Youth Outcome Patterns Across Levels of Care in CAMHD Services

State of Hawai'i Department of Health

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EXECUTIVE SUMMARY

This technical report reviews recent studies on youth mental health treatment outcome patterns and is intended to assist policy-making around two general areas. First, in keeping with evidence-based practice, quality improvement efforts should seek continual advancement in the system's ability to expeditiously identify youth who are displaying higher needs and who may require more intensive and frequent treatment monitoring. Evidence suggests that early identification of these youth will enable treatment team members to better monitor and respond to their needs, resulting in improved outcomes for those youth and the prevention of treatment failure. Second, there is a need to establish appropriate timelines for service authorizations. This involves setting policies for when a qualified clinician's approval is required to reauthorize additional services for youth. Both of these areas can be informed by knowledge of typical outcome patterns of youth receiving services.

The studies presented here examined different stages of treatment episodes in order to identify key junctures that present critical opportunities to address the areas just described. The findings suggest that there are indeed time points that are important for making decisions about the appropriateness of services and/or the intensity/frequency with which to monitor youth and adjust their services. Such decisions can be thought of as taking place at different stages on the treatment timeline and include: 1) the initial selection of level of care (LOC), 2) the client's early response to that service, and 3) the client's status at the time when youth on average are expected to have shown substantial improvement.

At the initial selection of a level of care, the client's CAFAS score at that point can provide a risk indicator that signals the probability of success. If the risk indicator shows a low probability of success, then more careful consideration of placement in that level of care can be made, or a decision made to increase supports and/or the frequency of treatment monitoring and adjustment for that client in that level of care. The following table summarizes the recommended Initial Risk Indicators.

Table 1. Summary of Initial Risk Indicators.

Level of Care	CAFAS Cutoff (Scores at This Level or Higher)	Probability of Successful Discharge
Community Based Residential III	***150+***	***47.8%***
Transitional Family Home	***120+***	***45.2%***
Intensive In-Home	***130+***	***46.7%***

If a client is placed and continues services within a given level of care, early lack of progress is indicative of risk for an unsuccessful discharge. Early MTPS progress ratings and CAFAS scores can serve as indicators of when a youth is "off-track" from a successful discharge. Again, a case with early risk indicators can receive more service supports, a different level of care and/or can be monitored (and then adjusted) more frequently. The following table summarizes the Early Progress Risk Indicators identified in this study. These indicators show which youth have a less than 50% chance of a successful treatment episode.

Table 2. Summary of Early Progress Risk Indicators.

Level of Care	Assessment	Early Progress Risk Indicator
Hospital-Based Residential	2nd (Month) MTPS	Average MTPS Progress Rating ***Below 2.8***
Community Based Residential III	4th (Month) MTPS	Average MTPS Progress Rating ***Below 2.9***
	2nd (Quarter) CAFAS	CAFAS Score ***150 or higher***
Transitional Family Home	3rd (Month) MTPS	Average MTPS Progress Rating ***Below 3.6***
	2nd (Quarter) CAFAS	CAFAS Score ***140 or higher***
Multisystemic Therapy	3rd (Month) MTPS	Average MTPS Progress Rating ***Below 3.3***
Functional Family Therapy	3rd (Month) MTPS	Average MTPS Progress Rating ***Below 3.6***
Intensive-In Home	2nd (Month) MTPS	Average MTPS Progress Rating ***Below 2.0***
	2nd (Quarter) CAFAS	CAFAS Score ***120 or higher***

CAFAS total score range: 0-240. MTPS progress rating range: 1-7 (1=Deterioration, 2=No Significant Changes, 3=Minimal Improvement, 4=Some Improvement, 5=Moderate Improvement, 6=Significant Improvement, 7=Complete Improvement)

If improvements are being made as hoped, another checkpoint exists to ensure that services remain appropriate. The progress level of individual cases can be reviewed around the time frame when youth on average have made considerable gains in a given LOC up to that point yet have made little progress thereafter. This was identified as the "point of diminishing improvement." This can serve as a guide as to the maximum treatment length before a qualified clinician must review the case and authorize the continuation, discontinuation, or modification of services (while other such reviews should occur much sooner). The following table summarizes the point of diminishing improvement for selected levels of care.

Table 3. Summary of Times to Point of Diminishing Improvement.

	Range (in Months)
Hospital-Based Residential	5
Community High Risk	6-11
Community Based Residential II	6-7
Community-Based Residential III	7-8
Transitional Family Home	5-6
Multisystemic Therapy	3-6
Functional Family Therapy	4
Intensive In-Home	6-10

The locally-based evidence presented here mirrors considerable other research indicating that initial severity and early treatment response can predict long term treatment outcomes. This congruence of findings from multiple other places and local CAMHD data strengthens confidence in the applicability of this evidence for treatment planning and monitoring. It also provides more evidence for timeframes that can be applied to service authorization standards and procedures. Moreover, these findings represent CAMHD's continued commitment to data-informed decision-making to improve its services for youth and families.

Introduction

Mental health systems and the clients they serve can benefit from sound policies and practices that are based on research evidence. One area of research that is useful for informing policy development is the examination of outcome patterns of youth receiving treatment. Knowledge of how youth typically improve in various services within a system of care can be helpful in client treatment planning and monitoring, authorizing appropriate units of services, and overall system service utilization management.

This technical report reviews recent CAMHD studies on youth outcome patterns and is intended to assist policy-making around two general areas. First, in keeping with evidence-based practice, quality improvement efforts should seek continual advancement in the system's ability to expeditiously identify youth who are displaying higher needs and who may require more intensive and frequent treatment monitoring and adjustment. Evidence suggests that early identification of these youth will enable treatment team members to better monitor and respond to their needs, resulting in improved outcomes for those youth and the prevention of treatment failure. Second, there is a need to establish appropriate timelines for service authorizations. This involves setting policies for when a qualified clinician's approval is required to reauthorize additional services for youth. While both of these areas serve distinct purposes, they rely on knowledge of youths' response to treatment.

The studies reported here continue a research program that began with a technical report (Jackson et al, 2012) that was aimed at identifying appropriate service authorization and review timeframes. This report takes a step further from the technical report and presents studies that have expanded upon those initial research questions, with updated data and improvements to analytic processes as well as new investigations of risk indicators that identify youth with complex needs.

It should be noted that the findings presented here are merely a source of information for developing policies around treatment provision. They are meant to be used as a guide in determining possible timeframes for individual case review and are not for dictating the type or amount of services provided.

The report begins with a review of relevant research followed by the two general areas of study and an overall summary.

Review of Research

There is still minimal research on youth treatment response patterns, particularly on response patterns within the many different types of services available. The research literature has mainly described the characteristics of adult treatment patterns in standard outpatient psychotherapy-types of mental health services, but it provides little information on what progress looks like for youth and within other types of services (Newnham & Page, 2010).

Research describing outpatient service outcome trajectories does offer some insight and has demonstrated a fairly reliable pattern of improvement during this type of treatment. Although episode lengths can vary considerably, many of these studies have confirmed a dose-response curve that reflects rapid improvement rates in the initial stages followed by a decelerating curve

over the course of treatment (Lambert, Hansen, & Finch, 2001; Lutz, 2003). While these investigations have primarily focused on adult clients, the few studies with youth have also found a similar curvilinear response pattern among recipients of outpatient-type treatments including psychotherapy, group skills training, and medication management (Cannon, Warren, Nelson, & Burlingame, 2010; Warren, Nelson, Mondragon, Baldwin, & Burlingame, 2010). However, with the exception of selected studies which support some evidence-based programs (e.g., Multisystemic Therapy) in prescribing specific treatment lengths, there is little consensus in the literature on expected patterns of youth outcome trajectories and the lengths of time required for improvement in the various different services that comprise a system of care.

Studies conducted on residential treatment show a broad range of episode lengths (James, Zhang, & Landsverk, 2012; Knorth, Harder, Zandberg, & Kendrick, 2008; Leichtman, Leichtman, Barber, & Neese, 2001; Lyons, Terry, Martinovich, Peterson, & Bouska, 2001; Noftle et al., 2011; Ringle, Ingram, & Thompson, 2010), with evidence that both longer and shorter stays can be associated with positive outcomes (Baker, Wulczyn, & Dale, 2005; Ringle, Ingram, & Thompson, 2010; McCurdy & McIntyre, 2004). Similarly, there is no consistent pattern of progress for youth with more intensive treatment needs in hospital inpatient settings. Swadi and Bobier (2005) found an overall mean length of stay of 27.3 days and suggested that relatively short stays in the hospital are feasible, as gains tend to occur early in treatment. In contrast, Green and colleagues (2007) found that clinically meaningful improvements in hospital inpatients occurred at 16.6 weeks with longer stays predicting better outcomes. Sexual deviancy/sex offender services also tend to be residential, and whether a modal pattern of change exists for these youth is also unclear (Jones, Chancey, Lowe, & Risler, 2010; National Adolescent Perpetrator Network, 1993). In addition, there was no research found to uncover lengths of stay in foster care provided within mental health systems, but within child welfare systems, these services have shown a median stay of 7.6 months between removals from home to reunification (U.S. Department of Health and Human Services et al., 2012). However, a recent study by Yampolskaya, Sharrock, Armstrong, Strozier, and Swanke (2014) found a median length of stay of 21 months for youth with complex needs. Overall, it is expected that variation exists in improvement patterns between youth, between service types, and between different sites and providers, but system decisions and policy-making often require an understanding of average patterns across a whole system of care, which is largely absent in the literature.

For this reason, this system of care has been conducting its own research on its population to assist in developing practice standards and policies. Several studies related to improvement timeframes have been conducted in the past 10 years, which are summarized in Table 4. Several definitions of improvement can be compared based on the length of time required to meet the particular criteria of improvement.[1]

As is evident, estimations of the length of time required for improvement varies greatly depending on the definition being used. In the prior technical report (see Jackson et al., 2012), timeframes were estimated based the combined criteria of when the average improvement trajectory started to plateau and when a majority of youth had benefited from services. Sometimes, youth continue to improve after a longer duration, but that occurs in a minority of cases. This definition of treatment improvement is useful in estimating a time frame that can be used as a "checkpoint" for making decisions about the continuation or a change in service.

