

Do High Fidelity Wraparound Services for Youth with Serious Emotional Disturbances Save Money in the Long-Term?

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Abstract

Background: Treating youth with serious emotional disturbances (SED) is expensive often requiring institutional care. A significant amount of recent federal and state funding has been dedicated to expanding home and community-based services for these youth as an alternative to institutional care. High Fidelity Wraparound (Wrap) is an evolving, evidence-informed practice to help sustain community-based placements for youth with an SED through the use of intensive, customized care coordination among parents, multiple child-serving agencies, and providers. While there is growing evidence on the benefits of Wrap, few studies have examined health care spending associated with Wrap participation and none have examined spending patterns after the completion of Wrap. Merging health care spending data from multiple agencies and programs allows for a more complete picture of the health care costs of treating these youth in a system-of-care framework.

Aims of Study: (i) To compare overall health care spending for youth who transitioned from institutional care into Wrap (the treatment group) versus youth not receiving Wrap (the control group) and (ii) to compare changes in health care spending, overall and by category, for both groups before (the pre-period) and after (the post-period) Wrap participation.

Methods: The treatment group (N=161) is matched to the control group (N=324) temporally based on the month the youth entered institutional care. Both total health care spending and spending by category are compared for each group pre- and post-Wrap participation. The post-period includes the time in which the youth was receiving Wrap services and one year afterwards to capture long-term cost impacts.

Results: In the year before Wrap participation, the treatment group

averaged \$8,433 in monthly health care spending versus \$4,599 for the control group. Wrap participation led to an additional reduction of \$1,130 in monthly health care spending as compared to the control group in the post-period. For youth participating in Wrap, these spending reductions were the result of decreases in mental health inpatient spending and general outpatient spending.

Discussion: Youth participating in Wrap had much higher average monthly costs than youth in the control group for the year prior to entering Wrap, suggesting that the intervention targeted youth with the highest mental health utilization and likely more complex needs. While both groups experienced reductions in spending, the treatment group experienced larger absolute reductions, but smaller relative reductions associated with participation. These differences were driven mainly by reductions in mental health inpatient spending. Larger reductions in general outpatient spending for the treatment group suggest spillover benefits in terms of physical health care spending. Further analysis is needed to assess how these spending changes impacted health outcomes.

Implications for Health Policies: Wrap or similar programs may lead to reductions in health care spending. This is the first study to find evidence of longer-term spending reductions for up to a year after Wrap participation.

Implications for Further Research: Randomized trials or some other source of plausibly exogenous variation in Wrap participation is needed to further assess the causal impact of Wrap on health care spending, outcomes, or broader system-of-care spending.

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Background

Approximately 20 percent of all youth less than 19 years of age have a diagnosable mental health disorder.^{1,2} One in ten youth have a mental health disorder severe enough to impair their functioning in their home, school, and community.^{3,4} Previous studies demonstrate that institutional care for youth with severe emotional disturbances (SED) is expensive.^{5,6} The Substance Abuse and Mental Health Service Administration (SAMHSA) defines individuals less than 18 years of age with an SED as having “a diagnosable mental,

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behavioral, or emotional disorder of sufficient duration to meet Diagnostic and Statistical Manual of Mental Disorders criteria that results in a functional impairment which substantially interferes with or limits the child's role or functioning in family, school or community activities."⁷ The Deficit Reduction Act of 2005 authorized \$218 million in funding to ten states to develop five-year demonstration programs that provide community alternatives to Psychiatric Residential Treatment Facility (PRTF) level of care through home and community-based services for youth with an SED. Several states utilized the Alternatives to PRTF Demonstration Grant to help divert and/or transition youth with SEDs from PRTFs through the implementation or expansion of High Fidelity Wraparound (Wrap).

