client populations are most likely to experience future involvement with OYA. Findings suggest that Child Welfare, Mental Health Treatment Services, and Alcohol and Drug Treatment Services serve the largest concentrations of future OYA youth. The current series of studies is focused on identifying the individual and/or family-level characteristics and service utilization patterns within these client populations that impact the probability of OYA involvement. This information can be used to develop programs intended to divert youth from coming to OYA.

The first report in this series summarized an analysis predicting OYA commitment among children and youth involved with the Oregon Child Welfare system (Braun, 2015b). In a similar vein, we present an analysis of children and youth involved with OHA's Mental Health Treatment Services and the probability of future OYA commitment. The final report in this series will be focused on the population served by Alcohol and Drug Treatment Services and is forthcoming.

Mental Health Treatment Services Involvement among OYA Youth

OYA's earliest work on the feeder system showed that 58% of youth committed to felony probation or close custody for the first time between 2000 and 2013 had histories of involvement with OHA's Mental Health Treatment Services (Braun, 2014). Records indicate these youth experienced a range of mental health services prior to OYA commitment including child and adolescent basic outpatient treatment, crisis services, psychiatric day treatment, and psychiatric residential treatment. Those who accessed Mental Health Treatment Services prior to OYA commitment were on average 12 years old at the beginning of their first treatment episode, and this first episode began about 3 years prior to their involvement with OYA. Female youth were more likely than male youth to have been involved with mental health treatment prior to first arriving at OYA. Caucasian and African American youth were more likely to have experienced mental health treatment compared to Native American and Asian youth; and Hispanic/Latino youth were the least likely to have been involved with mental health treatment prior to OYA commitment. Youth committed to OYA probation and close custody as juveniles were more likely to have histories of mental health treatment relative to those entering close custody under an adult sentence. Finally, results indicated that involvement with Mental Health Treatment Services is not significantly related to youths' overall risk of recidivism but is significantly associated with the risk of recidivism for a violent offense.

The next feeder system analysis compared a selection of OYA youth from the first study with a group of similarly-aged youth randomly selected from historical DHS/OHA client records (Braun, 2015a). DHS and OHA service histories were compared between the two groups to identify program areas serving the largest concentrations of youth who were later committed to OYA. Findings indicated that OYA youth were significantly more likely to have histories of involvement with Mental Health Treatment Services, Child Welfare, and Alcohol and Drug Treatment Services relative to non-OYA youth. Approximately 59% of youth who were later committed to OYA had histories of involvement with Mental Health Treatment Services, whereas only 20% of the comparison group had similar histories. Predictive models indicated the likelihood of OYA commitment was significantly influenced by prior history of Mental Health Treatment Services; indeed, sampled youth who were involved with mental health treatment before the study end date were nearly five times more likely to be committed to OYA than youth with no history of mental health treatment. Overall, findings from the second feeder system analysis suggest that youth who become involved with OYA are more likely than other youth to have received mental health treatment—certainly due to a higher prevalence of mental health issues and a greater need for treatment.

Current Study

Findings from the first two OYA feeder system studies demonstrated the significant prevalence of involvement with Mental Health Treatment Services and estimated the impact of mental health treatment need on the likelihood of OYA commitment. Results suggest that OHA's Mental Health Treatment Services unit attends to a large proportion of future OYA youth. Knowing this, our analysis now focuses on uncovering the specific individual and/or family characteristics and service utilization patterns that impact the probability of OYA commitment among those involved with Mental Health Treatment Services.

Data

More than 13 years of mental health treatment records were collected from OHA’s Mental Health Treatment Services’ Client Process Monitoring System¹ and matched with OYA commitment records from 2000 to 2013. Records from other DHS and OHA program areas serving children and youth between 2000 and 2010 were also matched including Alcohol and Drug Treatment Services, Child Welfare, Self-Sufficiency, and Medical Assistance.

