

University of Nevada, Reno

**Increasing Access to Therapy Services for Medicaid Children with Mental Health
Needs in a Western State**

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in
Economics

by

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We recommend that the thesis
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Abstract

Background:

Children, ages (0 to 21), who were enrolled in a Western State's fee for service (FFS) plan under Medicaid were being placed on waiting lists and experienced limited availability of providers to deliver therapeutic services. As a result, the State's Medicaid program implemented a reformulation of its behavioral health system with the intention of increasing access to behavioral health services, increasing the capacity of behavioral health providers, and expanding coverage of behavioral health services. The increase in access to therapeutic services was intended to relax the capacity constraint, subsequently increasing the level of care for children with behavioral health needs.

Aims of Study:

This study evaluates whether the reformulation actually increased access to behavioral health services for children (0-21 years old) and if the reformulation is associated with improved outcomes. Outcomes will be measured as both quantities and costs.

Methods:

The data was extracted from medical and pharmacy claims, the eligibility file, and the prior authorization file beginning 1 January two years before implementation of the program changes, through 31 December three years after implementation. The study design is a pre-post comparison for the treatment group of eligible persons defined as those who with behavioral health diagnoses in the before period, compared to those who

did not. Children were identified as having a behavioral health diagnosis if they had any treatment coded with a behavioral health diagnosis, a prescription for a behavioral health medication or treatment by a behavioral health provider. Therefore, a non-linear difference in difference (DD) approach is used to examine the impact of the increase in access to therapy on stated outcomes. Additionally, analysis will be performed separately on those who are in state custody and those who are in parental custody.

Results:

There are four main implications from the research. First, the increase in access to therapeutic services decreased the overall costs from Medicaid claims. This was primarily due to a decrease in physical health costs, which refutes the null hypothesis that the reduction would be in mental health costs. However, it is thought that this is a result of the child receiving better care under the expansion of services, thereby reducing the number of inconsequential physical health visits.

Second, the increase in access to therapeutic services resulted in lower therapeutic costs as well as lower overall therapeutic visits. The number of visits of therapeutic services provided by specialty therapists decreased by almost the same amount that visits for therapeutic services with physicians and nurse practitioners increased, indicating a substitution of services. It was originally assumed that this finding was due to a reduction in the marginal use of services; however, in discussions with the state it was found that there may have been a simultaneous reduction in rates. Future research should include time dummy variables for each six month period to account for possible rate changes.

Third, indicators of whether or not the increase in services resulted in better care for children yield mixed results. Mental health drugs increased, which could indicate that children are now receiving the medications that they need or are being overmedicated. The number of visits, length of stay, and costs of Residential Treatment Center's increased except for children in parental custody, which resulted in a decrease in cost. These coefficients were also shown to change significantly in magnitude when the robustness of the results was checked by taking out patients with negative overall physical health paid. However, one irrefutable outcome is inpatient psychiatric facility admissions. This DD estimate decreased for all patients, regardless of custodianship, and this is one of the most expensive and intensive forms of treatment, which is a positive outcome for patients who received more access to therapy.

Lastly, the impact of reformulation on the service mix differs for children in state custody compared to those in parental custody. One difference is in RTC's, in which children in parental custody had less visits and shorter lengths of stay. Another notable difference is in physical health paid, children in state custody had a larger reduction in physical health care, yet children in parental custody had a much larger decrease in physical health prescriptions.

Acknowledgments

While it is customary to express thanks for the specific individuals who contributed to the thesis project, a decision was made to withhold the name of the State, to protect the confidentiality of the data. Therefore it is only possible to express my appreciation in general terms. First, I would like to thank the individuals in the State Medicaid organization who commissioned the study, and then facilitated the study logistics. I would also like to thank the Administrative Faculty Researcher who conducted extensive coding for the initial extraction of data, and provided helpful interpretations and encouragement throughout the study. I would also like to thank my thesis advisory committee for their advice and insight and help in acquiring a new and faster computer to run the analysis.

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Introduction

In January of the implementation year, a western state¹ implemented a reformulation of its behavioral health system with a goal of increasing access to behavioral health therapeutic services for fee-for service members. Prior to the reformulation, outpatient mental health services could only be provided by a small number of public entities. After the reformulation, qualified private sector providers were allowed to provide outpatient mental health services to the Medicaid population. By expanding the pool of eligible providers, the capacity constraint was relaxed. This project will estimate the impact of the resulting increase in access to therapeutic services for children (0-21 years old) and if the reformulation is associated with improved outcomes.

Multivariate analysis will be used to examine the relationship between utilization of the therapeutic services and clinical outcomes for two groups of recipients for five years, two years before implementation and three years after:

- Children who used therapeutic services²
- Children who did not use therapeutic services

This analysis will also compare the impact of the program change on children in parental-custody versus children in state-custody.

¹ For this study, the western state analyzed will be referred to as the State throughout the paper

² This change occurred in context of other changes. The most relevant is the simultaneous increase in access to rehabilitation. Caution should be taken when interpreting results.

In order to accurately estimate the effect of the reformulation, additional variables will be included to control for individual demographics, utilization of targeted case management (TCM) and specific individual diagnoses.

Literature Review

Medicaid and Child Mental Health Services

Medicaid, which is governed by the U.S. Department of Health and Human Services (USDHHS), is the largest payer for mental health services in the United States (Centers for Medicare & Medicaid Services: Mental Health Services Overview). The USDHHS allows states to create and administer their own Medicaid programs within guidelines to better serve their individual states' needs. In order for the State to meet its citizens' needs, it currently provides Medicaid services through traditional fee-for-service (FFS) provider networks, Children's Health Insurance Program (CHIP) and managed care.

Children in the State who reside in rural areas can enroll in the managed care program; however, most caregivers of children with mental/behavioral health disorders choose to enroll in the FFS program. Those who are not eligible for either FFS or managed care can enroll in the State's CHIP.

The State's CHIP mission is to provide low-cost healthcare to low income children (ages 0 to 18), who are uninsured, not eligible for Medicaid, and have family gross annual income between 100% and 200% of the Federal Poverty Level. In addition, the CHIP charges premiums, whereas the State's Medicaid program does not.

In the implementation year, the State's low rate of per capita mental health spending, and high suicide rate, earned the State's Mental Health System a grade of D- ("NAMI: National Alliance on Mental Illness"). Although NAMI commended the State's Mental Health System on its transparency and willingness to improve, they expressed an urgent

need to increase the number of facilities and implement evidence-based practice and Assertive Community Treatment (ACT) programs ("NAMI: National Alliance on Mental Illness").

Of the States' children (ages 0 to 17) enrolled in Medicaid, 8.4% have received at least one service from a behavioral health provider or facility, 10% two years later, and 11.8% one year after that ("State Doc 2"). This equates to a 40.6% increase in three years. This statistic supports the argument that "... involvement with the child welfare system appears to increase the likelihood of children receiving mental health services (Lyons & Rogers, 2004)" despite the fact that "It has been well established that the majority of children who have mental health needs do not receive services" (Angold, Messer, Stangle, & Burns, 1998; Horwitz, Gary, Briggs-Gowan & Carter, 2003; Thompson, Richard 1).