[1] A widely used criterion of improvement (Jacobson and Truax, 1991) that is based on change from a clinical to a non-clinical level was not used because of its low frequency of occurrence in this population of youth with serious emotional disabilities.

Table 4. Summary of Findings Related to Improvement Timeframes.

Services	2006-2012 Studies: Improvement Plateau (CAFAS & MTPS) for Majority of Youth[1] (in Months)	2006-2012 Studies: Median Time Estimate to 30+ CAFAS Improvement[2] (in Months)	2006-2012 Studies: Median Time Estimate to Successful Discharge (MTPS)[3] (in Months)	Current Actual Average Length of Treatment: 2011-2016 (in Months)
Intensive In-Home	5-7	11	17	12.95
Functional Family Therapy	4-6	6	7	4.67
Multisystemic Therapy	4-6	6	5	4.51
Therapeutic Foster Home	6-8	8	15	13.49
Community Based Residential III	5-6	7	8	5.19
Community High Risk	10-12	10	25	21.08
Hospital-Based Residential	2-3	4	3	2.52

[1]Jackson et al. (2012)
[2]Jackson et al. (2016)
[3]Research conducted by CAMHD Research and Evaluation Office.

Another definition of improvement is sometimes termed "reliable change," which was codified in the Jackson et al. (2016) study as a 30-or-more point improvement in the CAFAS. This can be a slightly more stringent criteria to meet and therefore can take longer to reach. As is shown in Table 4, the estimated median time to reliable change is more often on the higher end of the range that is determined by the "improvement plateau for majority of youth." Nonetheless, reliable change can be a useful criteria for some purposes, particularly for individual treatment monitoring, but not necessarily for system-wide decisions, as it may not reflect change in the same way for all youth. For example, a 30-point improvement on CAFAS might not be a large enough change for youth with more severe problems while, in some cases, a 30-point improvement might be too high of an expectation for a higher functioning youth who barely met criteria for services.

The final definition of improvement examined was the therapist rating of "successful/goals met" at the time of discharge from the level of care. While a useful criteria for success that is applicable for all youth, it appears to be the most time-consuming to meet. Estimates of median time to successful discharge are more often higher than time frames of the preceding two criteria. Therefore, this timeframe is not appropriate for decisions such as treatment level continuation or discontinuation, as such decisions should be considered earlier during treatment.

A recent examination of *actual* lengths of treatment, regardless of outcome status, found, as expected, that actual average lengths of treatment fall somewhere in between these estimates of

improvement timeframes (see Table 4). This makes sense as some youth are discharged earlier than necessary due to refusal of or withdrawal from treatment (or for other reasons), and some youth remain in treatment longer than the expected timeframe for improvement.

Continuing from these studies, two general areas were pursued. First, considering the burgeoning research that finds that early treatment progress or deterioration is a useful predictor of treatment success (Howard et al., 1996; Lambert, 2007; Lutz, 2003; Newnham & Page, 2010), the first study examined whether some early indicators of treatment success could be identified. Study 1 re-examined the extent to which treatment success can be predicted by youth level of functioning at the beginning of treatment (which has been a strong predictor in earlier studies). Study 1 also investigated whether treatment success (or failure) can be predicted by early progress (or deterioration). Study 2 continues work on identifying appropriate timeframes for service authorizations, but uses a slightly different approach from the previous technical report.

Study 1

Background

The goal of Study 1 was to determine whether early indicators could be identified that predict increased risk of an unsuccessful treatment episode. Equipped with such information, treatment team members can attempt to more closely monitor and increase supports for those youth who are at-risk in an effort to maximize their outcomes and avoid treatment failure.

Two types of risk indicators were examined. The first is initial level of dysfunction, which has shown to be a significant predictor in many studies including those done in this system of care (Daleiden, Pang, Roberts, Slavin, & Pestle, 2010; Hansen & Lambert, 2003; Jackson et al, 2016; Reyno & McGrath, 2006). The second is early deterioration during treatment, which also has considerable research support as a predictor of treatment failure (Howard et al., 1996; Jackson et al., 2014; Lambert, 2007; Lutz, 2003; Newnham & Page, 2010).

Methods

Sample

The sample used for this analysis (across all levels of care) included 933 youth who were discharged from episodes of care that ended between July 1, 2011 and June 30, 2016 and whose records included a discharge status within 1 month before or after their episode end date. These youth had 1,104 episodes of care within this period. Individual youth were included more than once if they had multiple episodes of care that had more than 60 days between each episode (or five or more days for Hospital-Based Residential services). The numbers of included treatment episodes in each level of care are indicated in Table 5. A detailed description of typical characteristics of youth within each service type can be found in CAMHD's Annual Factbook (Keir, Jackson, Mueller, & Okado, 2016).

Table 5. Number of Episodes Per Level of Care

Level of Care	Number of Episodes
Hospital-Based Residential	95
Community High Risk	13
Community Based Residential II	13
Community-Based Residential III	141
Transitional Family Home	169
Multisystemic Therapy	91
Functional Family Therapy	39
Intensive In-Home	543

Instruments

The Child and Adolescent Functional Assessment Scale (CAFAS) measures impairment across eight subscale domains: role performance in school/work, role performance at home, role performance in the community, behavior toward others, moods/emotions, self-harmful behavior, substance use, and thinking (Hodges, 2000). Care Coordinators at local Family Guidance Centers gather information on youth to select specific behavioral descriptions on the CAFAS that reflect a youth's level of impairment across the eight domains. The level of impairment for all items in the CAFAS is measured by a four-point scale (i.e., severe=30, moderate=20, mild=10, no/minimal=0). The total CAFAS score can range from 0 to 240, with higher scores indicating greater overall functional impairment. Psychometric properties of the CAFAS are well-documented in the literature. The literature shows that the CAFAS has internal consistency, inter-rater reliability, stability across time, and concurrent and predictive validity (Hodges, Doucette-Gates, & Kim, 2000; Hodges & Kim, 2000; Hodges & Wong, 1996; Hodges, Wong, & Latessa, 1998; Manteuffel, Stephens, & Santiago, 2002). The CAFAS is conducted for all youth registered at CAMHD at approximately 3-month intervals.

The Monthly Treatment Progress Summary (MTPS) is a locally constructed clinician report form designed to capture data on the service format, service setting, treatment targets, clinical progress ratings on each target, intervention strategies (practice elements), and discharge status (when applicable) on a monthly basis. Specifically, clinicians provide a progress rating for each target that represents the degree of progress achieved between the child's baseline level of functioning and the goal specified for the target. Progress ratings are provided using a 7-point scale (1-7) with the descriptors of: Deterioration < 0%, No Significant changes 0 – 10%, Minimal Improvement 11 – 30%, Some Improvement 31 – 50%, Moderate Improvement 51 – 70%, Significant Improvement 71 – 90%, and Complete Improvement 91 – 100%. The average score of clinical progress across all target ratings is calculated for every youth at every month. Discharge status ratings include (1) Success/Goals Met, (2) Insufficient Progress, (3) Family Relocation, (4) Runaway/Elopement, (5) Refuse/Withdraw, (6) Eligibility Change, and (7) Other. Ratings of (1) were considered "successful discharges" and ratings of (2), (4), and (5) were considered "unsuccessful discharges."

Analysis

The particular services included in these analyses were selected based on the needs of CAMHD staff in developing policies and guidelines, as well as the following criteria: 1) the services represent the most frequently used in CAMHD's array of mental health services, 2) the services are long enough for clinical improvement, and 3) the services involve a therapeutic component on which to judge improvement over time. Services such as ancillary services, crisis services, and assessments were not included.

With regard to Initial Risk Indicator analyses, an "initial CAFAS score" was defined as the first total CAFAS summed score that was completed within the month before treatment start, the first month of treatment, or the second month of treatment. Descriptive statistics were used to examine the rates of discharge success at each initial CAFAS score for each level of care. To account for small n sizes of some CAFAS scores, scores were grouped into 20-point ranges. T-tests were also used to test differences between successfully and unsuccessfully discharged youth on their initial CAFAS scores. Logistic regression analyses were also conducted on three levels of care (Community-Based Residential III, Transitional Family Home, and Intensive In-Home) that had a sufficient number of both successful and unsuccessful discharges in order to test a prediction model with initial CAFAS as the predictor and discharge success as the outcome.

For Early Progress Risk Indicator analyses, the first step primarily used average MTPS progress ratings because the numbers of CAFAS data at each month were limited. Average MTPS progress ratings are calculated for each youth at each month, and consist of the average of the progress ratings reported for each treatment target during the month. For each level of care, all average MTPS progress ratings throughout their service episodes were aggregated so that mean scores could be calculated at each treatment episode month across all youth (scores for all first-months of episodes were averaged, scores for all second-months of episodes were averaged, etc.). Episode months were either included up to 24 months or up to the month after which there were fewer than 2 cases available within any month. Successful and unsuccessful discharge groups were then compared on their trajectories. Confidence intervals were calculated at each month to show where differences in mean scores were statistically significant. The first month at which successful and unsuccessful discharges showed a significant difference will be called the "month of divergence."

In the second step, where MTPS and CAFAS data were sufficient, logistic regression analyses were used to test the prediction models of discharge success as a function of the MTPS score at the "month of divergence" and as a function of the second CAFAS score (which is the score closest to the months of divergence that were found). Second CAFAS scores at months 2 to 4 were also predictive of discharge success in Intensive In-Home in prior research on this system of care (Jackson et al., 2014). Early Progress Risk Indicators were then calculated by examining discharge success rates for youth at each MTPS score at the "month of divergence" as well as at each CAFAS level at the second assessment.

Initial Risk Indicator Results

Of all the levels of care examined, three of them were found to have enough CAFAS data and a discernable pattern of youth at risk of unsuccessful discharge: Community-Based Residential III (CBRIII), Transitional Family Home (TFH), and Intensive In-Home (IIH). Overall, in these services, youth with higher dysfunction at the start of services are more likely to be discharged unsuccessfully. This effect was significant for TFH ($t=-2.875$, $df=84$, $p=.005$) and IIH ($t=-2.054$, $df=99.13$, $p=.043$), and although statistical significance was not shown for CBRIII, the average initial CAFAS score was higher for unsuccessful than successful discharges.

Within these three levels of care, CAFAS cutoffs can be designated depending on the level of risk deemed necessary for prompting action. As a recommendation, the findings reviewed below include highlighted levels where youth with those initial CAFAS scores revealed a discharge success rate of less than 50%.