The initial dataset contained over one million mental health treatment episodes experienced by 441,658 clients in Oregon. The goal of the current study is to assess the probability of OYA commitment among Mental Health Treatment Services clients—some of whom experienced later involvement with OYA and others who did not. Therefore, similar to previous work (Braun, 2015a, 2015b) the initial dataset was first limited to include only clients who could have possibly been committed to OYA within the same time period covered by OYA youth records (i.e., January, 2000 through July, 2013). In order to be “eligible” for possible commitment to OYA, a youth must be between the age of 12 and 19 years old at the time of adjudication. Therefore, individuals were limited to those who were born between January, 1981 and July, 2001 and whose records did not indicate they passed away before the age of 12 (when available).² Data were further restricted to include only mental health treatment episodes where the client was age 19 or younger when the episode began. A single mental health treatment episode was then chosen randomly for each client to assure balance of the predictive model across the mental health treatment continuum. Elimination of records based on this criteria resulted in a final sample of 133,529 Mental Health Treatment Services clients and treatment records.

Administrative records of involvement with Alcohol and Drug Treatment Services, Child Welfare, Self-Sufficiency, and Medical Assistance were summarized up to each client’s study end date (i.e., date of OYA commitment for clients who became involved with OYA and date of 19th birthday for clients who did not). Summarized records were matched at the individual level with mental health and OYA data. The final dataset reflected each client’s involvement with these program areas up to their study end date.

Sample

The final sample included 133,529 individuals born between 1981 and 2001 who were clients of OHA’s Mental Health Treatment Services in Oregon between 2000 and 2013. Just over 4% (n=5,798) of the sample were committed for the first time to OYA probation or close custody between 2000 and 2013. Table 1 shows demographic information for the full sample. Approximately 51% of the sample is male, and 49% is female. Caucasian is the most frequently represented racial/ethnic group (76.8%) followed by Hispanic/Latino (12.3%), African American (5.1%), Native American (3%), Other/Unknown (1.6%), and Asian (1.1%). On average, individuals in

¹ Individuals enrolled in the Client Process Monitoring System (CPMS) include those whose mental health treatment is paid for with public funds (e.g., Medicaid, Oregon Health Plan, Medicare, state and federal grants, etc.).

² Date of death is only available for individuals who were involved with select program areas including Self-Sufficiency, Medical Assistance, and CPS (i.e., in cases where the maltreatment type associated with the claim is Fatality).

Table 1. Demographic information for the full cohort of children and youth in Mental Health Treatment Services (n=133,529).

	N	%	Mean	SD	Range
Sex					
Female	65,323	48.9%			
Male	68,206	51.1%			
Race/Ethnicity					
Caucasian	102,564	76.8%			
Hispanic/Latino	16,477	12.3%			
African American	6,823	5.1%			
Native American	4,035	3.0%			
Other/Unknown	2,149	1.6%			
Asian	1,481	1.1%			
Age at first known Mental Health Treatment Services episode			11.6 yrs	4.2	0-19 yrs
Newborn-3 years	4,393	3.3%			
4-6 years	15,826	11.9%			
7-9 years	22,125	16.6%			
10-12 years	27,638	20.7%			
13-15 years	36,736	27.5%			
16 years or older	26,811	20.1%			
Current Mental Health Treatment Services episode number			1.5	1.3	1-45
First episode	97,575	73.1%			
Second episode	20,950	15.7%			
Third or higher episode	15,004	11.2%			

the sample were 11.6 years old ($SD = 4.2$) at the time of their first contact with Mental Health Treatment Services; and about 73% of the treatment episodes were the clients' first.

Analysis

The sample was divided randomly into a training set (80%) used to develop the predictive model and a testing set (20%) used to evaluate model accuracy. Following procedures recommended by Homer, Lemeshow, and Sturdivant (2013), relationships among variables were examined through correlation analyses conducted with the training set and selected for modeling based on their associations with the outcome (i.e., future OYA commitment yes or no) and each other (i.e., not highly intercorrelated).

Results

Similar to previous work (e.g., Braun, 2015b), variables were entered into the predictive model so that the effects of gender and race/ethnicity on OYA commitment could be statistically controlled.

After controlling for these factors, constructs representing individual characteristics and service utilization patterns were entered into a backward stepwise logistic regression model predicting OYA commitment within the training set. The predictive model was then applied to individuals in the testing set to assess model accuracy, sensitivity, and specificity.