Children with Mental Health Disorders

Children, ages three and under are often left out of studies (Gaskin, and Mitchell 32). This could be due to the lack of data for children this young, or a perception that children ages 0 to 3 cannot have mental health issues, or that the symptoms cannot be diagnosed. However, it is suspected that when behavioral mental health illness are addressed at a younger age including infancy, the child will experience better development and behavioral outcomes over time (Reynolds, Ou, & Topitzes, 2004; Thompson, Richard 16-22). Early treatment could lead to a steeper decline in the level of externalizing behavior over time; however it could also signal severe psychological problems that can be addressed later in life (Vinnerljung et al., 2006; Thompson, Richard 16-22).

Medicaid and Changes that Affect Mental Health Care

One of the most important reformulation choices in increasing access to care is the decision to either create a new program or expand an existing program (Nicholson-Crotty 23). Researchers have shown that one strategy is not necessarily more successful than the other; both strategies can improve access to mental health services and ensure the quality of these services that is critical in meeting the needs of children with mental health disorders (Thompson, Richard 22).

Improving access to mental health care among children within Medicaid is important. It has been shown that children from low income families³ are 2 to 3 times more likely to have a serious mental disorder than other children (Glieb et al. 1997)” (Cuellar, and Markowitz JEL No. 10, 2). Therefore, not only is there a disproportionate number of children with mental health needs within Medicaid, but these children are at a higher risk of not having their needs met (Thompson, Richard 1).

Improving access to mental health care can be as simple as expanding Medicaid eligibility. An expansion in eligibility in one study resulted in lower suicides for children (Cuellar, and Markowitz JEL No. 10, 17).

Access to Care for Children with Mental Health Needs

There are essentially two forms of treatment for children with mental health needs, psychotropic and psychotherapeutic. Psychotropic treatment involves the administration

³ Medicaid eligibility in the State requires that children are from families with low income. (State Doc 1)

of mental health drugs. The central classifications of psychotropic medications are antipsychotics, antidepressants, anticonvulsant (barbiturates), anti-anxiety and ADHD medications ("Mental Health Medications"). Psychotherapeutic treatment involves rehabilitation, therapy, admission to residential treatment centers and inpatient psychiatric centers.

There are pros and cons of using either, and often, these two types of treatments are used concurrently. In fact, some short-term studies support the efficacy of both especially for children with ADHD (NIH 2000; Cuellar, and Markowitz JEL No. 10, 10). Despite this, Medicaid spends a disproportionate amount on psychotropic drugs (Ling, Berndt, and Frank 50). The share of Medicaid's spending on psychotropic drugs increased 15.2% over a ten year period compared to spending on all prescription drugs during the same time (Cuellar, and Markowitz JEL No. 10, 1).

In 2002, Medicaid stated that the cost of psychotropic drugs in particular were driving up the expenditures ("Psychotropic Medications: Addressing Costs without Restricting Access" 1). This is due to a variety of factors, including the introduction of new psychotropic medications, policy changes including a wider coverage of medications, and new types of insurance coverage (Cuellar, and Markowitz JEL No. 2). Despite the reasons of increasing costs, maintaining and/or improving the quality of care must remain the top priority and innovative approaches must be initiated, because restricting access to care is not an option ("Psychotropic Medications: Addressing Costs without Restricting Access" 2).

Drug treatment is not the only expensive form of treatment. Inpatient psychiatric treatment is considered the most expensive, intensive and restrictive form of care (Park, and Ryan 43). Despite the expense of treatment, psychosocial or pharmacotherapy, the cost of the treatment appears to not be an important predictor of the type of treatment under non-managed care participation (Domino, and Salkever 566). Yet, in one study, patients under fee-for service providers took 12% more prescription drugs than their managed care counterparts, despite having 8% fewer outpatient visits per year (Domino, and Salkever 567).

Policy Background

According to a PowerPoint presentation in January of the implementation year, the State's Medicaid office implemented a reformulation of its behavioral health system with the following specific policy goals:

- Increase access to behavioral health services for recipients.
- Increase the capacity of behavioral health providers
- Expand coverage of behavioral health services.

(PowerPoint 2)

The driving force for the policy reformulation was primarily due to the limited access to care for behavioral health services. This included recipients being placed on waiting lists and limited time for providers to deliver services.

The resulting policy changes that are specific to this study are the expansion of therapeutic services, due to the increase in access to therapy as well as the expansion of eligible providers. The expansion of services consists of the ability to include Marriage

and Family Therapist (MFT) and Licensed Clinical Social Workers (LCSW) under the BHCN, and case management for non SED/SMI recipients.

This project will examine whether the reformulation actually increased access to behavioral health services for children (0-21 years old) and if the reformulation is associated with improved outcomes.

Methodology

Data

The data used for this analysis is provided by the State's Medicaid and is extracted from medical and pharmacy claims, the eligibility file, and the prior authorization file. The data is pulled from claims data beginning 1 January two years before implementation through 31 December three years after implementation. The variables included in the dataset are detailed in Table 1: Variables and Descriptive Statistics.

The sample includes patients 21 years of age and younger who have Medicaid as their primary insurance and are enrolled in the Fee for Service (FFS) Plan, have been diagnosed with a Mental Health Disorder⁴, have received a behavioral health prescription, behavioral health therapeutic and/or rehabilitation service, or have stayed in a residential treatment center, or inpatient psychiatric facility.

⁴ Mental Health Disorders include: antisocial behavior, anxiety, autism, bipolar disorder, depression, eating disorder, neuroses, obsessive compulsive, psychoses, schizophrenia, or substance abuse.

The data consists of only FFS patients. While children with mental illness may choose an HMO or a FFS plan, the majority of patients diagnosed with mental health disorders choose FFS.

Descriptive Statistics

The data consists of 1,653,300 monthly observations for 27,555 patients over a 60 month period. This consists of two years before the reformulation and three years after. There are 11,055 females and 16,501 males; and there are 3,054 children ages 0 to 5, 10,704 children ages 6 to 12, 3,271 children ages 13 to 14, 5,449 children ages 15 to 17, and 5,078 ages 18 to 21. Additionally, approximately 25% of the children observed are in state custody, and 3.4% are part of the juvenile justice⁵ system.

The methodology for estimating the results restricts the sample to only those who were eligible to receive the services before the reformulation. The variable used as an indicator of eligibility for inclusion in the sample with whether the child had any treatment or diagnosis of a mental health condition prior to implementation. The resulting sample consists of 7,250 patients. Moreover, the analysis focuses on therapeutic services. Therapeutic services are grouped into services provided by specialty mental health providers and services provided by a physician or nurse practitioner. Of the resulting eligible sample of 7,250, 4,571 who ever received therapy and these patients received approximately 1.4 visits on average. Additionally, 3,991

⁵ The code for juvenile justice includes emergency placement aid , caution should be used when interpreting.

received therapy prior to the reformulation, 2,717 received therapy after access was expanded, and 2,137 patients received therapy both before and after.

All of the variable names used in the analysis, as well as their definition, means and standard deviations are provided in Table 1.

Measures

The outcomes used to determine the effect of the impact of the increase in access to therapeutic services were divided into cost and quantity components. The cost variables, as well as their sub-costs are shown in the figure below.