In CBRIII, youth who had initial CAFAS scores of 150 or higher had a 47.8% success rate (Table 6). Thus, a risk indicator of "150 or greater on initial CAFAS" can be used if it is deemed that youth should require higher-level monitoring when their probability of success is less than 50%. This would result in approximately one third (28/81) of youth in CBRIII receiving additional attention (as this sample is based on a 5-year period, the number of youth flagged per year would be considerably lower than 28). Alternatively, if it is deemed that youth should require higher-level monitoring when their probability of success is less than 20%, then a risk indicator of "170 or greater" can be used for youth in CBRIII. This would result in approximately 6% (5/81) of youth in CBRIII receiving additional attention and service adjustments.

Table 6. CBRIII Discharge Success Rate by Initial CAFAS Score

Initial CAFAS Score	Success Rate at This Level or Higher	N at This Level or Higher (Denominator)
All	**70.4%**	81
90+	**71.4%**	77
110+	**71.6%**	67
130+	**66.0%**	47
150+	**47.8%**	23
170+	**20.0%**	5

In TFH, youth who had initial CAFAS scores of 120 or higher had a 45.2% success rate (Table 7). Thus, a risk indicator of "120 or greater on initial CAFAS" can be used if it is deemed that youth should require higher-level monitoring when their probability of success is less than 50%. This would result in approximately one half (44/86) of youth in TFH receiving additional attention (as this sample is based on a 5-year period, the number of youth flagged per year would be considerably lower than 44). Alternatively, if it is deemed that youth should require higher-level monitoring when their probability of success

Table 7. TFH Discharge Success Rate by Initial CAFAS Score

Initial CAFAS Score	Success Rate at This Level or Higher	N at This Level or Higher (Denominator)
All	**61.6%**	86
80+	**58.7%**	75
100+	**50.8%**	59
120+	**45.2%**	31
140+	**38.5%**	13

is less than 40%, then a risk indicator of "140 or greater" can be used for youth in TFH. This would result in approximately 15% (13/86) of youth in TFH receiving additional attention.

In IIH, youth who had initial CAFAS scores of 130 or higher had a 46.7% success rate (Table 8). Thus, a risk indicator of "130 or greater on initial CAFAS" can be used if it is deemed that youth should require higher-level monitoring when their probability of success is less than 50%. This would result in 18% (41/229) of youth in IIH receiving additional attention (as this sample is based on a 5-year period, the number of youth flagged per year would be considerably lower than 41). Youth with initial CAFASs of 150 or higher only showed a slightly lower success rate at 45.5%. Use of this cutoff would result in approximately 5% (11/229) of youth in IIH receiving additional attention.

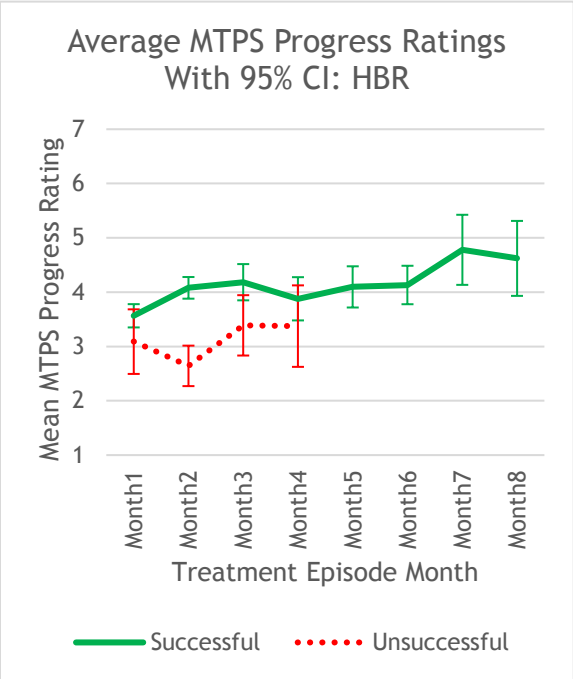
Table 8. IIH Discharge Success Rate by Initial CAFAS Score

Initial CAFAS Score	Success Rate at This Level or Higher	N at This Level or Higher (Denominator)
All	**71.6%**	229
70+	**72.1%**	197
90+	**66.9%**	130
110+	**54.8%**	62
130+	**46.7%**	30
150+	**45.5%**	11

Early Progress Risk Indicator Results

The following shows results comparing MTPS progress rating trajectories of successful and unsuccessful discharges. It is evident that considerable differences can be detected early on for youth trending toward an unsuccessful discharge. Statistically significant differences in mean scores can be seen where 95% confidence intervals are non-overlapping, which is occurring as early as 2-4 months. Services not included due to low sample sizes in the successful and/or unsuccessful groups are Community Based Residential I (Community High Risk [CHR]) and Community Based Residential II.

Hospital-Based Residential (HBR)

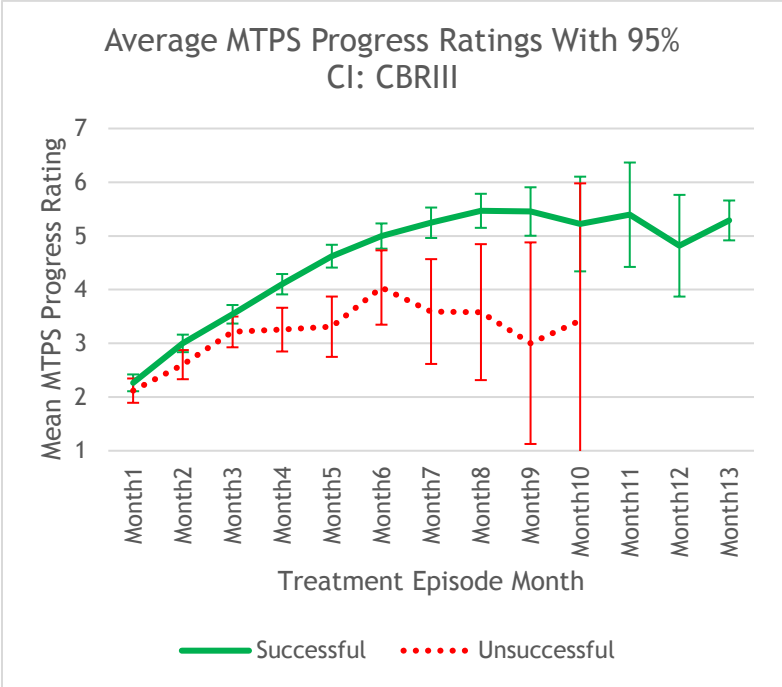


In HBR, the "month of divergence" occurred at month 2. The logistic regression with month 2 MTPS mean progress rating as the predictor and discharge success as the outcome showed a significant effect of the predictor (p=.026), with lower ratings having a higher predicted probability of an unsuccessful discharge.

The examination of actual success rates revealed that youth who have an MTPS mean progress rating of 2.75 or lower at month 2 show a less than 50% chance of success.

Due to the short-term nature of HBR services, there were not enough CAFAS data available for these youth.

Community-Based Residential III (CBR III)



In CBR III, the "month of divergence" occurred at month 4. The logistic regression with month 4 MTPS mean progress rating as the predictor and discharge success as the outcome showed a significant effect of the predictor (p=.001), with lower ratings having a higher predicted probability of an unsuccessful discharge.

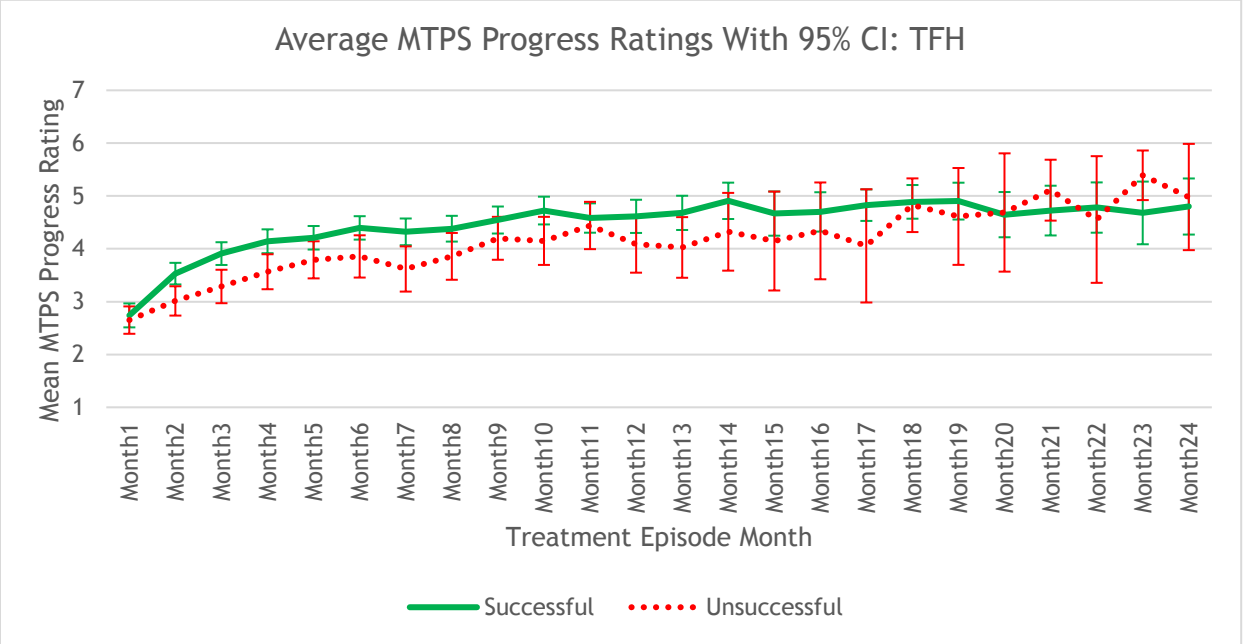
The examination of actual success rates revealed that youth who have an MTPS mean progress rating of 2.86 or lower at month 4 show a less than 50% chance of success.

The logistic regression with the second CAFAS score as the

predictor and discharge success as the outcome also showed a significant effect of the predictor (p=.044), with higher scores having a higher predicted probability of an unsuccessful discharge.

The examination of actual success rates revealed that youth who have a second total CAFAS score of 150 or higher show a 20% chance of success.