Results of the final model developed in the training set are displayed in Table 2. Eleven variables including gender and race/ethnicity remained in the model at its final step. All together gender, race/ethnicity, involvement with Alcohol and Drug Treatment Services, number of mental health treatment referrals made by the criminal justice system, percentage of incomplete mental health treatment episodes, involvement with Self-Sufficiency, experience with foster care, number of psychiatric residential treatment episodes, age at first known mental health treatment, number of mental health treatment referrals made by oneself or one’s personal support system, and number

Table 2. Final step of the backward stepwise logistic regression model predicting OYA commitment among the training sample of Mental Health Treatment Services clients in Oregon (n=106,823).^a

	β	S.E.	Wald	df	Sig.	Odds ratio
Constant	-4.96	0.08	3440.55	1	.000	0.007
Child gender (Male)	1.31	0.03	1158.57	1	.000	3.73
Race/Ethnicity: African American	0.40	0.06	45.91	1	.000	1.49
Race/Ethnicity: Other/Unknown	-0.76	0.17	19.01	1	.000	0.46
Race/Ethnicity: Asian	-0.28	0.17	2.79	1	.095	0.75
Race/Ethnicity: Hispanic/Latino	0.03	0.04	0.54	1	.463	1.36
Race/Ethnicity: Native American	-0.02	0.08	0.06	1	.797	0.97
Alcohol & Drug Treatment Services involvement (Yes/No)	1.31	0.03	1480.22	1	.000	3.70
Number of mental health treatment referrals made by the criminal justice system	0.84	0.02	1115.27	1	.000	2.33
Percentage of mental health treatment episodes that were not completed for any reason	0.65	0.03	286.20	1	.000	1.92
Self-Sufficiency involvement (Yes/No)	-0.54	0.03	205.62	1	.000	0.58
Foster Care involvement (Yes/No)	0.55	0.03	199.10	1	.000	1.73
Number of psychiatric residential treatment episodes	0.19	0.02	96.92	1	.000	1.21
Age at first known mental health treatment episode	0.03	0.01	62.41	1	.000	1.03
Number of mental health treatment referrals made by client’s personal support system (including self-referral)	-0.12	0.01	41.60	1	.000	0.88
Number of psychiatric day treatment episodes	0.31	0.05	28.82	1	.000	1.37

^aAUC = .816.

of psychiatric day treatment episodes significantly predicted OYA commitment ($-2LL = 31,945.11$; $\chi^2[15] = 6,224.32$, $p < .0001$).

Model effects indicate that both gender and race/ethnicity significantly predict future OYA commitment within the Mental Health Treatment Services client population. Gender is significant ($\beta = 1.31$, $p < .0001$) in that the probability of OYA commitment for male clients is more than 3.5 times that of female clients (Odds ratio[OR]_{Gender} = 3.73). Race/ethnicity is also significant in that African American clients are about 1.5 times more likely to experience future OYA commitment relative to Caucasian clients ($\beta = 0.4$, $p < .0001$; OR_{AfricanAmerican} = 1.49). Clients of Other or Unknown race/ethnicity are significantly less likely to experience OYA commitment compared to Caucasians ($\beta = -0.76$, $p < .0001$; OR_{Other/Unknown} = 0.46). Mental Health Treatment Services clients who are also involved with Alcohol and Drug Treatment Services are 3.7 times more likely to be committed to OYA compared to those who have no known record of alcohol or drug treatment ($\beta = 1.31$, $p < .0001$; OR_{A&DTreatment} = 3.7). The number of times a client is referred to mental health treatment by agents of the criminal justice system (e.g., police and probation/parole) also significantly predicts OYA commitment ($\beta = 0.84$; $p < .0001$). For every treatment referral initiated by the criminal justice system, the probability of future OYA commitment more than doubles (OR_{CJReferrals} = 2.33). Not completing mental health treatment also increases the probability of future OYA commitment ($\beta = 0.65$; $p < .0001$). Regardless of the reason for incompleteness, each percentage increase in the proportion of incomplete mental health treatment episodes corresponds with a 92% rise in the likelihood of OYA commitment (OR_{IncompleteTx} = 1.92). Mental Health Treatment Services clients who are also engaged with Self-Sufficiency services have a lower likelihood of future OYA commitment ($\beta = -.054$; $p < .0001$). Clients whose records reflect one or more episodes of Self-Sufficiency services are 42% less likely to be committed to OYA. Experience with foster care increases the probability of OYA commitment among Mental Health Treatment Services clients ($\beta = 0.55$; $p < .0001$) such that one or more foster care episodes corresponds with a 73% rise in the likelihood of OYA commitment (OR_{FosterCare} = 1.73). The number of times a client has engaged in psychiatric residential treatment also impacts the probability of future OYA commitment ($\beta = 0.19$; $p < .0001$) such that each additional treatment episode of this type increases the probability by 21% (OR_{PsychResTx} = 1.21). Age at first known involvement with Mental Health Treatment Services significantly predicts OYA commitment ($\beta = 0.03$; $p < .0001$); the older a client is when he/she begins treatment, the more likely he/she is to be committed to OYA (OR_{AgeFirstTreatment} = 1.03). The number of times a client is referred to mental health treatment by either themselves or an individual from their personal support system significantly decreases the probability of future OYA commitment ($\beta = -0.12$; $p < .0001$). Each additional treatment referral initiated by the client or a parent, friend, or other support person corresponds with a 12% decrease in the likelihood of OYA commitment (OR_{PersonalReferrals} = 0.88). The number of times a client has been involved with psychiatric day treatment also predicts OYA commitment ($\beta = 0.31$; $p < .0001$). Each additional psychiatric day treatment episode increases the probability of OYA commitment by 37% (OR_{PsychDayTx} = 1.37).