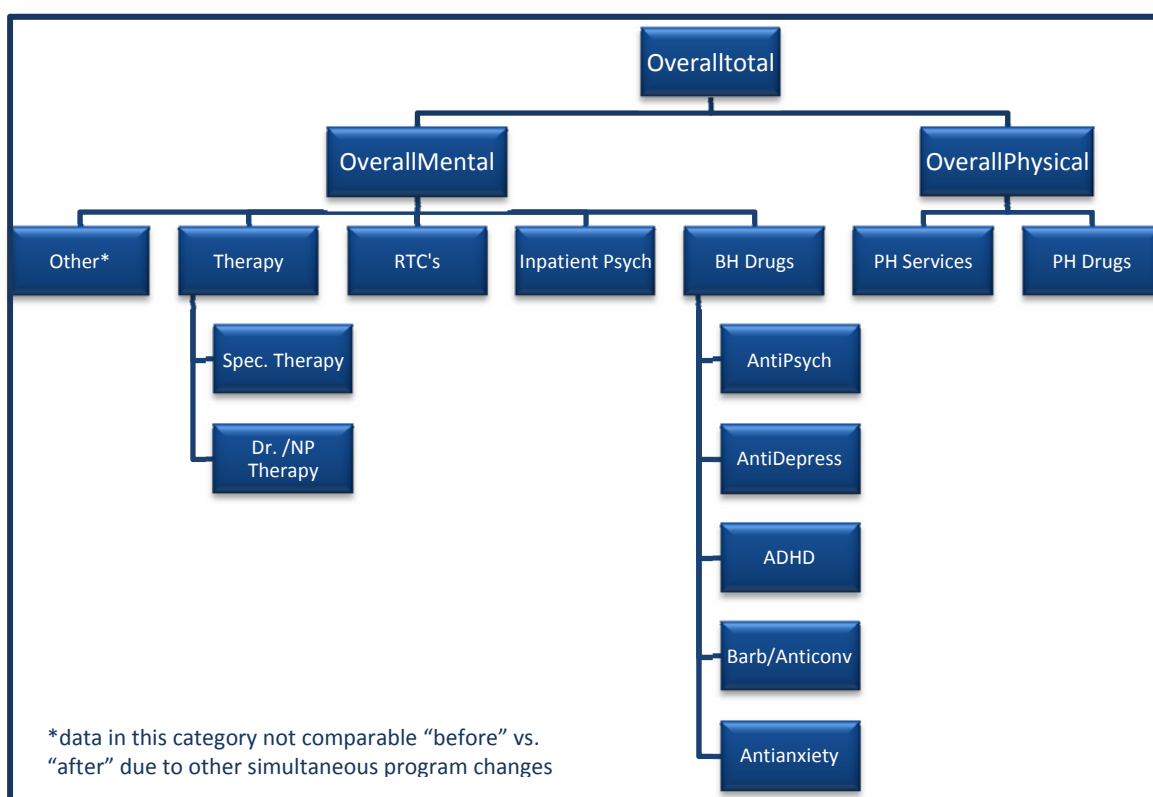


Figure 1: Major Cost Categories

The quantity components provided are either aligned to the major cost categories, or are provided as behavioral outcomes. Those quantities aligned to the cost components are

therapy, RTC's, Inpatient Psych, and behavioral health drugs. The category "other" is not analyzed in detail because it includes services for which definitions and codes changed at the same time as the implementation of the reformulated access to therapy.

Therapy quantities are counted by number of visits. Behavioral health drugs are counted as the number of behavioral health prescriptions. Admissions, such as Residential Treatment Center's (RTC's) and Inpatient Psych are counted three ways. The quantities include the total number of admissions, the average length of stay, and the total number of days of re-admissions. Multiple variables for quantities were included to not limit the definition of mental health services. Often, mental health research treats one admission the same as receiving multiple continuous treatments (Rushton et al., 2002; Thompson, Richard 17). The length and type of admission are often not stated (e.g. Angold et al., 2002; Thompson, Richard 17).

In addition to the type and level of admissions, the dosage and intensity of drugs also need to be examined to see if mental health services really benefit children at a young age (Thompson, Richard 21). Therefore, the number of psychotropic prescriptions, unique prescriptions, unique prescribers, as well as the number of days of use are provided in the data.

Suicide is a likely measure for determining mental health outcomes because of its correlation with depression and other mental health diagnosis. In fact, "Depression is the single most common mental disorder associated with suicide among youth (Brent et al. 1988)" (Cuellar, and Markowitz JEL No. 10, 9). However, there has been evidence that the very medications used to treat mental illness may increase the risk of suicide among

children. The FDA, as well as special health professionals, warns about the increase of suicidal thinking and behavior among children who take newer types of antidepressant drugs, including SSRIs and SNRIs (Cuellar, and Markowitz JEL No. 10, 10).

In order to test the hypothesis that the behavioral program reformulation had an impact on utilization or cost, it is important to control for other factors that could contribute to the outcome. These are considered dummy variables and for this study are mostly demographic.

One of the demographic variables used in this study is gender. It is suggested that boys externalize behavior more than girls (Thompson, Richard 17), and most behavioral health research has focused mostly on boys (Parke & Slaby, 1983; Johnson, and O'Leary 573). Due to the disturbance that externalizing behavior has among families and in classrooms, early detection of mental health problems and subsequent treatment could be slanted towards boys and bias the results. Therefore, gender is a significant variable due not only to statistical interest but also to also possible endogeneity.

Another variable among patient demographics that may cause endogeneity is race due to cultural characteristics. This is not to suggest that there is causation between race and mental behavioral problems, but that cultural characteristics may influence how parents/child caretakers interpret behavioral problems and seek treatment (Thompson, Richard 17). In addition, there may be differential access to quality health care due to race. One study showed that nonwhite handicapped students received less medication than their white peers (Cullinan, Gadow, and Epstein 475).

Race is not the only predisposing factor determining access to care. Other factors include social structure, parental attitudes and logistical demographics (Gaskin, and Mitchell 30). Therefore, the county of residence is included as an indicator of the patients' logistical access to care. It is hypothesized that children in rural areas that are significant distances away from services will have different outcomes due to the limited access to care and to treatment facilities.

An additional demographic variable included in the data is an indicator variable, noting whether each child is in state custody. This variable is paramount in comparing the experience of the state-custody children versus the parental-custody children because those in state-custody may be more likely to interact with providers who have detailed knowledge of the available services. In 2005, 513,000 children in the United States were in out-of-home care (state custody) and among these children; 42% - 60% have emotional and behavioral problems (Park, and Ryan 42). Differential knowledge about available services may lead to differences in utilization patterns, and in the impacts of the services on outcomes.

Another reason to include the state-custody child variable is because of the psychological trauma associated with leaving familiar surroundings. Out-of-home placement for children with mental health problems can result in sporadic placement, longer periods of time spent in out-of home care, impediment in academic skills including school failure, and a decreased possibility of reunification (Connell, Katz, Saunders, & Tebes, 2006; Horwitz, Simms, & Farrington, 1994; James, 2004; Landsverk, Davis, Ganger, Newton, & Johnson, 1996; Newton et al., 2000, Zima et al., 2000; Park, and Ryan 42).

Conversely, youth who are in state custody and have had mental health treatments have a longer time to jail detention (Norton, Yoon, Domino, and Morrissey 720).

Total case management is also included as a control variable, as children who are assigned case workers are more informed about the types of services as well as increases to those services.