Transitional Family Home (TFH)



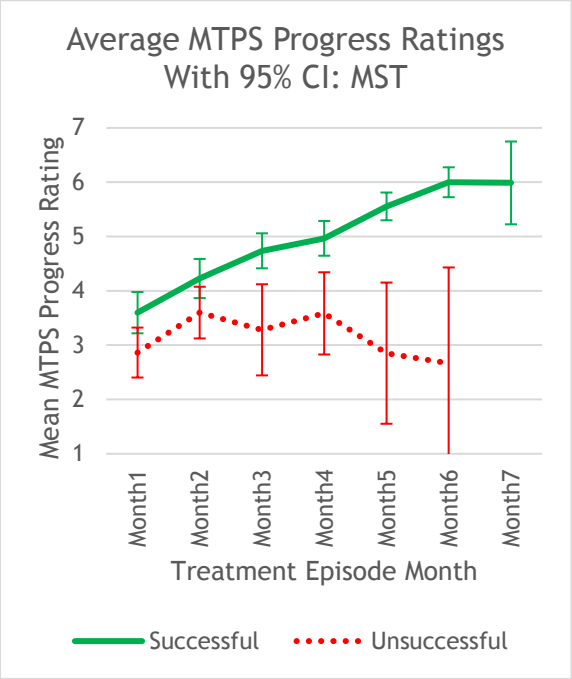
In TFH, the "month of divergence" occurred at month 3. The logistic regression with month 3 MTPS mean progress rating as the predictor and discharge success as the outcome showed a significant effect of the predictor (p=.002), with lower ratings having a higher predicted probability of an unsuccessful discharge.

The examination of actual success rates revealed that youth who have an MTPS mean progress rating of 3.60 or lower at month 3 show a less than 50% chance of success.

The logistic regression with the second CAFAS score as the predictor and discharge success as the outcome approached significance (p=.065), with higher scores having a higher predicted probability of an unsuccessful discharge.

The examination of actual success rates revealed that youth who have a second total CAFAS score of 140 or higher show a 25% chance of success.

Multisystemic Therapy (MST)

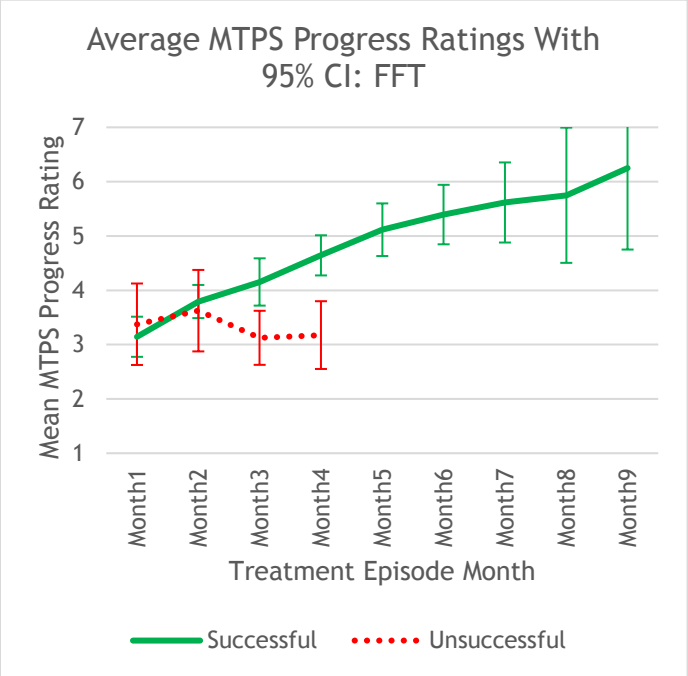


In MST, the "month of divergence" occurred at month 3. The logistic regression with month 3 MTPS mean progress rating as the predictor and discharge success as the outcome showed a significant effect of the predictor (p=.001), with lower ratings having a higher predicted probability of an unsuccessful discharge.

The examination of actual success rates revealed that youth who have an MTPS mean progress rating of 3.33 or lower at month 3 show a less than 50% chance of success.

There were not enough CAFAS data for adequate statistical analysis.

Functional Family Therapy (FFT)

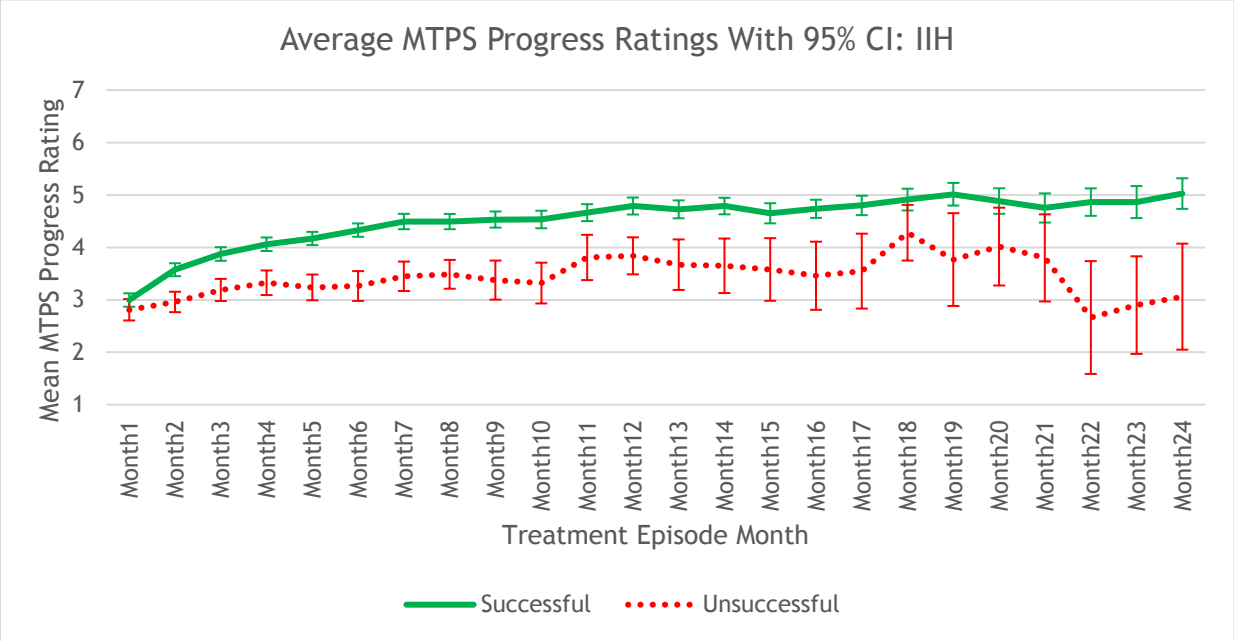


In FFT, the "month of divergence" occurred at month 3. The logistic regression with month 3 MTPS mean progress rating as the predictor and discharge success as the outcome approached significance (p=.095), although with a sample size of 29, there is low power for this statistical test. A vast majority of these youth were rated as a successful discharge, so no strong evidence exists of a correlation between MTPS mean progress ratings and success at discharge.

A possible alternative criteria could be the upper level of the 95% confidence interval at month 3 for unsuccessful discharges. Youth with scores of 3.62 or lower at month 3 fall within the 95%

confidence level of unsuccessful discharges.

Intensive In-Home (IIH)



In IIH, the "month of divergence" occurred at month 2. The logistic regression with month 2 MTPS mean progress rating as the predictor and discharge success as the outcome showed a significant effect of the predictor (p=.000), with lower ratings having a higher predicted probability of an unsuccessful discharge.

The examination of actual success rates revealed that youth who have an MTPS mean progress rating of 2.00 or lower at month 2 show a less than 50% chance of success.

The logistic regression with the second CAFAS score as the predictor and discharge success as the outcome also showed a significant effect of the predictor (p=.000), with higher scores having a higher predicted probability of an unsuccessful discharge.

The examination of actual success rates revealed that youth who have a second total CAFAS score of 120 or higher show a 46% chance of success.

Discussion

These findings provide evidence that early indicators can be used to provide information about the risk-level of youth should they continue services as usual in that particular level of care. A few levels of care (namely, CBRIII, TFH, and IIH) had sufficient data to generate a risk indicator that can be used at the start of treatment (see Table 9). In general, youth with high initial CAFAS scores were more likely to be discharged unsuccessfully. In particular, the following cutoffs can be

used to alert treatment team members to cases which may require greater attention and responsiveness during treatment.

A rough estimate of the number of youth that would be flagged per year under these criteria is about 10 youth going to CBRIII, about 15 youth going to TFH, and about 20 youth going to IIH. This would average to less than 1 youth per care coordinator per year.

Table 9. Summary of Risk by Initial CAFAS Scores.

Level of Care	CAFAS Cutoff (Scores at This Level or Higher)	Probability of Successful Discharge
Community Based Residential III	*150+*	*47.8%*
	170+	*20.0%*
Transitional Family Home	*120+*	*45.2%*
	140+	*38.5%*
Intensive In-Home	*130+*	*46.7%*
	150+	*45.5%*

The findings presented also support previous research in that early treatment progress, or lack of progress, can be predictive of success. As youth undergo treatment, a distinction becomes evident between youth who will be discharged successfully and youth who will be discharged unsuccessfully. This distinction becomes significant between months 2 to 4.

Thus, in addition to Initial Risk Indicators that can be used at the start of treatment, Early Progress Risk Indicators can be used during the early treatment phase. The following table summarizes possible Early Progress Risk Indicators that can alert treatment team members to youth who are not progressing as expected.

Table 10. Summary of Early Progress Risk Indicators.

Level of Care	Assessment	Early Progress Risk Indicator
Hospital-Based Residential	2nd (Month) MTPS	Average MTPS Progress Rating ***Below 2.8***
Community Based Residential III	4th (Month) MTPS	Average MTPS Progress Rating ***Below 2.9***
	2nd (Quarter) CAFAS	CAFAS Score ***150 or higher***
Transitional Family Home	3rd (Month) MTPS	Average MTPS Progress Rating ***Below 3.6***
	2nd (Quarter) CAFAS	CAFAS Score ***140 or higher***
Multisystemic Therapy	3rd (Month) MTPS	Average MTPS Progress Rating ***Below 3.3***
Functional Family Therapy	3rd (Month) MTPS	Average MTPS Progress Rating ***Below 3.6***
Intensive-In Home	2nd (Month) MTPS	Average MTPS Progress Rating ***Below 2.0***
	2nd (Quarter) CAFAS	CAFAS Score ***120 or higher***

In Table 10, Early Progress Risk Indicators that are based on the average MTPS progress ratings use the time point at which successful and unsuccessful cases become significantly differentiated. The cutoff score is the score below which youth have a less than 50% chance of a successful discharge. Early Progress Risk Indicators that are based on the CAFAS score use the second CAFAS of the treatment episode. The cutoff score for the CAFAS is the score above which youth have a less than 50% chance of a successful discharge, and in the case of CBR III and TFH, a much less than 50% chance of a successful discharge.