Accuracy, rate of detecting true positives (i.e., sensitivity), and rate of detecting true negatives (i.e., specificity) were evaluated by applying the model developed in the training set to the individuals in the testing set (n = 26,706). The accuracy of the model in predicting future OYA commitment among Mental Health Treatment Services clients was assessed by examining the area under the receiver operating characteristic curve (AUC). AUC analyses conducted with the testing set produced a value of .816, indicating the model developed in the training set accurately predicts OYA commitment among youth in the testing set nearly 82% of the time. Sensitivity and specificity were evaluated by comparing the probability of OYA commitment estimated by the model to the actual OYA commitment status of youth in the sample. The cutoff value that maximized both sensitivity and specificity was 0.04 or larger—that is any sampled youth with a model-estimated probability of at least 0.04 would be classified as a future OYA youth. With this cutoff value, Table 3 demonstrates that sensitivity reached 76.5% (888 of 1,160 OYA youth were correctly classified) and specificity was 71.1% (18,165 of 25,546 non-OYA youth were correctly classified). The AUC estimate remained at .816 despite the adjusted cutoff level.

Table 3. Classification table showing the final model's ability to correctly predict future OYA commitment and no future OYA commitment in the testing sample (n = 26,706).

Observed	Predicted		Percentage correct
	OYA Commitment - No	OYA Commitment - Yes	
OYA Commitment - No	18,165 ^a	7,381	71.1%
OYA Commitment - Yes	272	888 ^b	76.5%
Overall percentage			73.8%

^a True negatives; ^b True positives.

Model Performance within Certain Groups

As in previous work (Braun, 2015b), we assessed model performance within certain subpopulations in addition to the overall group of Mental Health Treatment Services clients. All assessments of subpopulations were conducted using the testing sample.

Gender. Similar to the results from our analysis predicting OYA commitment among Oregon Child Welfare children, the current analysis indicates the performance of the predictive model is not equal between male and female Mental Health Treatment Services clients. When applied to males, the AUC drops to .751 and overall classification accuracy falls to 66%. The model applied to males is considerably better at detecting true positives (i.e., 82.5%) than true negatives (i.e., 49.4%). Among females, the AUC is the same as the overall sample, however classification performance is opposite that of the males. While overall classification accuracy is good (i.e., 71.3%), the model performs extremely well when detecting true negatives (i.e., 91%) and poor when detecting true positives (i.e., 51.7%) among females.

Race/Ethnicity. Caucasian clients make up the overwhelming majority of the Mental Health Treatment Services sample, therefore the model tends to perform equally well when applied to this racial/ethnic group alone (i.e., AUC = .816, classification accuracy = 74%). The model is slightly less accurate among African American clients, with the AUC dropping to .762 and overall classification accuracy reaching only 64.2%. The rate of detecting true positives among African Americans is considerably higher than true negatives (i.e., 78.9% vs. 49.6%). The opposite is true for the model when applied to Hispanic/Latino clients, where the AUC increases to .854. Classification accuracy for the model among Hispanic/Latino clients is also higher at 76%, and the model does good job predicting both true negatives (i.e., 70%) and true positives (i.e., 82%).