The study will attempt to control for factors other than the treatment that might be affecting outcomes, such as patient health status and illness severity. This can be accounted for by using control variables such as the number of psychotropic drugs as well as diagnosis. Diagnoses of mental health as well as non-mental health are included in addition to the number of Emergency Room (er) visits. Similar strategies will be used to control for regional and demographic differences.

Analysis

It is hypothesized that relaxing the mental health provider capacity constraint will permit more children with Medicaid to receive these services, and this will result in desirable mental health outcomes. Further, it is hypothesized that the effects will be different dependent upon whether the child is in state or parental custody.

The data used in the study is a balanced panel data set. It is considered to be balanced as every person has an observation for each month over the sixty month time period. This type of longitudinal data is appropriate for evaluating the effects of mental health services on outcomes in children (Thompson, Richard 16-22).

The study design is a pre-post comparison for the treatment group of eligible persons defined above. Therefore, a non-linear difference in difference (DD) approach will be used to examine the estimators of the increase in access to therapy on stated outcomes. The initial difference that will be examined is the differences in dependent variables between children who used the treatment and children who did not use the treatment before the reformulation. The second difference that will be examined is the differences in dependent variables between children who used the treatment and children who did not use the treatment after the reformulation. The difference-in-difference, that is the key result of this methodology, will be difference between the first two differences. Additionally, the analysis will be done on those who are in state custody versus those who are in parental custody.

The difference-in-difference outcome is shown in the following diagram, with x denoting the dependent variable:

$$(x^{UT} - x^{DNUT})_{After\ Reformulation} - (x^{UT} - x^{DNUT})_{Before\ Reformulation}$$

Specifically, the following equation is estimated:

Outcome Variable

$$\begin{aligned} &= \alpha_0 + \alpha_1 After + \alpha_2 Therapyever + \alpha_3 (Therapyever * After) \\ &+ \alpha_4 TCM + \sum_{i=5}^n \alpha_i (Demographic\ Controls) \\ &+ \sum_{i=(n+1)}^m \alpha_i (Diagnosis\ Controls) + e \end{aligned}$$

The DD interaction term, noted as α_3 in the equation above, is the relative impact of receiving therapy after the reformulation (compared with the impact of receiving therapy prior to the reformulation). This coefficient therefore measures the impact of relaxing the capacity constraint. One cannot simply look at the treatment group before compared to the treatment group after and deduce that the difference is the impact, because other changes likely occurred at the same time. The DD model uses a control group to subtract out those other differences, and the coefficient of the interaction term, α_3 , is the resulting change.

As a result of panel data, there are frequent observations that are zero, the months where the child did not receive health treatment, yet was still eligible. In order to remove the bias of multiple zeros, the data was collapsed to six month observations for every variable.

There are also a few observations with unusually high costs, resulting from a neonatal patient, major trauma, and organ replacement. Analysis will be performed with and without these observations to ensure that the results are not biased by outliers.

Further robustness checks will result in the removal of negative overall physical health observations, which result from differences in the methods for storing claims data for physical and mental health treatments. This variable is calculated by subtracting the overall mental health total paid from the overall total paid. The difference consists of overall physical health and observations where the overall mental health was more than the overall total paid due to the dates of the services not coinciding with the billing dates.

Therefore, these resulting patients will be removed and analysis performed to ensure that the resulting outcomes are not altered.

Additionally, the data needed to be restricted to only those who were eligible to receive mental health treatment in the before period, as indicated by a behavioral health diagnosis, prescription or treatment. This was accomplished by constructing a sample of patients who had a mental health diagnosis, received a behavioral health prescription, behavioral health therapeutic and/or rehabilitation service, stayed in a residential treatment center, or inpatient psychiatric facility in the before period.

Results

The difference in difference (DD) coefficients, summarized in Figure 2 and Table 2 in Appendix B, show the impact of relaxing the therapy capacity constraint on cost and quantity outcomes for eligible Medicaid children. This is the difference between the change in outcomes (after reformulation – before reformulation) for children who received therapy prior to reformulation and the comparable change for children who did not receive therapy prior to reformulation, where all children included in the sample had indications of behavioral health issues prior to reformulation. This study design is based on the assumption that children with behavioral health issues prior to reformulation were potential candidates for therapy during that period. Some of these children received therapy, while others did not. Assuming that, for some of the children who did not receive therapy, therapy was indicated but unavailable due to the capacity constraint, the before/after comparison of outcomes for the two subsamples provides an estimate of the

impact of relaxing the constraint. The reported coefficients estimate this impact after controlling for demographic variables, the use of Total Case Management, and diagnoses.

As shown in Figure 2, the overall total costs are separated into mental health and physical health cost categories. The results will be broken down into each cost category, the cost subcategories of mental and physical health, and the quantity variable(s) that underlie these costs. These results will then be compared to the results of restricting the analysis to children in stated custody and children in parental custody. Finally, the impacts of TCM, demographic and diagnosis controls will be reported and compared for all.

Note that the reported coefficients measure the change in the average 6-month cost or utilization per child.

Results for the sample of children with behavioral health diagnoses prior to the reformulation

The reformulation led to a decrease of “overall total costs” by \$265.28***⁶; which reflects an increase in “overall mental health” costs of \$85.38* offset by a decrease in average monthly “overall physical health” costs of \$350.66***. The mental health cost components will be analyzed in detail first followed by the component of the physical health costs.

As shown in Figure 2, the mental health cost category is broken into 5 subcategories: other, therapy, RTC’s, Inpatient Psych and behavioral health drugs. After reformulation,

⁶ Notes: *p<0.1, **p<0.05, ***p<0.01

overall mental health expenditures increased due to the increase in expenditures for RTC (\$249.55) *** and behavioral health drugs (12.45) ***. This increase was offset by a decrease in expenditures for therapeutic services of \$73.93 *** and Inpatient Psychiatric stays of \$33.96*. This indicates that the reformulation resulted in higher mental health costs attributable to the RTC costs and behavioral health drugs, yet was reduced due to the decrease in costs of therapy services and inpatient psych facility costs. Note that the decrease in expenditures for therapeutic services measures the average (over a 6 month period) cost per child with indication of behavioral health issues prior to reformulation.

The decrease in the costs of therapy reflects the large decrease in expenditures for Specialty therapy (\$81.42*) and a minimal increase in expenditures for therapeutic services provided by physicians and nurse practitioners (\$7.49*). The overall increase in the cost of behavioral health drugs was due mostly to an increase expenditures for antipsychotics (\$12.44*). Through discussions with the state, it was determined that this was not due to a change in prior-authorization rules regarding the numbers of visits.

Overall physical health decreased due to decreases in both physical health services (\$27.38) *** and physical health drugs (\$123.28) ***. It is possible that the increase in therapeutic services has given children an increased level of care that stops them from manifesting physical health problems. Future research should include the addition of six month time variables to account for possible rate changes.

The cost impacts are important in determining whether the reformulation was successful, but so are the quantity impacts. Most quantity variables had more than one measurement. For example, admissions are counted as number of admissions, number of recurring

admissions, and the average length of stay. A robustness check for the quantity variables was performed separately using all measures, and those that resulted in statistically significant results are as follows:

- Number of days of prescription
- Number and average length of stay of admissions to RTC's and Inpatient Psych Facilities
- Number of therapeutic visits.