Since the term was first coined in the 1980s, Wrap has been described in various ways including as a philosophy, an approach, and a service. More recently the National Wraparound Initiative defined Wrap as "an intensive, individualized care planning and management process."⁸ The values of Wrap are consistent with the System of Care framework. Key characteristics of the process are that individualized, strength-based, culturally competent plans are developed by a family-centered team, driven by the preferences and needs of the youth and family. Through the team-based planning and implementation process, Wrap aims to develop problem-solving skills, coping skills, and self-efficacy of the youth and family members that support integrating the youth into the community and building the family's social support network.⁹

Since 2003, 10 controlled studies have been published on the effectiveness of Wrap for youth involved in the mental health, child welfare and juvenile justice systems.¹⁰ Most of these studies focus on the effectiveness of Wrap as measured by some subset of the following outcomes: reductions in residential placements, improved mental health outcomes, school success, and juvenile justice recidivism.¹¹ However, very few of these studies address the impact of Wrap on health care costs, despite some states and jurisdictions reporting residential and psychiatric hospitalization cost savings from implementing Wrap.¹²

One study by Grimes *et al.* evaluated the costs and outcomes of the Mental Health Services Program for Youth (MHSPY) in Massachusetts, a Medicaid-funded demonstration project that draws on the principles of Wrap to serve youth with a diagnosed mental illness resulting in significant clinical impairment, a current out-of-home placement, or places the youth at imminent risk for an out-of-home placement.¹³ The authors note that this Wrap model was implemented through a clinical care management entity and included intensive clinical oversight, potentially distinguishing it from other Wrap models that focus solely on care coordination. In Grimes' study, Medicaid claims from 2005 and 2006 were used to compare health service utilization by spending category (including pharmacy) for youth enrolled in Wrap to Medicaid enrolled youth receiving "usual care." Propensity score matching was used to reduce potential differences between the Wrap and usual care groups. Despite matching on diagnosis and prior hospital use, the usual care group still had less psychiatric

impairment. It does not appear as though the Wrap and usual care groups were matched based on the timing of their transition from high-intensity care. Results comparing average monthly expenditures per child indicated that the average costs of youth participating in Wrap exceeded the average costs of the usual care group that only received outpatient mental health services, but were less than those who had at least one inpatient stay. Grimes' study did not consider costs after discharge from Wrap, but stressed that it was an important topic for future research.

Another study described results from an evaluation of a congressionally mandated Wrap demonstration for child and adolescent dependents of military personnel.¹⁴ Behavioral health service utilization and costs (not including pharmacy) of youth receiving Wrap were compared to a usual care group. It does not appear as though the Wrap and usual care groups were matched based on the timing of their transition from high-intensity care. The authors note that composing the comparison group was a challenge and decided to use families who refused Wrap services or were ineligible. The two groups were similar at baseline in terms of three measures of acuity and 30 months of cost data. Average costs fell for both groups during the 14 months of services, but these costs decreased twice as quickly among the usual care group. This was primarily due to the addition of nontraditional care (Wrap) in excess of traditional care costs for children participating in Wrap.

A final study described a national evaluation of ten states receiving funding via the Alternatives to PRTF Demonstration Grant.¹⁵ This cost analysis did not use individual data, but rather average cost data for children in Wrap collected from participating states, along with similar cost data for children enrolled in PRTF care. Given the approach, it was not possible to match on demographic characteristics or the start date of PRTF care. Costs were measured globally including the actual cost of providing Wrap services, along with costs associated with all other services paid for by Medicaid. Urdapilleta's analysis did not stratify costs by category of service. Descriptive results suggested that Wrap may be associated with improvements in clinical and functional outcomes, as well as significant cost savings, during the provision of Wrap.¹⁵

This paper compares average monthly health care spending for youth in a southeastern state transitioning from institutional care into Wrap to youth who started institutional care at the same time but who did not receive Wrap. Unlike the previous literature, this study compares combined costs both during and the year after Wrap participation to spending in the previous year, making it the first study to consider the impact of Wrap on long-term health care spending. An additional contribution of this work is that both total health care spending as well as several distinct categories of spending (emergency room [ER]/inpatient, mental health inpatient, general outpatient, mental health outpatient, and pharmacy spending) are included. Finally, this study focuses on youth transitioning from institutional care into Wrap rather than those being diverted from institutional care into Wrap because there may be differential effects for these two groups. Previous cost studies appear to combine these groups.

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This study found that mean monthly health care spending was higher for the treatment group relative to the control group (\$8,433 versus \$4,599) in the year before Wrap participation. Wrap participation led to an additional reduction of \$1,130 in monthly health care spending compared to the control group during the post-period. For youth participating in Wrap these spending reductions resulted from decreases in mental health inpatient spending and general outpatient spending.