A rough estimate of the number of youth that would be flagged per year under these criteria is about 50 youth total. This would be an average of less than one youth per care coordinator per year.

While other indicators can certainly be used, the assessments and timeframes (initial and early progress) used here have consistently shown significant predictive value within this system of care. Other variables such as family engagement, client-therapist relationship, multi-system involvement, etc., likely have predictive value as well, but these are not measured reliably in this system of care. The development of future risk indicators should involve implementing and utilizing such measures for increased predictive power.

Limitations

The examination of risk at treatment start only uses a single measure of initial functioning (CAFAS). The system's other measure (the MTPS) is a measure of progress and not of initial functioning, so is not equipped for this purpose. A new measure, however, the Ohio Scales, will be examined for its usefulness as an initial problem severity indicator in forthcoming research. Future studies should also examine how combinations of other variables (other [non-mental health] system involvement, legal issues, drug use, parent engagement, etc.) contribute to a risk profile of youth.

Similarly, the MTPS was the primary measure used to assess early treatment progress. CAFAS scores were also examined, but due to the reduced availability of CAFASs (which are completed once per quarter) and youth functioning possibly being a construct that may be less susceptible to early change, CAFAS trajectories did not yield as clear patterns as MTPS trajectories. Again, future research will examine whether Ohio Scales is an outcome measure that can be usefully integrated into an early progress prediction model.

Another limitation of these studies is missing data. A number of CAFASs are not completed within the window used around the start of services (1 month before to 2 months after service start). Also, with CAFASs only completed quarterly, levels of care that have smaller case numbers have minimal CAFAS data available. In addition, while MTPSs have a high monthly completion rate, the completion rate of discharge MTPS information is less complete. If bias exists in the data, it is possible that it errs on the side of higher success rates, as it seems more likely that missing data is due to difficult and unsuccessful cases.

Study 2

Background

Like the 2012 Jackson et al. study, the current study seeks to inform the development of updated provider performance standards around timeframes for authorization of services. The current study was deemed necessary because changes in service provision may have occurred in the past 5 years, which was to some extent evident in decreases in lengths of stay in some levels of care. In addition, improvements to analytic processes were made to better define start and end of treatment episodes, so a new analysis of how outcomes change within episodes was needed.

The specific goal of this study, as in the previous study, was to determine when, on average, youth are expected to have shown the most benefit from services. It is suggested that this point may be the most appropriate time at which the case should be reassessed and decisions should be made on whether to continue services or not. The goal was not to recommend specific lengths of service.

Methods

Sample

The sample used for this analysis (across all levels of care) included 1,395 youth who were discharged from episodes of care that ended between July 1, 2011 and June 30, 2016. These youth had 2,091 episodes of care within this period. Individual youth were included more than once if they had multiple episodes of care that had more than 60 days between each episode (or five or more days for Hospital-Based Residential services). Due to low "n" sizes and/or high variance in treatment patterns, the following levels of care were not included: Comprehensive Behavioral Intervention, Outpatient Treatment, Partial Hospitalization, and Respite Home. The numbers of other level of care episodes are indicated in Table 11. A detailed description of typical characteristics of youth within each service type can be found in CAMHD's Annual Factbook (Keir et al., 2016).

Table 11. Number of Episodes Per Level of Care

Level of Care	Number of Episodes
Hospital-Based Residential	142
Community High Risk	15
Community Based Residential II	14
Community-Based Residential III	202
Transitional Family Home	276
Multisystemic Therapy	157
Functional Family Therapy	77
Intensive In-Home	1078

Instruments

The CAFAS and MTPS instruments were used in this study as well and are described in the previous section.

Analysis

This study used the same criteria as the first study for the selection of services to be examined. Within each level of care, all service episodes were aggregated so that mean scores could be calculated for each treatment episode month across all youth who had CAFAS and MTPS data at each month (scores for all first-months of episodes were averaged, scores for all second-months of

episodes were averaged, etc.). Episode months were either included up to 24 months or up to the month after which there were fewer than 2 cases available within any month (as single outlying scores overly influence the best-fitting trendline). Standard errors were also calculated for CAFAS scores and MTPS progress ratings at each month and are included in the graphs presented.

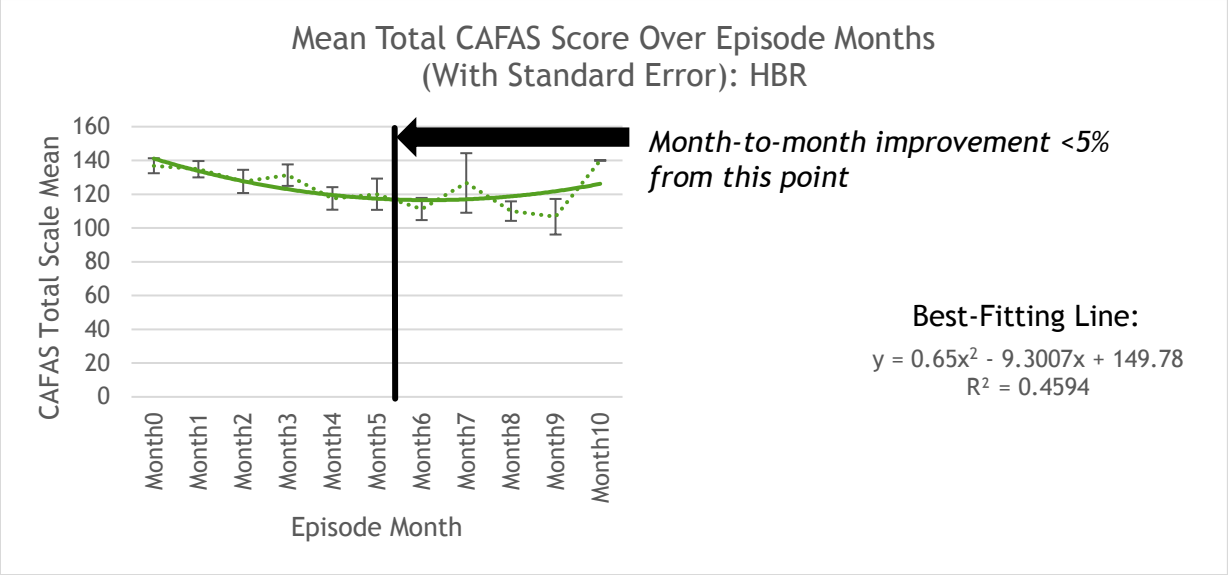
While actual means are shown for each level of care (dotted line), the best fitting line was used to estimate the outcome trajectory (solid line). The best fitting line may have taken the form of a logarithmic, exponential, or polynomial trend. The equations and R-squared values for the best fitting lines are also included with each graph.

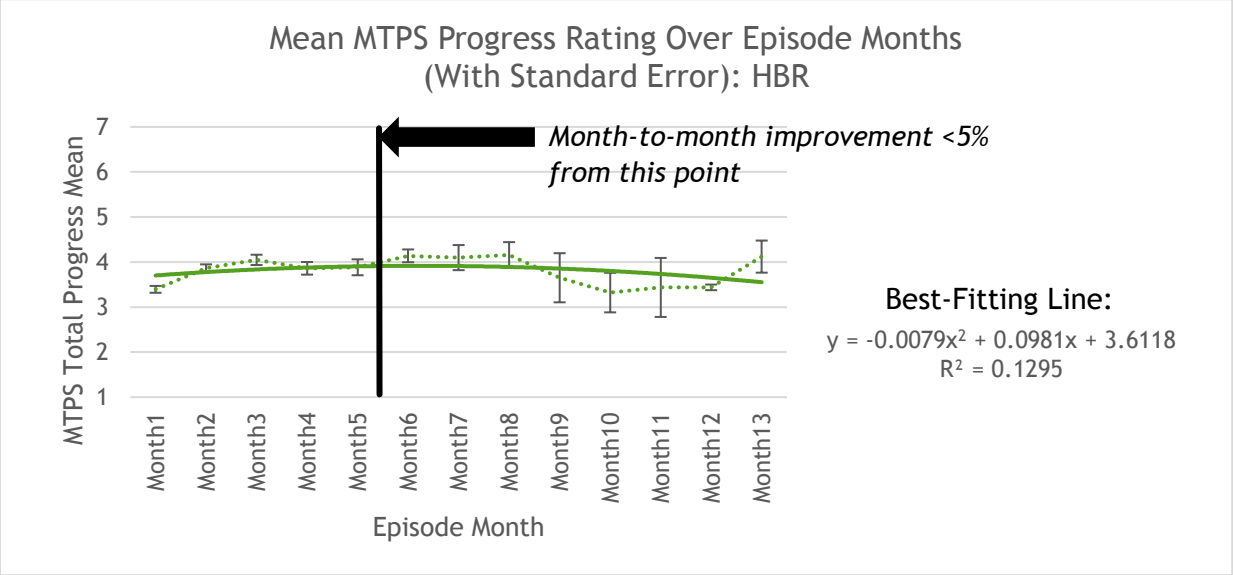
To estimate the time at which a majority of improvement has occurred, a "point of diminishing improvement" was calculated (akin to "point of diminishing returns" in economics). The point of diminishing improvement was defined as the month after which the average improvement slowed to less than a 5% improvement from the preceding month. The percent improvement was calculated by the difference in mean scores between consecutive months divided by the total range of mean scores (the range being the difference between the minimum and the maximum mean scores within the trajectory) for that level of care.

Results

The results are presented graphically below. For most trajectories, the "point of diminishing improvement" is indicated. In one instance below, the point of diminishing improvement could not be calculated because the improvement trajectory showed continual improvement up until the end of episode data. Both CAFAS and MTPS findings are presented and discussed for all levels of care, which helps to overcome some of the limitations of any single data source and the small sample sizes available for some levels of care.