The first category of quantity variables is the number of prescriptions. The number of days for mental health prescriptions increased, even though as stated above, the estimated coefficient for total costs for antidepressants, ADHD medications, and barbiturates decreased. The estimated coefficient for the number of days for physical health prescriptions decreased, this is consistent with the costs of physical health prescriptions decreasing.

The second category of quantity variables is the number and length of stay of admissions. The number of admissions to RTC's and inpatient psychiatric center's essentially remained the same; however, the length of stay increased. This is despite the fact that estimated impact on expenditures increased significantly relative to the increase in the length of stay, and that the cost of inpatient psych facility claims decreased.

The final category of quantity variables is the number of therapeutic visits. As expected, the number of therapeutic services provided by physicians and nurse practitioners increased (.11), while the number provided by specialty providers decreased (-.19). Additionally, this resulted in a decrease in overall therapeutic costs.

Although the number of therapeutic visits to physicians and nurse practitioners increased, the number of visits to specialty therapists decreased by almost the same amount. It appears that the visits to specialty therapists are being substituted with visits to physicians and nurse practitioners. It's possible that patients are receiving different levels of care. Physicians and nurse practitioners may be providing more medication management than specialty therapists, as shown by the increase in the number of prescriptions across all categories except for barbiturates.

Results separated into State and Parental Custody

The overall total costs as a result of the reformulation for state custody decreased by \$68.26; this is almost \$200 less than the decrease in overall total costs for all, and it is not statistically significant. In contrast, the estimated impact of reformulation on overall total costs is larger for children in parental custody than for the sample of both types of children. Thus, the primary impact of reformulation occurred among children in parental custody.

The primary difference between the impact of reformulation on children in parental vs. state custody occurred in mental health expenditures, which increased by \$319.36*** for children in state custody compared to the increase in costs of \$85.38*** for both groups combined. Expenditures for physical health decreased by more, \$386.03*** for children in state custody, compared to \$333.841 for children in parental custody.

The most notable difference between the impact on mental health expenditures for children in state custody (vs. children in parental custody) occurs for RTC expenditures,

which increased by \$447.712*** for children in state custody and decreased by \$542.96 for children in parental custody. In addition, expenditures for inpatient psychiatric facilities decreased significantly for children in parental custody, but did not change significantly for children in state custody.

For expenditures on physical health, the decrease in physical health care was larger for children in state custody – compared with children in parental custody. In contrast, expenditures for physical health prescriptions decreased significantly for children in parental custody, but did not change significantly for children in state custody.

With regards to the quantity variables, only the number and lengths of stay of RTC admissions, and the number of therapy visits are statistically significant, when the sample is restricted to state custody. The number of RTC admissions increased by a mere .004*** visits, but the average length of stay is approximately twice as long as all. The number of therapeutic visits are very similar to all; the number of therapeutic visits to specialty providers decreased by .264, but the number of therapeutic visits to physicians and nurse practitioners increase by .092

In addition, the quantities of prescriptions for three types of behavioral health drugs increased significantly for children in parental custody, but did not change significantly for children in state custody. Inpatient days in psychiatric facilities decreased significantly for children in parental custody, but did not change for children in state custody.

The results, taken as a whole indicate that there is substitution among the types of treatment, and the substitutions differ significantly for the two groups of children.

The main differences in mental health across the three samples are as follows:

- The largest decrease in overall total costs was for those in parental custody
- The largest increase in overall mental health costs occurred for those in state custody
 - The costs for RTC's increased for all and state custody but decreased for those in parental custody
- The largest decrease in overall physical health costs occurred for those in state custody
 - The costs for physical health care decreased the most for those in state custody
- The change in the costs of RTC's decreased for parental custody, but increased for children in state custody.

As stated earlier in the paper, it was important to control for demographic variables. As the hypothesis was focused on the result of overall mental health costs, the control variables are presented for this regression. The control variables are separated into TCM, demographic and diagnosis variables. The coefficient of TCM for mental health paid as the dependent variable is -31.94 for all, -130.9* for state custody and 80.82** for parental custody. This implies that more TCM units decrease the overall mental health costs for claims for all and state custody patients, but increase the mental health costs for claims of parental custody patients.

Of the demographic variables, females contribute, though not statistically significant at the 10% level, less to mental health costs than males, which is consistent with the literature that males are more expensive in regards to mental health. Children that are part of the juvenile justice system increase the mental health costs for all and state custody, yet do not change mental health costs if the patient is in parental custody.

Additionally, the logistical demographic was thought to impact costs. However, as shown in Table 3, the only statistically significant location is the location labeled as *medicaid_office*. A location is labeled this way if left blank or if out of state. The demographic for race, was not thought to account for costs, rather, is thought to affect the way mental health is handled among different cultures; therefore race was controlled for. However, none of the races were statistically significant. Additionally, because of the data, age remained the same for the patient over the course of the study, as a result of this combine with using fixed effect regressions, these variables were dropped.

Of the diagnosis variables, there were large negative coefficients for blood, and lymph diagnoses. Conversely, all mental health disorders except obsessive compulsive disorders and autism contribute significantly to the increase in mental health costs, with the largest being eating disorders for all and parental custody, and bipolar disorders for all three categories. Other large and significant coefficients are mental health er visits, severely mentally ill (SMI) and severely emotionally disabled (SED). The implication is that for every \$1 increase in these variables, the overall mental health costs increase by the coefficient, SMI contributes more to costs of mental health than SED, which makes sense due the level of treatment for SMI individuals costing more.

Robustness Check

The robustness check for the outcomes was conducted by removing all individuals who had a negative overall physical health paid, indicating that either there was a credit to physical health, but more likely due to the fact that there was a lapse from treatment to billing time of mental health services. In doing so, the results were only affected in

magnitude except for overall mental health paid due only to the change in magnitude of the RTC coefficient.

When the 1,186 patients were removed as a result of a negative overall physical health paid, the RTC coefficient changed in magnitude by a considerable amount. The RTC coefficient for all changed from 249.55 to 6.62, for state custody changed from 447.71 to 23 and for parental custody changed from -542.96 to -.93 indicating that with these patients included, RTC's are overinflated.

Conclusions and Recommendations

It was hypothesized that by increasing access to therapy by expanding the pool of providers, subsequently relaxing the capacity constraint that more children with Medicaid would receive these services and consequently result in desirable mental health outcomes.

There are four main implications from the research. First, the increase in access to therapeutic services decreased the overall costs from Medicaid claims. This was primarily due to a decrease in physical health costs, which refutes the null hypothesis that the reduction would be in mental health costs. However, it is thought that this is a result of the child receiving better care under the expansion of services, thereby reducing the number of inconsequential physical health visits.

Second, the increase in access to therapeutic services resulted in lower therapeutic costs as well as lower overall therapeutic visits. The number of visits of therapeutic services provided by specialty therapists decreased by almost the same amount that visits for therapeutic services with physicians and nurse practitioners increased, indicating a substitution of services. It was originally assumed that this finding was due to a reduction in the marginal use of services; however, in discussions with the state it was found that there may have been a simultaneous reduction in rates; therefore, future revisions should consider the use of a six month time dummy variable.

Third, indicators of whether or not the increase in services resulted in better care for children yield mixed results. Mental health drugs increased, which could indicate that children are now receiving the medications that they need or are being overmedicated.