Aims of the Study

The primary study aim is to compare overall health care spending for youth with SEDs who transitioned from institutional care into Wrap (the treatment group) versus youth starting institutional care at the same time, but not receiving Wrap (the control group). The secondary aim is to compare changes in health care spending, overall and by category, for both groups during and the year after Wrap participation to prior year spending.

Methods

The treatment group consisted of youth transitioning from institutional (PRTF) care into Wrap. Total health care spending in the 12 months before Wrap participation (the pre-period) was compared to spending in the combined time during and 12 months after participation in Wrap (the post-period). Youth who did not participate in Wrap served as a control group in this analysis. Youth in both groups had a diagnosis and duration of symptoms which classified their illness as SED. The two groups were matched temporally on the start date of their institutional care stay because they had similar functional assessment scores and met an institutional level of care. Treatment youth exited their institutional care stay via participation in Wrap, while control youth may have remained in institutional care or been previously discharged. The average length of stay in these institutional care episodes was 274 days for youth in the treatment group and 169 days for youth in the control group. Thus, temporal matching among youth in the treatment group was not based on the start of Wrap participation. Total health care spending is stratified into several distinct categories, including: emergency room ER/inpatient, mental health inpatient, general outpatient, mental health outpatient, and pharmacy spending.

On average, youth in the treatment group were enrolled in Wrap for nine months. Each youth's health care spending was tracked for an additional 12 months to include a long-term component in the post-period. This made the average length of the post-period 21 months. For each youth in the treatment group, their temporally paired controls were assigned the same post-period in order to compare spending patterns over the same timeframe.

Figure 1 illustrates a sample of Wrap episodes (in grey) for youth in the treatment group matched temporally to their controls.

Youth 1 from the treatment group has the longest possible Wrap episode (from August 2009 to December 2011), given the timing of the study sample. This youth was observed for 29 months during their Wrap episode, as well as 12 months before and 12 months after, for a total of 53 months (12 pre-period and 41 post-period). This youth's Wrap episode was initiated August 2009 during transition from an institutional care stay that started in August 2008. This episode is matched to youth 1 from the control group who was admitted to institutional care in August 2008 and continuously enrolled in Medicaid for the same 53-month period.

Youth 2 from the treatment group had an 18-month Wrap episode that started January 2010 during transition from an institutional care stay that started in August 2009. This youth's 12-month pre-period consisted of seven months in the community followed by five months in institutional care. This youth was observed for a total of 42 months (12 pre-period and 30 post-period). Youth 2 from the treatment group was matched with a youth from the control group who similarly started an institutional care stay in August 2009.

Data

This analysis used Medicaid administrative enrollment and claims data from a southeastern state between August 2008 and December 2012. The data was augmented with claims paid directly by the State Behavioral Health Authority for behavioral health services not covered by Medicaid. The treatment group consisted of 161 youth between the ages of six and 20 years who were continuously enrolled in Medicaid, diagnosed with an SED with a Child and Adolescent Functional Assessment Score (CAFAS) greater than 120, and enrolled in a first Wrap episode between August 2009 and December 2011. Youth were continuously enrolled in Medicaid during their Wrap episode, as well as 12 months before and 12 months afterwards. Thus, the total number of months observed for each youth was dependent on the duration of his/her Wrap episode.

By restricting the start date of the treatment group in the sample to August 2009 or later, total health care spending could be observed for the full 12-month pre-period. Similarly, by restricting the end date of the treatment group in the sample to December 2011 or earlier, the treatment group's total health care spending for the full 12-month period after Wrap treatment concluded was included in the post-period. The 161 youth in the treatment group were matched to 324 controls: 46 youth (1:1 match), 67 youth (1:2 match), and 48 youth (1:3 match). Thus, the total sample size was 485 youth. Youth in the control group were also continuously enrolled in Medicaid, diagnosed with an SED with a CAFAS greater than 120; however, they were not enrolled in Wrap during the study period.