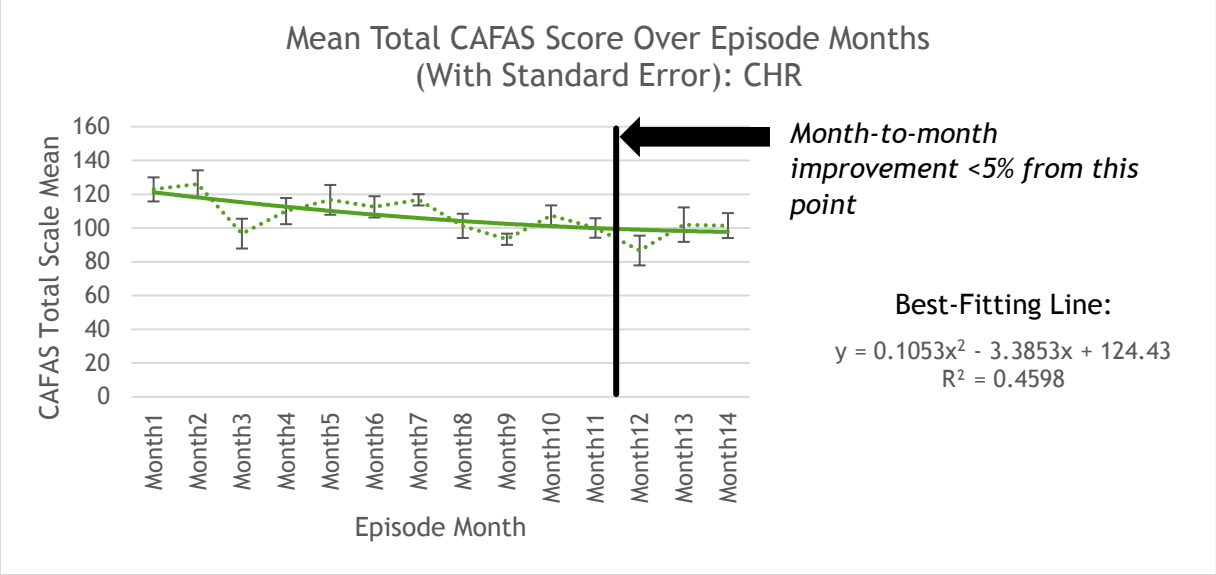
Hospital-Based Residential (HBR)

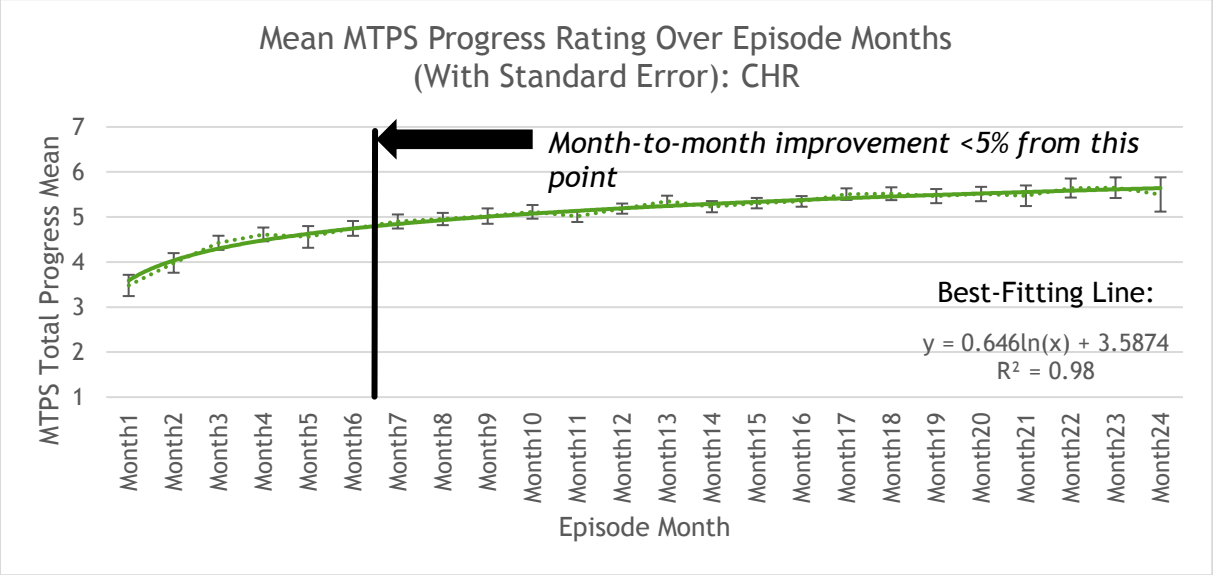




For HBR, the CAFAS and MTPS trajectories suggest that a point of diminishing improvement may exist around 5 months.

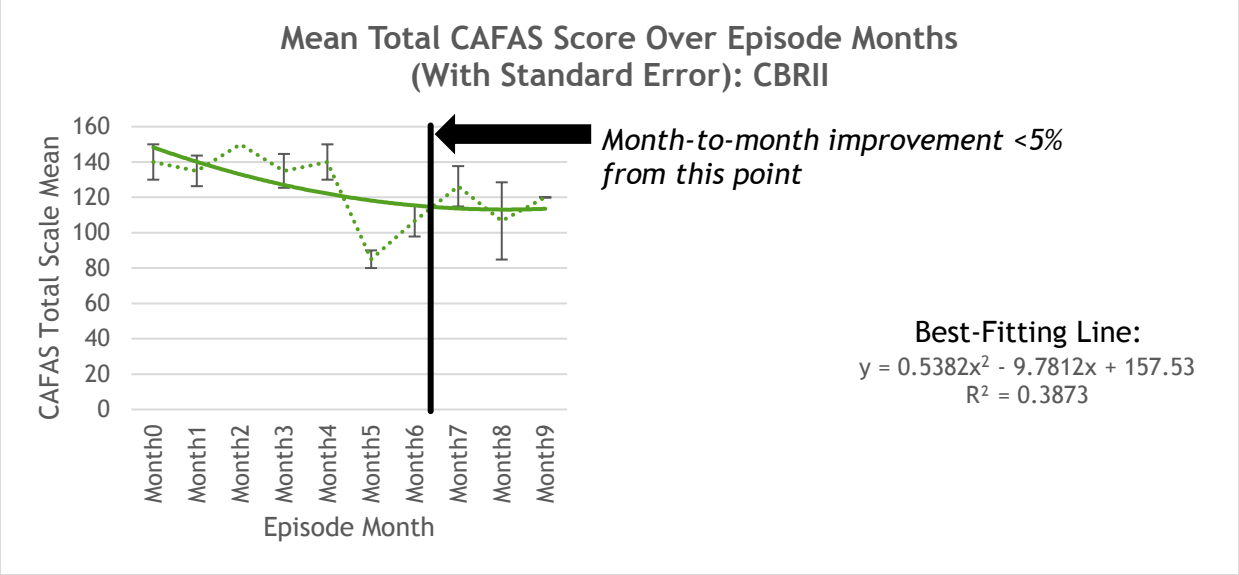
Community Based Residential I (Community High Risk [CHR])

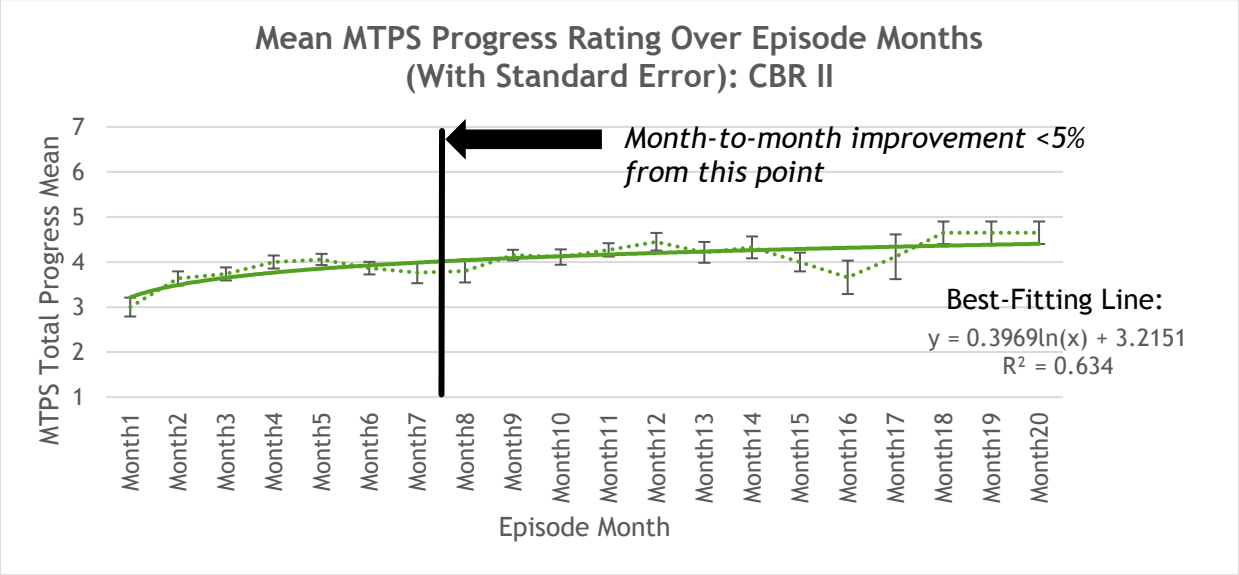




For CHR, the CAFAS and MTPS trajectories suggest that a point of diminishing improvement may exist somewhere between 6-11 months.