The number of visits, length of stay, and costs of Residential Treatment Center's increased except for children in parental custody, which resulted in a decrease in cost. These coefficients were also shown to change significantly in magnitude when the robustness of the results was checked by taking out patients with negative overall physical health paid. However, one irrefutable outcome is inpatient psychiatric facility admissions. This DD estimate decreased for all patients, regardless of custodianship, and this is one of the most expensive and intensive forms of treatment, which is a positive outcome for patients who received more access to therapy.

Lastly, the impact of reformulation on the service mix differs for children in state custody compared to those in parental custody. One difference is in RTC's, in which children in parental custody had less visits and shorter lengths of stay. Another notable difference is in physical health paid, children in state custody had a larger reduction in physical health care, yet children in parental custody had a much larger decrease in physical health prescriptions.

Due to the robustness check of the data yielding different results for RTC's, care should be taken when interpreting these results. Further studies should include propensity score matching to test the results as well as research into the negative physical health paid variables. It would also be beneficial to run regressions analysis to learn the contributing factors for the decline in physical health; due to the limitations of the data, this could not be adequately determined.

Overall, the reformulation resulted in lower overall costs, lower therapeutic visits and costs, increased drug use, and decreased inpatient psychiatric visits and lengths of stay.

The determination of success made by the state should be performed while taking care to note that simultaneous changes occurred during the reformulation and that further robustness checks should be made for the determination of RTC's.

Appendix A: Tables

Table 1: Variables and Descriptive Statistics

Variable	Definition	Mean	Std Dev.
ad_paid	net paid for antidepressants	1.456	10.013
addays	number of days with antidepressant	1.101	5.244
adhd_paid	net paid for ADHD drugs	6.421	28.162
adhddays	number of days with ADHD drug	1.670	6.761
adm_paid	net paid for inpatient psych admissions	47.432	542.829
adm_paid_res	net paid for residential admissions	153.503	2011.592
admits	number of inpatient psych admissions	0.006	0.051
admits_res	number of residential admissions	0.003	0.029
after	binary variable for time after implementation	0.617	0.486
age0_5	binary variable for children ages 0 to 5 as of Nov. of last studied year	0.111	0.314
Age6_12	binary variable for children ages 6 to 12 as of Nov. of last studied year	0.388	0.487
age13_14	binary variable for children ages 13 to 14 as of Nov. of last studied year	0.119	0.323
age15_17	binary variable for children ages 15 to 17 as of Nov. of last studied year	0.198	0.398
age18_20	binary variable for children ages 18 to 20 as of Nov. of last studied year	0.184	0.388
amind	race	0.029	0.167
antisocbeh	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.035	0.185
antisocbeh_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	34.849	429.351
anxiatydis	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.010	0.102
anxiatydis_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	3.359	98.087
ap_paid	net paid for antipsychotics	22.227	99.043
apdays	number of days with antipsychotic	2.174	8.573
asian	race	0.014	0.119
autism	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.019	0.135
autism_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	4.241	80.370

Variable	Definition	Mean	Std Dev.
ax_paid	net paid for antianxiety drugs	0.215	4.228
axdays	number of days with antianxiety drug	0.194	2.288
barb_paid	net paid for barbiturates or anticonvulsants	11.359	92.761
barbdays	number of days with barbiturate or anticonvulsant drug	2.049	9.263
bipolaridis	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.048	0.213
bipolaridis_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	72.248	660.525
black	race	0.219	0.414
blood	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.011	0.103
blood_er	number of ER visits for diagnosis of condition	0.000	0.013
bloodcost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	4.171	173.446
bone	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.023	0.149
bone_er	number of ER visits for diagnosis of condition	0.001	0.020
bonecost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	7.860	379.996
brain	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.020	0.139
brain_er	number of ER visits for diagnosis of condition	0.000	0.012
braincost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	3.293	112.415
canceretc	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.001	0.029
canceretc_er	number of ER visits for diagnosis of condition	0.000	0.001
canceretcost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	2.089	129.648
days_los_cnt	LOS based on covered days from claims-- inpatient psych	0.085	1.043
days_los_cnt_res	LOS based on covered days from claims-- residential treatment center	0.401	5.584
days_los_computed	LOS computed (discharge date - admission date)-- inpatient psych	0.092	1.123
days_los_computed_res	LOS computed (discharge date - admission date)--residential treatment center	0.460	6.007
depression	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.077	0.267

Variable	Definition	Mean	Std Dev.
depression_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	60.635	527.878
eatingdis	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.000	0.012
eatingdis_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	0.139	40.355
female	sex	0.401	0.490
heart	indicator whether diagnosis of heart condition was present as primary, secondary, or tertiary on facility claim	0.012	0.110
heart_er	number of ER visits for diagnosis of condition	0.000	0.008
heartcost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	11.394	1180.296
highcost	indicator for highest cost diagnosis (primary, secondary, or tertiary diagnosis)	0.026	0.160
highcost_er	number of ER visits for diagnosis of highest cost condition	0.001	0.016
highcostcost	net paid for highest cost diagnosis (only claims that were billed with that primary diagnosis)	15.948	1066.389
immune	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.003	0.053
immune_er	number of ER visits for diagnosis of condition	0.000	0.002
immunecost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	0.819	138.182
juvjust	indicator for Juvenile Justice child	0.034	0.181
los_cnt	net paid for antipsychotics	0.081	1.002
los_cnt_res	average LOS based on covered days from claims--residential treatment center	0.401	5.581
los_computed	net paid for antidepressants	0.087	1.072
los_computed_res	average LOS computed (discharge date - admission date)--residential treatment center	0.459	6.004
lymph	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.000	0.013
lymphcost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	0.018	4.635
Lymphosarcoma_reticulosarcoma_er	number of ER visits for diagnosis of condition	0.000	0.000
male	sex	0.599	0.490
medicaid_office	zip code classification if zip code is blank or out of state	0.049	0.215

Variable	Definition	Mean	Std Dev.
menthlth_er	number of ER visits for diagnosis of condition	0.003	0.035
menthlth_pd	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	369.374	1366.619
mhb4yn	indicator for eligibility of mental health services before	0.242	0.428
neo	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.009	0.096
neo_er	number of ER visits for diagnosis of condition	0.000	0.001
neocost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	16.705	832.615
neurosesnec	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.337	0.473
neurosesnec_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	141.946	724.171
obsessivecomp	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.001	0.035
obsessivecomp_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	0.215	15.469
other	race	0.112	0.316
out_of_state	zip code classification	0.000	0.003
overallmh_paid	summation of visit_bsd_paid + rehab + rx_paid_bh + adm_paid + adm_paid res	400.742	2359.257
overallph_paid	result of (total_med_paid + rx_paid) - overallmh_paid	586.405	4401.477
overalltotal	overallmh_paid + overallph_paid	987.147	4314.118
palegia	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.003	0.052
palegia_er	number of ER visits for diagnosis of condition	0.000	0.000
palegiacost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	0.552	18.899
pancliverkid	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.003	0.059
pancliverkid_er	number of ER visits for diagnosis of condition	0.000	0.003
pancliverkidcost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	2.573	230.509
physical_hlth_paid	result of overallph_paid - rx_paid_ph	528.631	4042.097
psychosesnec	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.035	0.183
psychosesnec_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	40.341	482.463