To give more detail regarding the definitions of the variables used in the analysis, urbanicity was defined using the U.S. Department of Agriculture's 9-point Rural Urban Continuum Code, with "1" being the most urban and "9" being the least. A youth's residence at the start of the post-period was considered urban if it measured a "1," "2," or "3" on this continuum. Wrap spending referred to spending

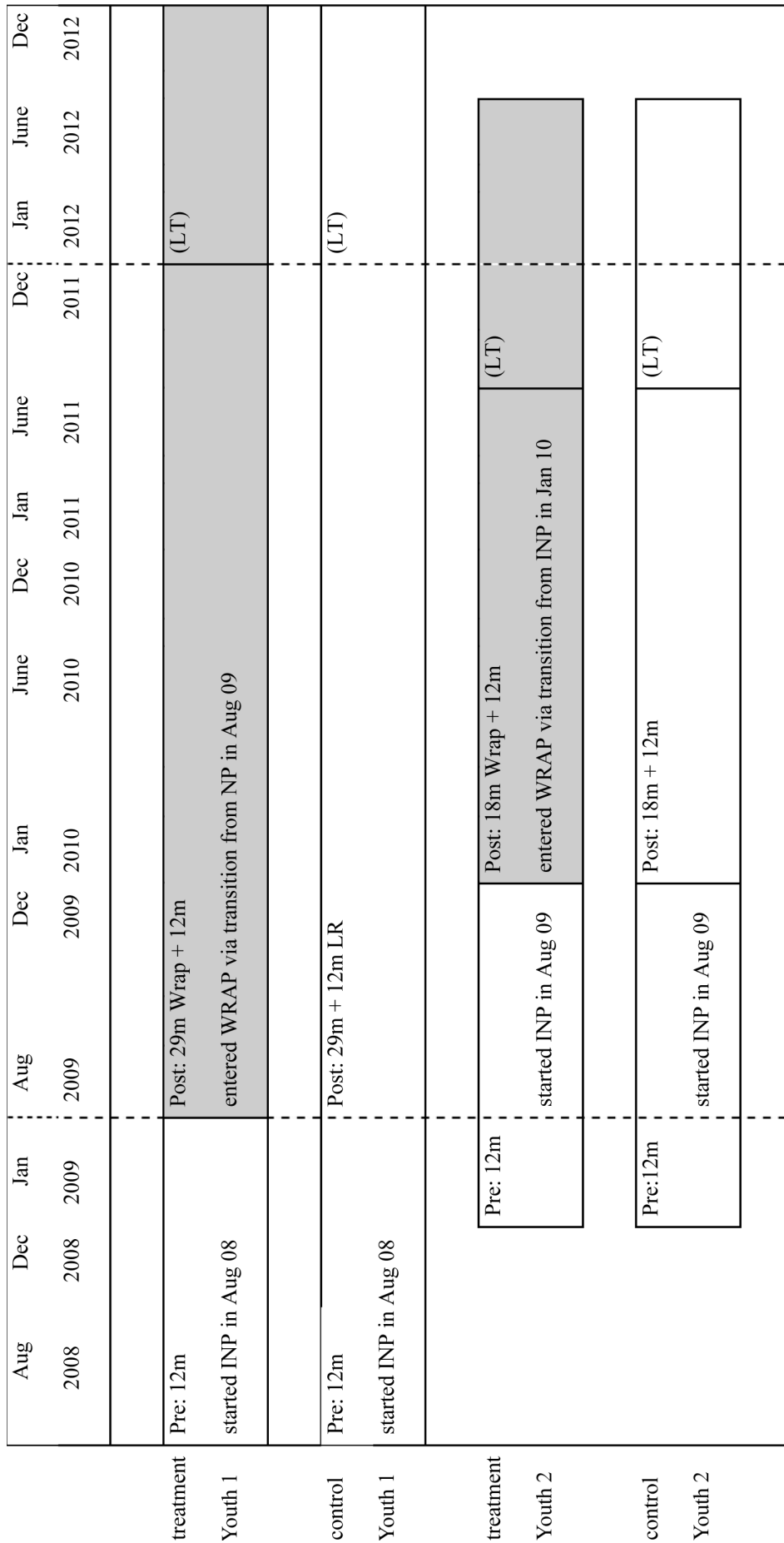


Figure 1. Sample Wrap Treatment Episodes.