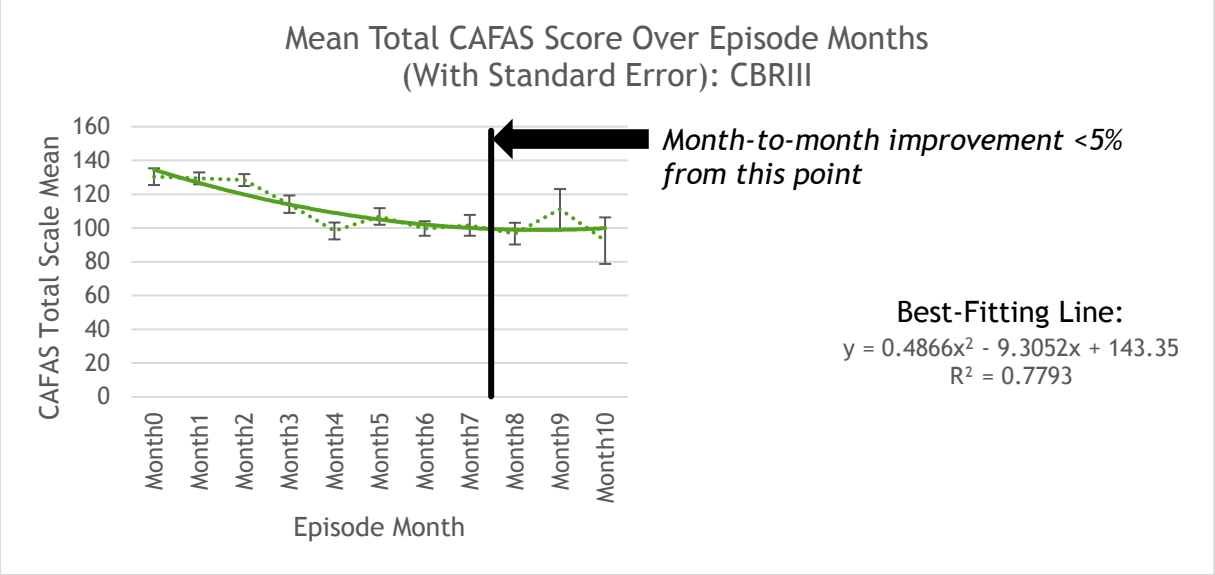
Community Based Residential II (CBR II)

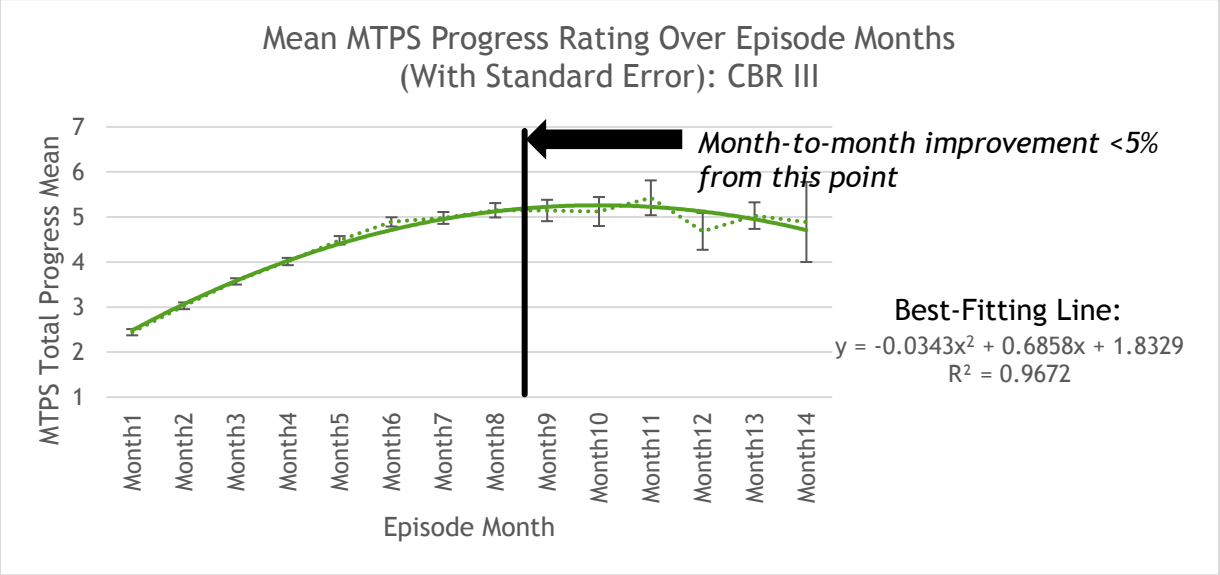




For CBR II, the CAFAS and MTPS trajectories suggest that a point of diminishing improvement may exist around 6-7 months.

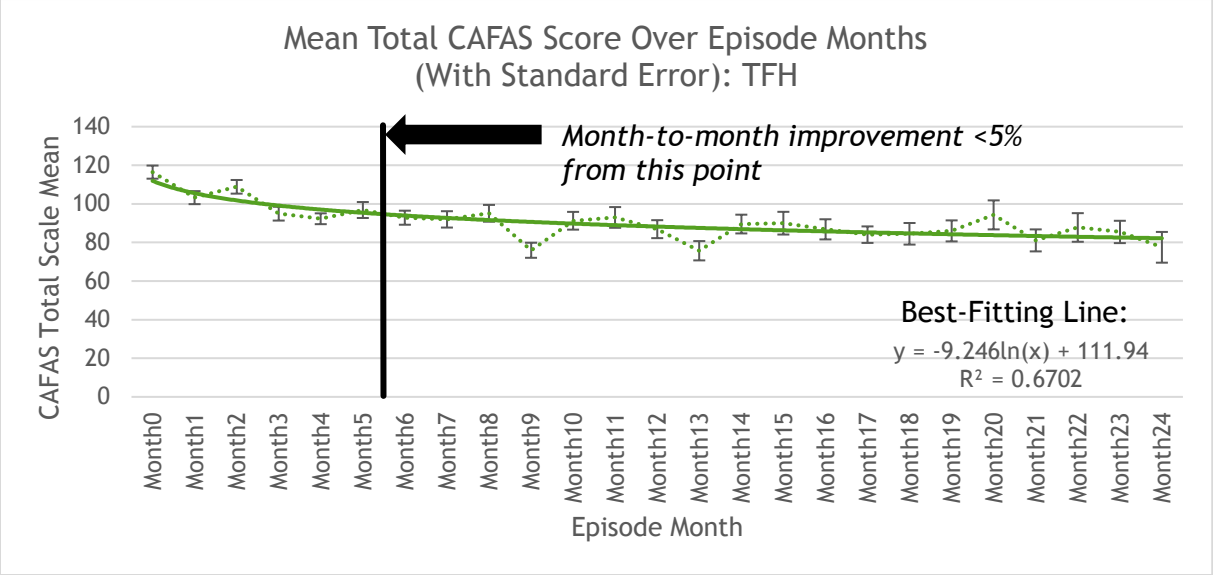
Community-Based Residential III (CBR III)

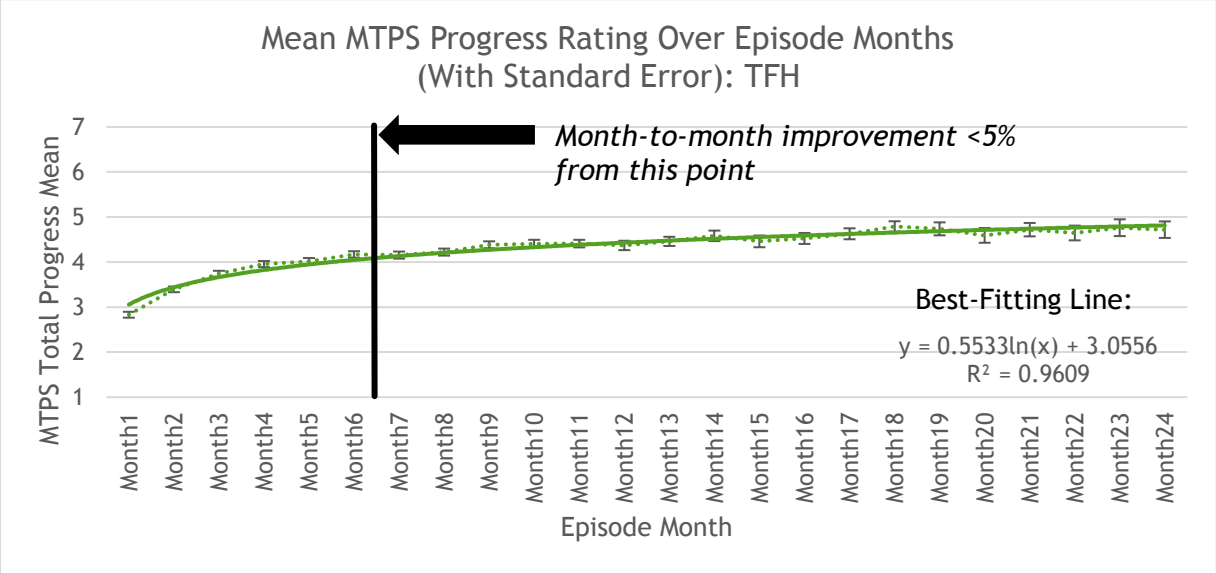




For CBR III, the CAFAS and MTPS trajectories suggest that a point of diminishing improvement may exist around 7-8 months.