Variable	Definition	Mean	Std Dev.
rehabhoursafter	indicator if patient had rehabilitation services after implementation action year	0.047	0.191
respiratory	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.003	0.058
respiratory_er	number of ER visits for diagnosis of condition	0.000	0.004
respiratorycost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	2.517	111.045
rural	zip code classification	0.180	0.385
rx_paid	total paid for POS pharmacy	99.452	1617.937
rx_paid_bh	total paid for behavioral POS pharmacy	41.678	154.333
rx_paid_ph	rx_paid - rx_paid_bh	57.774	1607.976
schizophrenia	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.004	0.066
schizophrenia_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	8.842	247.554
sed	indicator for SED (severely emotionally disturbed)	0.074	0.261
sexother	sex if male or female was missing	0.000	0.011
smi	indicator for SMI (severely mentally ill)	0.000	0.022
statecust	indicator for state custody	0.254	0.435
substanceabuse	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.006	0.078
substanceabuse_pd	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	2.558	75.219
systemicsclerosis_er	number of ER visits for diagnosis of condition	0.000	0.000
systemscle	indicator whether diagnosis was present as primary, secondary, or tertiary on facility claim	0.000	0.003
systemsclecost	net paid for specific diagnosis (only claims that were billed with that primary diagnosis)	0.001	0.419
tcm_paid	paid for targeted case management	52.387	150.411
tcm_units	units of targeted case management	0.235	0.424
therapy_paid	visit_bsd_paid + visit_bsd_pt2024_paid_all	38.530	127.026
therapyever	indicator if patient had therapy ever	0.197	0.397
therapyeverafter	indicator if patient had therapy after 1/1/06	0.143	0.350
time2	time trend	5.500	2.872
total_med_paid	net paid for all medical claims	887.695	3928.862
urban	zip code classification	0.712	0.453
urbanadjacent	zip code classification	0.081	0.273
visit_bsd_paid	net paid for therapeutic services-- specialty MH providers	35.044	122.603

Variable	Definition	Mean	Std Dev.
visit_bsd_pt2024_pa id_all	net paid for therapeutic services for physician or nurse practitioner	3.487	19.891
visit_bsd_PT2024_v isits_all	number of visits for therapeutic services to physician or nurse practitioner	0.044	0.291
visit_bsd_visits	number of visits for therapeutic services (visit based codes)-- specialty MH providers	0.238	0.815
white	race	0.631	0.478

Table 2: Estimates from DD for All, SC, and PC

	For All		For Statecustody		For Parentalcustody	
Outcomes (quantity)	Estimate	P-value	Estimate	P-Value	Estimate	P-Value
apdays	0.902	0.000	0.466	0.133	1.327	0.000
addays	0.279	0.028	-0.114	0.613	0.595	0.000
adhddays	0.789	0.000	0.246	0.355	1.191	0.000
axdays	0.050	0.267	-0.032	0.563	0.092	0.163
barbdays	0.096	0.565	0.340	0.132	0.042	0.859
admits	-0.001	0.184	0.000	0.836	-0.001	0.257
days_los_cnt	-0.057	0.036	-0.026	0.680	-0.045	0.028
days_los_computed	-0.457	0.000	-0.038	0.565	-0.042	0.043
los_cnt	-0.053	0.047	-0.019	0.765	-0.045	0.020
los_computed	-0.057	0.040	-0.033	0.618	-0.043	0.031
admits_res	0.002	0.000	0.004	0.002	0.002	0.000
days_los_cnt_res	0.680	0.000	1.290	0.000	0.488	0.000
days_los_computed_res	0.787	0.000	1.310	0.000	0.609	0.000
los_cnt_res	0.683	0.000	1.297	0.000	0.491	0.000
los_computed_res	0.789	0.000	1.317	0.000	0.612	0.000
visit_bsd_visits	-0.199	0.000	-0.264	0.000	-0.151	0.000
visit_bsd_PT2024_visits_all	0.109	0.000	0.092	0.000	0.132	0.000
	For All		For Statecustody		For Parentalcustody	
Outcomes of buckets (paid)	Estimate	P-value	Estimate	P-Value	Estimate	P-Value
overalltotal	-265.281	0.000	-68.255	0.376	-293.183	0.000
overallmh_paid	85.377	0.100	319.363	0.004	40.658	0.399
therapy_paid	-73.931	0.000	-91.998	0.000	-61.547	0.000
visit_bsd_paid	-81.416	0.000	-98.968	0.000	-69.985	0.000
visit_bsd_pt2024_paid_all	7.485	0.000	6.970	0.000	8.437	0.000
adm_paid_res	249.551	0.000	447.712	0.000	-542.959	0.000
adm_paid	-33.955	0.005	-15.014	0.568	-29.517	0.008
rx_paid_bh	12.449	0.000	6.311	0.228	19.317	0.000
ap_paid	12.437	0.000	7.178	0.043	17.557	0.000
ad_paid	-1.324	0.000	-1.046	0.028	-1.510	0.000
adhd_paid	4.341	0.000	2.334	0.044	5.753	0.000
barb_paid	-3.116	0.076	-2.338	0.449	-2.428	0.276
ax_paid	-0.108	0.235	0.179	0.319	-0.056	0.694
overallph_paid	-350.658	0.000	-387.618	0.000	-333.841	0.000
physical_hlth_paid	-227.375	0.000	-386.030	0.000	-141.176	0.039
rx_paid_ph	-123.284	0.000	-1.588	0.839	-192.665	0.000
rx_paid	-110.834	0.001	4.724	0.620	-173.349	0.002

Table 3: Regression Results – Overall Mental Health costs

VARIABLES	All overallmh_paid	Statecustody overallmh_paid	Parental Custody overallmh_paid
after	-364.7***	-848.6***	-87.00**
	-43.78	-99.73	-38.35
therapyever	-162.0***	-370.6***	-60.79
	-43.83	-92.38	-41.17
therapyeverafter	85.38	319.4***	40.66
	-51.95	-112	-48.23
rehabhoursafter	1,911***	1,780***	1,904***
	-67.47	-120.9	-80.25
statecust	100.8		
	-65.85		
heart	147.9	-141.1	185.1*
	-126.4	-327.7	-104.3
highcost	38.7	84.92	-5.155
	-73.2	-175.6	-62.47
bone	49.4	225.5	-22.54
	-76.65	-201.8	-62.87
brain	-0.859	-205.6	50.12
	-79.75	-298.5	-59.87
immune	100.4	723.6	-41.99
	-266.9	-737.8	-216.3
respiratory	-104.1	-22.07	-84.39
	-227.4	-811.4	-171.2
canceretc	-189.3	-1,197	-73.73
	-473.6	-1,782	-356.9
pancliverkid	-152.1	-355.4	-66.75
	-205.7	-698.2	-156.5
blood	-214.0*	-162.3	-248.6***
	-122.6	-367.2	-95.97
palegia	-64.09	-311.8	-38.37
	-251	-933.7	-187.5
lymph	-1,185	-5,991***	105
	-872.8	-2,317	-705
neo	-44.16	-267.2	30.92
	-224.4	-667.2	-182.2
systemscl	0	0	0
	0	0	0
antisocbeh	671.7***	785.0***	628.9***
	-59.42	-116.6	-59.71
anxiatidis	342.1***	574.8**	140.5
	-120.5	-243.8	-113.8
autism	44.64	47.2	30.71