Notes: INP stands for inpatient mental health hospitalization, Wrap stands for Wraparound care, and LT stands for long term.

Table 1. Descriptive Statistics.

	Treatment group	Control group
Sample Size	161	324
Pre-Wrap Monthly Duration	12.00	12.00
Post-Wrap Monthly Duration	20.92	21.15
Pre-Wrap Monthly Spending***	8,433.23	4,598.92
Post-Wrap Monthly Spending***, ^^^	5,175.16	2,471.11
Age 6-10***	19.25%	6.48%
Age 11-15*	56.52%	47.53%
Age 16-20***	24.22%	45.99%
Female	38.51%	40.12%
Urban	86.34%	82.72%
Foster*	37.27%	45.37%

Source: Medicaid administrative data from a southeastern state.

Notes: *** implies the difference between the treatment and control group is statistically significant at the 1% level, ** implies the difference between the treatment and control group is statistically significant at the 5% level, and * the difference between the treatment and control group is statistically significant at the 10% level. ^^^ implies the difference between pre- and post-WRAP spending is statistically significant at the 1% level, ^^ implies the difference between pre- and post-WRAP spending is statistically significant at the 5% level, and ^ implies the difference between pre- and post-WRAP spending is statistically significant at the 10% level.

on any services associated with the Wrap program. There was no Wrap spending in the pre-period, so such spending was only generated by the treatment group in the post-period. ER/inpatient spending included any spending for services received at a general hospital. MH inpatient spending refers to any spending in a psychiatric residential treatment facility (a PRTF stay) or a crisis stabilization unit. Outpatient spending included general services received outside of a hospital setting, such as a doctor’s office or laboratory. MH outpatient spending referred to spending associated with a mental health service received in the community. Finally, pharmacy spending included all spending on pharmaceuticals, regardless of the condition.

Statistical Analysis

Descriptive statistics and mean total health care spending were reported for the treatment group and the control group. Statistically significant differences were examined using t-tests for continuous variables and chi-square tests for categorical variables. Similar comparisons were examined by spending category. Next, a difference-in-differences regression was estimated using the following form for the Wrap treatment and control groups:

$$Spending_{it} = B_0 + B_1*Wrap_i*Post_t + B_2*Wrap_i + B_3*Post_t + X*B_4 + a_i + e_{it} \quad (1)$$

In this equation, the vector X represented observed youth characteristics (age, gender, urban vs. rural, and foster status) and a_i represented youth fixed effects, which control for the unobserved youth characteristics that are time-invariant. The primary coefficient of interest, B_1 , on the interaction between the Wrap indicator and the post-period indicator represented any change in spending as a result of participating in Wrap for the treatment group relative to the change in spending for the control group during the post-period. As is typically the

case in a difference-in-differences regression, a separate indicator was included for those who participated in Wrap ($Wrap_i$), as well as an indicator for the post-period ($Post_t$).

Results

Table 1 presents descriptive statistics for the sample. Mean spending was significantly higher (p-value < 0.01) for the treatment group relative to the controls (\$8,433 vs. \$4,599) in the pre-period. In the post-period, mean spending significantly fell for both the treatment (\$5,175; a 39 percent reduction, p-value < 0.01) and control (\$2,471; a 46 percent reduction, p-value < 0.01) groups, but spending in the treatment group continued to be significantly higher (p-value < 0.01) than spending in the control group.

Turning to demographic differences, the treatment group contained larger shares of young children than the control group (p-value < 0.01 for age categories 6-10 and 16-20 years and p-value = 0.06 for age category 11-15 years). It also had a smaller (p-value = 0.09) share of foster children (defined as those ever in foster care during the study period). There was no statistically significant difference in the share of youth that resided in an urban area or the share of female youth between the treatment and the control groups.

Table 2 reports mean spending by category. When spending was stratified into the six categories, generally the treatment group incurred more spending in the pre-period than the controls, with the exception being MH outpatient spending, which was significantly higher (p-value < 0.01) in the control group (\$508 vs. \$229). For the post-period, the treatment group incurred significantly higher ER/inpatient spending (\$238 vs. \$161, p-value < 0.05), MH inpatient spending (\$2,852 vs. \$1,114, p-value < 0.01), and pharmacy spending (\$537 vs. \$357, p-value < 0.01), compared to the control group.