Age. Findings suggest that model performance varies based on clients' age at their first known Mental Health Treatment Services episode. Among clients who were 3 years old and younger, the model predicts true negatives at a respectable rate of 81% and true positives at only 33% with an AUC of 0.667. When applied to clients aged 4 to 6 years old, the model reaches an AUC of 0.829 and performs relatively well predicting true positives (i.e., 64.7%) and very well predicting true negatives (i.e., 79.8%). The largest AUC (i.e., .848) and the best overall classification rate (i.e., 79.7%) is found among 7 to 9 year olds, however the model still tends to predict true negatives better than true positives (i.e., 80.6% vs. 78.7%) within this age group. The most balanced model is found when the model is applied to 10, 11, and 12 year olds. The AUC in this age group falls slightly to .798, however both true positives and true negatives are predicted equally well (i.e., 72% for each). Among 13 to 15 year olds, the model predicts correct positives better than correct negatives (i.e., 78.6% vs. 66.5%) and the AUC climbs to .806. This trend continues among clients 16 and older, with correct positives predicted 87% of the time and correct negatives predicted only 61.8% of the time. The AUC for the model applied to clients 16 and older is also higher at .833.

Discussion

OHA's Mental Health Treatment Services program serves a large proportion of individuals who eventually become involved with OYA. Previous analyses (Braun, 2014, 2015a) have demonstrated that more than half of OYA youth engage with Mental Health Treatment Services at some point before becoming involved with OYA, and that participating in these services due to mental health issues increases the probability of OYA commitment nearly five times. The current work expands on these findings by examining the individual characteristics and service utilization patterns of Mental Health Treatment Services clients that contribute to the probability of OYA commitment.

Results indicate that just over 4% of Mental Health Treatment Services clients born between 1981 and 2001 were committed to OYA between January, 2000 and July, 2013. Certainly this suggests that the majority of those involved with Mental Health Treatment Services during childhood and adolescence do not experience OYA commitment in the future. However, previous estimates indicate that only about 0.0015% of the entire Oregon youth population aged 10-19 was committed to OYA between 2000 and 2013 (Braun, 2015b). Compare this to the 4% commitment rate among Mental Health Treatment Services clients, and it becomes clear that this program area serves a large proportion of children and youth who are likely to be committed to OYA in the future. As with the Child Welfare population (Braun, 2015b), if Mental Health Treatment Services

clients can be assessed for OYA risk, enhanced intervention may divert some from OYA. Moreover, the fact that only 4% of Mental Health Treatment Services clients may be at risk for OYA commitment suggests that additional intervention services need only be targeted toward a relatively small part of this population.

The results of the current study indicate that identifying Mental Health Treatment Services clients at risk for future OYA commitment will require assessment for a combination of particular factors. These include gender, race/ethnicity, age, treatment referral source, type of mental health treatment received, history of treatment completion, and utilization of other available social services. Our model suggests that Mental Health Treatment Services clients at highest risk of future OYA commitment are typically male, African American, also involved with treatment for an alcohol or drug problem, referred to mental health treatment by a criminal justice source, have a history of not completing treatment, have not participated in Self-Sufficiency programs, have been involved with foster care, have participated in psychiatric residential and/or day treatment, were older when they first became involved with mental health treatment, and have not been referred to treatment by a parent, friend, or other support person.

Although the model performs somewhat differently with certain subgroups of Mental Health Treatment Services clients, the differences are so slight that they may not warrant separate models for separate groups. As with all statistical models, care should be used when applying the model in practice and data should supplement professional discretion. Findings suggest that the model may be the most accurate and useful among 10 to 12 year olds, therefore practitioners may choose to target this age group for OYA risk assessment and intervention.

Next Steps

The final report in this series will summarize the same analyses on data from the remaining program area that serves a large concentration of future OYA youth—Alcohol and Drug Treatment Services.

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