VARIABLES	All overallmh_paid	Statecustody overallmh_paid	Parental Custody overallmh_paid
bipolar	-119.3 1,289***	-387.3 1,421***	-91.55 1,127***
depression	-50.72 502.1***	-104.3 544.6***	-48.88 443.8***
eatingdis	-46.09 9,903***	-87.73 830.9	-47.85 6,304***
obsessivecomp	-1,449 41.37	-3,210 -101.9	-1,452 58.29
neurosesnec	-281.9 194.7***	-646.3 455.5***	-242.9 45.64*
schizophrenia	-31.06 1,136***	-71.42 1,396***	-27.2 761.6***
substanceabuse	-156.6 326.2**	-382.5 272	-134.7 416.0***
psychosesnec	-150.6 1,149***	-278.9 1,542***	-160 835.3***
heart_er	-58.38 -35.38	-119.7 -266.3	-55.82 80.59
highcost_er	-1,222 296.5	-8,128 464.9	-863.7 362.6
brain_er	-771.1 425.3	-2,157 936.1	-638.3 473.6
immune_er	-894.7 0	-3,957 0	-652.5 0
bone_er	0 -41.64	0 -814.8	0 184.8
respiratory_er	-622.9 1,332	-1,937 0	-488.4 600.6
canceretc_er	-4,786 0	0 0	-3,331 0
pancliverkid_er	0 3,068	0 26,620	0 1,181
blood_er	-4,781 -1,141	-19,663 -2,543	-3,556 -201.1
palegia_er	-1,260 0	-3,160 0	-1,035 0
neo_er	0 -20.99	0 0	0 -665.3
mentalth_er	-10,507 2,766***	0 3,499***	-7,276 2,456***
lymphosarcoma_reticulosarcoma_er	-335.2 0	-751.4 0	-302.9 0
	0	0	0

VARIABLES	All overallmh_paid	Statecustody overallmh_paid	Parental Custody overallmh_paid
systemicsclerosis_er	0	0	0
	0	0	0
urban	1.677	-3.757	-24.08
	-83.1	-153.7	-88.5
urbanadjacent	-14.18	-250.9	72.93
	-131.4	-288.2	-123
rural	-52.38	-36.8	-12.06
	-94.86	-189.1	-96.19
out_of_state	-140.6	0	-71.01
	-1,795	0	-1,242
medicaid_office	328.1***	426.7***	301.3***
	-88.04	-164.6	-93.55
black	84.67	668.5	-291.3
	-247.8	-607.2	-220
amind	129	-133.6	97.04
	-314.6	-920	-252.1
asian	-85.07	25.4	147.9
	-420.4	-798.6	-444.6
other	-2.492	204.4	21.01
	-76.26	-253.3	-59.7
sed	250.3***	274.8	163.0*
	-91.56	-188.8	-90.11
smi	5,439***	6,386***	3,622***
	-487.6	-845.3	-660.8
female	-685.1	-1,151	-1.105
	-555.9	-1,040	-565.7
sexother	0	0	0
	0	0	0
juvjust	989.2***	774.0***	0
	-95.89	-170.3	0
tcm_units	-31.94	-130.9*	80.82**
	-37.88	-74.97	-38.42
time2	52.12***	102.5***	14.39**
	-7.448	-16.84	-6.604
Constant	235.7	354	113.4
	-231.4	-479.9	-223.5
Observations	48,899	17,905	30,994
R-squared	0.096	0.088	0.099
Number of id	7,235	2,857	5,409

Notes_Titles: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Appendix B: Additional Figures

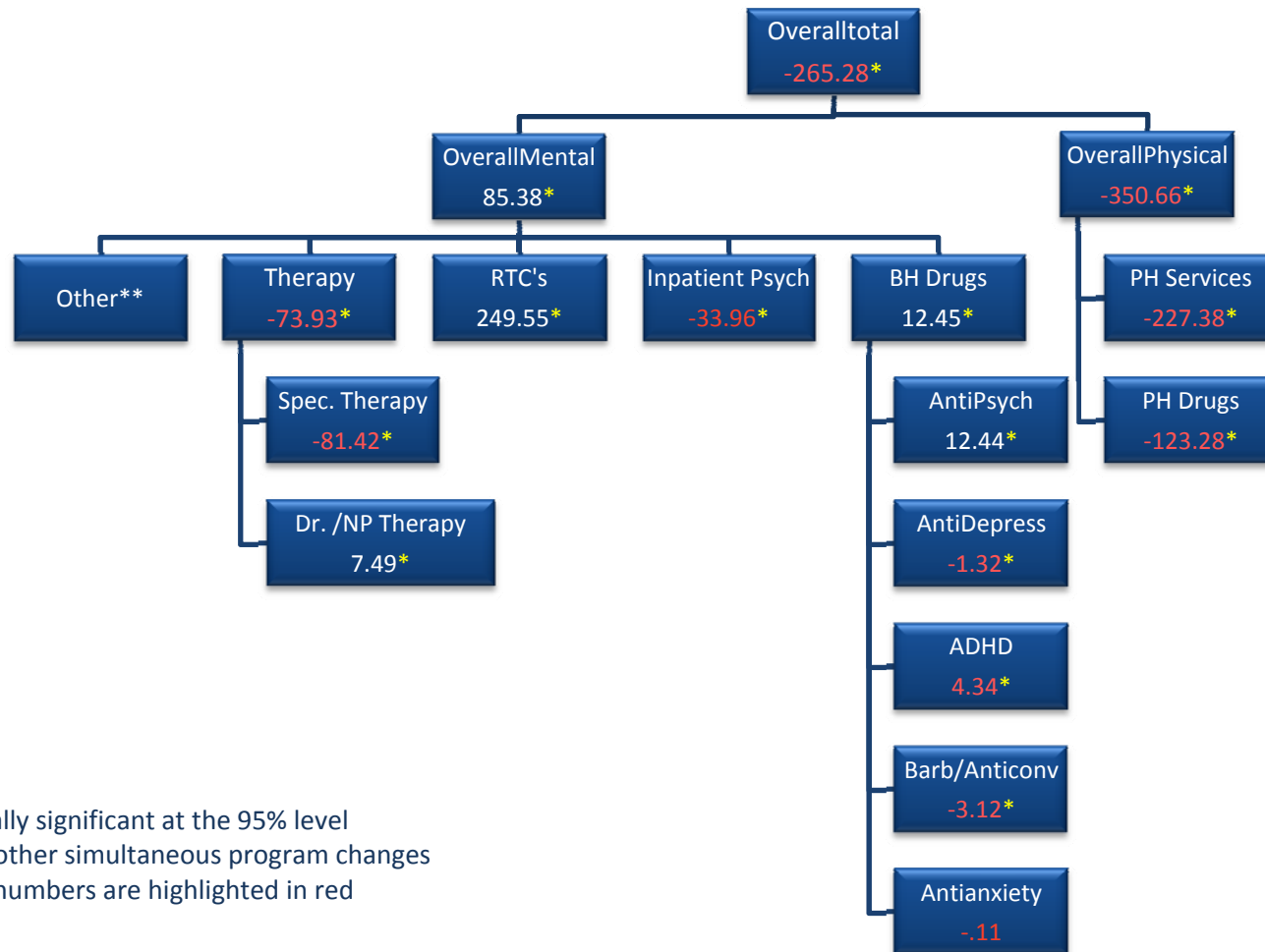


Figure 2: Results of DD

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