Table 2. Monthly Mean Spending by Category.

	Treatment group	Control group
Sample size	161	324
Mean Pre-Wrap Wrap Spending	0	0
Standard Deviation	N/A	N/A
Mean Post-Wrap Wrap Spending	693.27	0
Standard Deviation	42.16	N/A
Mean Pre-Wrap ER/Inpatient Spending	281.27	263.13
Standard Deviation	49.44	32.41
Mean Post-Wrap ER/Inpatient Spending***	238.36	160.93^^
Standard Deviation	32.67	21.20
Mean Pre-Wrap MH Inpatient Spending***	6,915.04	3,040.04
Standard Deviation	250.72	148.49
Mean Post-Wrap MH Inpatient Spending***	2,851.69^^	1,113.89^^
Standard Deviation	202.28	100.49
Mean Pre-Wrap Outpatient Spending	391.66	310.63
Standard deviation	62.48	23.81
Mean Post-Wrap Outpatient Spending	263.60^	299.67
Standard Deviation	20.01	40.06
Mean Pre-Wrap MH Outpatient Spending***	228.83	507.82
Standard Deviation	26.08	32.24
Mean Post-Wrap MH Outpatient Spending**	591.11^^	539.37
Standard Deviation	33.96	28.62
Mean Pre-Wrap Pharmacy Spending***	616.43	477.3
Standard Deviation	43.58	25.19
Mean Post-Wrap Pharmacy Spending***	537.12	357.24^^
standard deviation	36.16	17.01

Source: Medicaid Administrative data from a southeastern state.

Notes: Wrap spending refers to spending on any services associated with the Wraparound program. ER/inpatient spending include any spending for services received at a general hospital. MH inpatient spending refers to any spending in a psychiatric residential treatment facility (a PRTF stay) or a crisis stabilization unit. Outpatient spending includes general services received outside of a hospital setting, such as a doctor's office or laboratory. MH outpatient spending refers to spending associated with a mental health service received in the community. Finally, pharmacy spending includes all spending on pharmaceuticals, regardless of the condition. *** implies the difference between the treatment and control group is statistically significant at the 1% level, ** implies the difference between the treatment and control group is statistically significant at the 5% level, and * the difference between the treatment and control group is statistically significant at the 10% level. ^^ implies the difference between pre- and post-WRAP spending is statistically significant at the 1% level, ^ implies the difference between pre- and post-WRAP spending is statistically significant at the 5% level, and ^ the difference between pre- and post-WRAP spending is statistically significant at the 10% level.

MH inpatient spending is the largest spending category for both groups. In the post-period, both the treatment (\$6,915 to \$2,852, p-value < 0.01) and control (\$3,040 to \$1,114, p-value < 0.01) groups exhibited a statically significant reduction in this spending category. By design, the treatment group accrues spending on Wrap services (\$693 over the entire post period, \$1,219 during Wrap participation), while the control group never receives these services (\$0). Compared to the pre-period, ER/inpatient spending significantly falls (p-value = 0.01) for the control group, but not the treatment group. Outpatient spending decreases significantly (p-value = 0.05) for the treatment group, but not the control group. MH outpatient spending significantly increases (p-value < 0.01) in the treatment group, but not the control group. Pharmacy spending significantly decreases (p-value < 0.01) for the control group, but not the treatment group.

Table 3 presents estimates of equation (1) based on the

Wrap and control groups described above. The results suggest that Wrap led to a statistically significant reduction

Table 3. Baseline Regression Results.

Wrap*Post	-1,130.26
Standard Error	306.95
P-Value	0.000
Post	-2,127.81
Standard Error	176.68
P-Value	0.000
# Observations	1,455
# Children	485

Source: Medicaid administrative data from a southeastern state.

Notes: Child fixed effects are included in this regression, which control for any observed or unobserved child characteristics that are time-invariant, such as gender, race, or underlying health status.

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Table 4. Post-Period Spending stratified by Category.

	Spending Category						
	All	WRAP	ER/Inpatient	MH Inpatient	Outpatient	MH Outpatient	Prescription
Wrap*Post	-1,130.26	693.27	59.29	-2,137.20	-117.10	330.73	40.75
Standard Error	306.95	47.78	57.75	302.72	66.65	62.57	34.01
P-Value	0.000	0.000	0.305	0.000	0.079	0.000	0.231
Post	-2,127.81	N/A	-102.20	-1,926.15	-10.96	31.55	-120.05
Standard Error	176.68		33.27	174.42	28.40	36.05	19.60
P-Value	0.000		0.002	0.000	0.775	0.382	0.000
# Observations	1,455	1,455	1,455	1,455	1,455	1,455	1,455
# Youth	485	485	485	485	485	485	485

Source: Medicaid administrative data from a southeastern state.

Notes: Each column represents a separate difference-in-differences regression. In each regression child fixed effects are included, which control for any observed or unobserved child characteristics that are time-invariant, such as gender, race, or underlying health status.

(p-value < 0.01) in average spending of \$1,130 over and above any change in spending for the control group. The coefficient associated with the post indicator is an estimate of the change in spending for the control group. Thus, the control group experienced a \$2,128 reduction (p-value < 0.01) in average spending. Taken together these two coefficients imply that the treatment group experienced a reduction in average spending of \$1,130 + \$2,128 = \$3,258 in the post-period.

Table 4 stratifies spending by category. The first column restates the total spending change result reported in **Table 3**; the next six columns focus on particular sub-categories of spending. Participation in Wrap resulted in statistically significant reductions in MH inpatient spending (\$2,137, p-value < 0.01) and general outpatient spending (\$117, p-value = 0.08). Wrap participation led to a significant increase (p-value < 0.01) in Wrap spending and MH outpatient spending (\$330, p-value < 0.01). **Table 4** also reports no statistically significant change in ER/inpatient spending or pharmacy spending. These results suggest that the overall reduction in spending due to Wrap participation is driven by reductions in MH inpatient spending and general outpatient spending that more than compensate for an increase in MH outpatient spending.

In other analyses not presented, the sample is stratified by gender, foster care status, and age, separately. Generally, females in the post-period have less health care spending when compared to males in both the treatment and control groups. Foster care status does not have an impact on post-period spending. Generally, health care spending decreases with increasing age.

Discussion

In this paper, health care spending for children who transitioned from institutional care into Wrap was compared with spending for children starting institutional care at the

same time but who did not transition into Wrap. Overall, children transitioning into Wrap experienced a \$1,130 reduction in average spending in the post-period. This methodology is novel in that it includes spending for 12 months after the completion of Wrap in order to measure longer-term effects. This is a 13 percent reduction in spending, as compared to the treatment group's pre-period average monthly spending of \$8,433. When costs are broken down by category, these savings were mainly driven by reductions in MH inpatient spending and general outpatient spending. This suggests that Wrap may also have spillover benefits in terms of physical health care spending.

By comparison, the National Alternatives to PRTF Demonstration Evaluation found a 32 percent cost savings when comparing health care spending during Wrap enrollment to a similar period of residential treatment,¹⁵ which is higher than the 13 percent reduction in spending observed in this study. Results from the Wrap demonstration for military dependents reported average behavioral health costs fell for both the Wrap and usual care groups during Wrap, but costs decreased twice as quickly among the usual care group.¹⁴ Brickman's study did not include other health care or pharmacy costs which might partially explain why costs decreased less quickly for the treatment group. Results from the analysis of the MHSPY Wrap program showed that average monthly expenditures per child during Wrap were less than for a comparison group of youth who had at least one inpatient stay.¹³ Like the current study, the MHSPY study also broke down costs into categories and found reductions in mental health inpatient care to be the largest cost driver. The researchers also observed reductions in acute inpatient care and increased spending in pharmacy and mental health outpatient care. The current study found similar increases in MH outpatient spending in the post-period; however, no statistically significant change in ER/inpatient or pharmacy spending. This difference, with respect to pharmacy spending, may be due to the more clinical nature of the MHSPY Wrap program.

This study is consistent with the previous literature in

that: (i) results suggest reductions in health care spending for youth participating in Wrap, (ii) these reductions are mainly driven by a reduction in mental health inpatient utilization and suggest spillover effects on physical health care spending, and (iii) it is challenging to identify a group of youth to serve as a control group who do not enter Wrap, but who are otherwise similar. The literature finds mixed results depending on the construction of the control or comparison group. Despite the fact that the current study matches on the timing of entry into institutional care to ensure youth had similar acute needs, youth in the sample who transitioned into Wrap had higher levels of pre-transition health care spending than youth who did not transition into Wrap. The decision to match temporally was based on the outcome of post-Wrap spending patterns and the nature of mental health service utilization more generally. Consequently, sample size constraints prevent further matching on other characteristics associated with pre-intervention spending.

In summary, results from this study suggest that youth enrolled in Wrap experience sustained average monthly savings of \$1,113 in overall health care spending for a year after discontinuing Wrap services. When compared to youth in institutional care who did not receive Wrap services, the treatment group experiences larger absolute reductions (\$3,258 vs. 2,128), but smaller relative reductions (39 percent vs. 46 percent), in the post-period. These differences are mainly due to the fact that the Wrap intervention targeted youth with the highest mental health utilization and likely more complex needs. This suggests that Wrap and other community-based alternatives to institutional care may be a cost-effective addition to state mental health Systems of Care both in the short- and long-term.

Limitations

This analysis focuses on health care spending and does not evaluate whether Wrap is associated with changes in youth functioning or behavioral health needs. In other words, the focus is on costs rather than comparing costs to benefits. In addition, both the proposed costs and benefits of Wrap extend beyond government agencies associated with health care into departments of education, welfare, and justice. For example, one study found that foster youth graduating from Wrap had significantly fewer out-of-home placements and lower post-graduation costs than foster youth receiving residential care.¹⁶ A complete evaluation of the impact of Wrap should include such system-wide information, however such data at the state or local level are seldom captured in one database. For example, in the present analysis of health care spending, data was merged from four distinct data sources within two separate state agencies. In terms of data, it is not possible to separate out the costs of PRTF, crisis stabilization, and acute psychiatric care (within the MH inpatient category of spending); however, the overwhelming majority of these costs in this spending category are for PRTF care. In terms of methods, the inclusion of individual fixed effects to control for time-invariant unobserved child characteristics comes at the cost

of sweeping out cross-sectional variation in mean costs. This could potentially be problematic given that the treatment and control groups are matched temporally based on functional assessment scores rather than on prior cost experience. It is possible that these groups could experience differential regression-to-the-mean. In addition, despite the inclusion of an additional 12-month period after Wrap completion in the post-period, this study included a relatively short panel that could potentially lead to bias. For these reasons, study findings should be interpreted with caution.

Implications for Health Care Provision and Use

Wrap has the potential to save money by substituting care coordination in the community for institutional care. These health care savings represent both immediate cost savings as well as larger continued savings in the first year after Wrap participation. Furthermore, spillover effects, in terms of less use of outpatient physical health care, suggest that building a family's social support network and improving coping skills may have added benefits of allowing youth with SED to remain in the community with less need for intensive, costly health services. These results are consistent with other care coordination programs that address social determinants of health being implemented as part of delivery systems designed to support population health.¹⁷

Implications for Health Policies

States contemplating the introduction of care coordination programs, such as Wrap, may achieve health care cost savings as well as savings within other nonhealth state agencies, such as juvenile justice and child welfare. Evaluations of the costs and benefits of Wrap also contribute to the broader policy debate about home and community-based care versus institutional care, in general.

Implications for Further Research

Future research should focus on fully measuring the system-wide costs and benefits of Wrap to provide a complete picture of the cost-effectiveness of such care coordination. In addition, while this study is the first to report cost estimates for youth in the year after Wrap participation, further research is needed to assess the longer-term impacts of Wrap. Additional analysis could also be done to study the impacts of Wrap on youth being diverted from institutional care or youth with high needs who do not yet meet an institutional level of care. Finally, randomized assignment into Wrap for research purposes would be a potential solution to the challenges created by differences between the treatment and control groups in quasi-experimental settings.

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