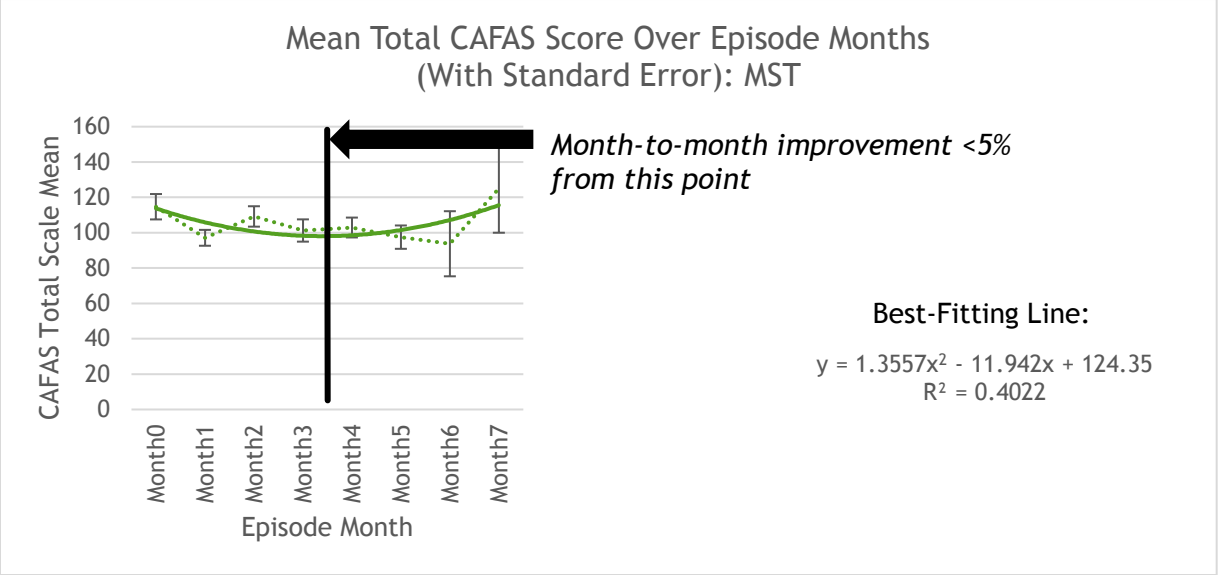
Transitional Family Home (TFH)

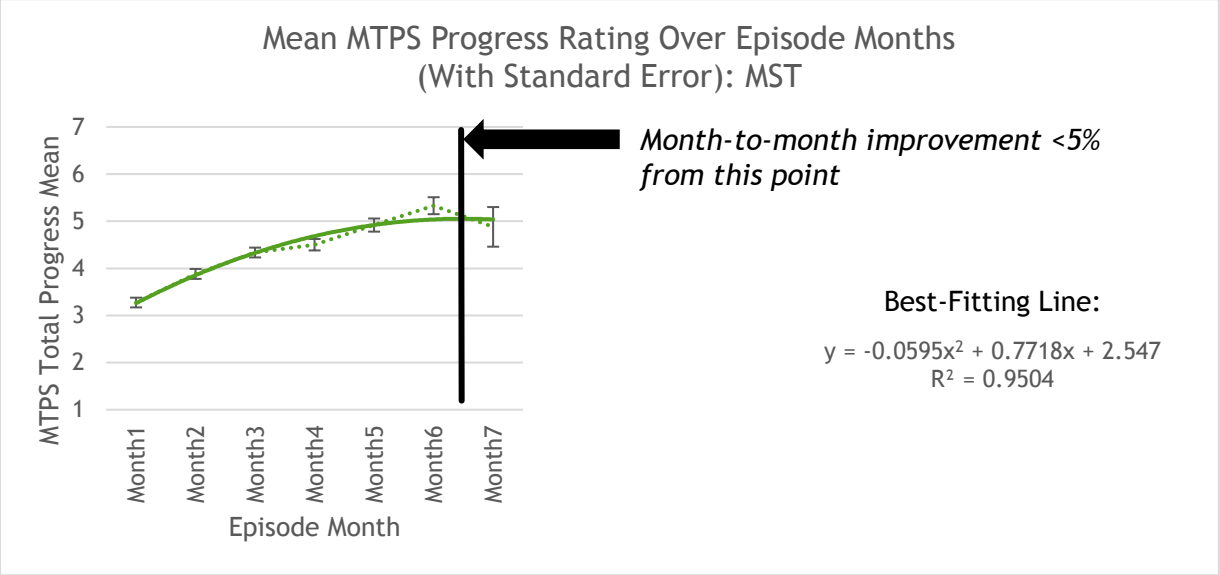




For TFH, the CAFAS and MTPS trajectories suggest that a point of diminishing improvement may exist around 5-6 months.

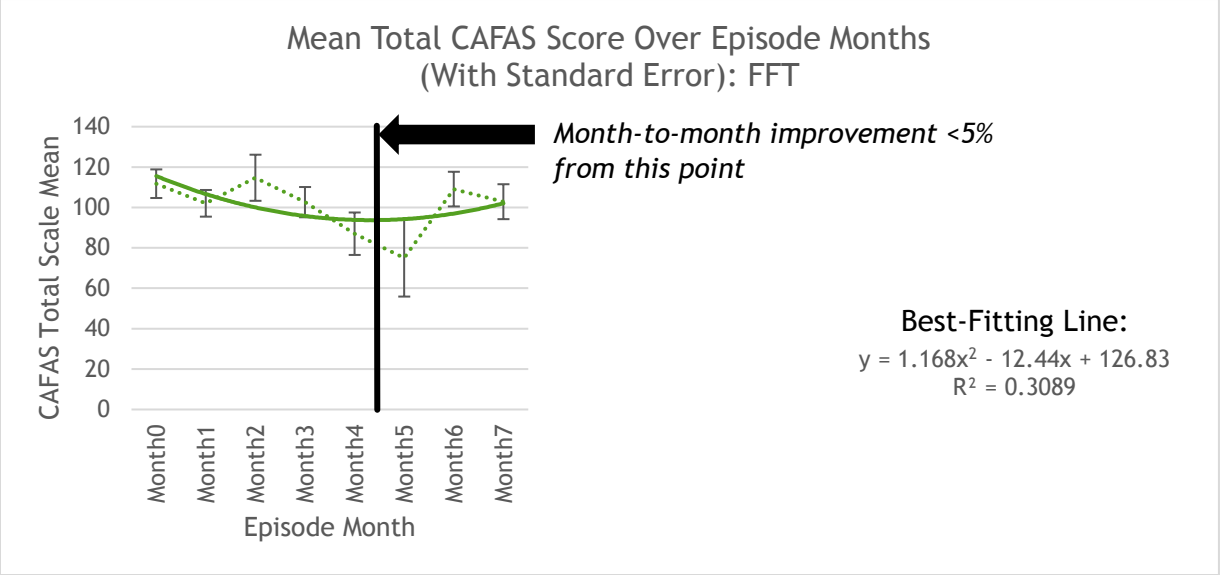
Multisystemic Therapy (MST)

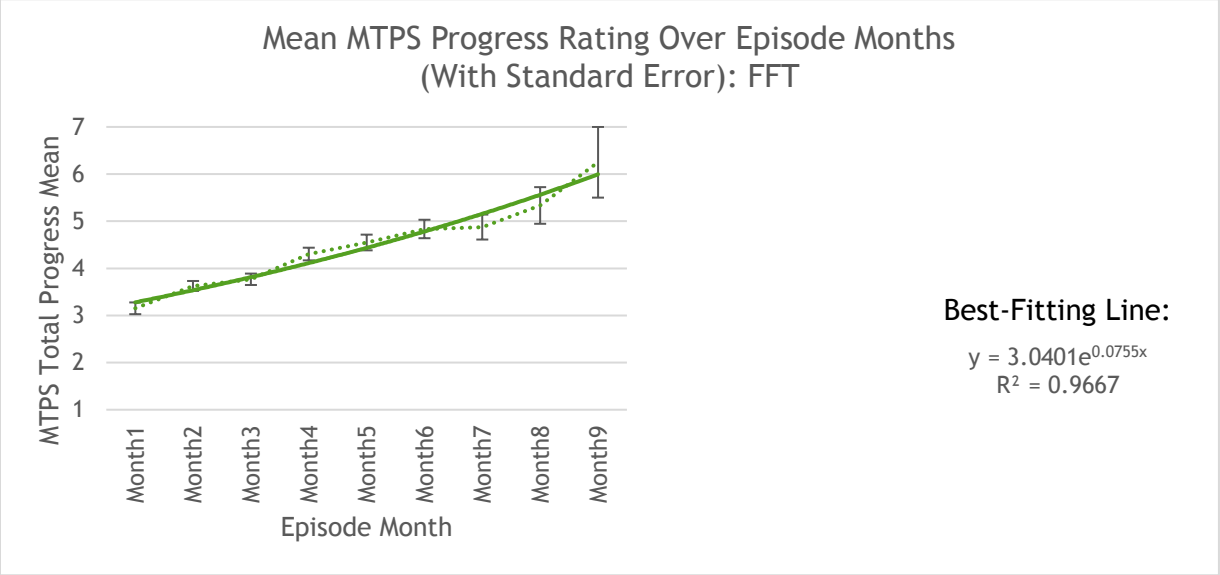




For MST, the CAFAS and MTPS trajectories suggest that a point of diminishing improvement may exist around 3-6 months.

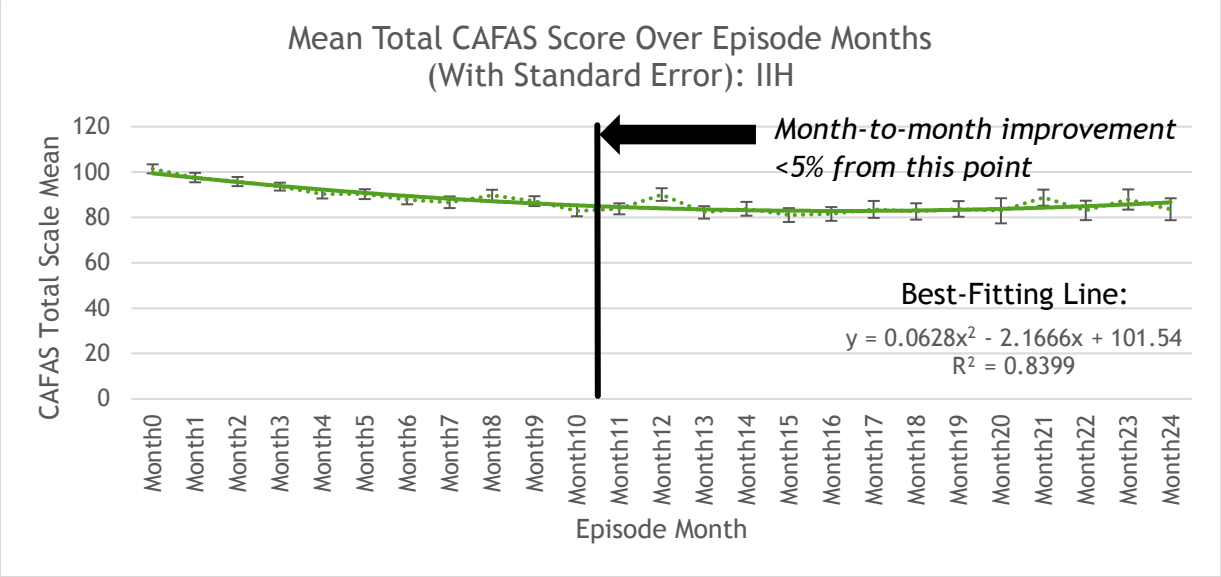
Functional Family Therapy (FFT)

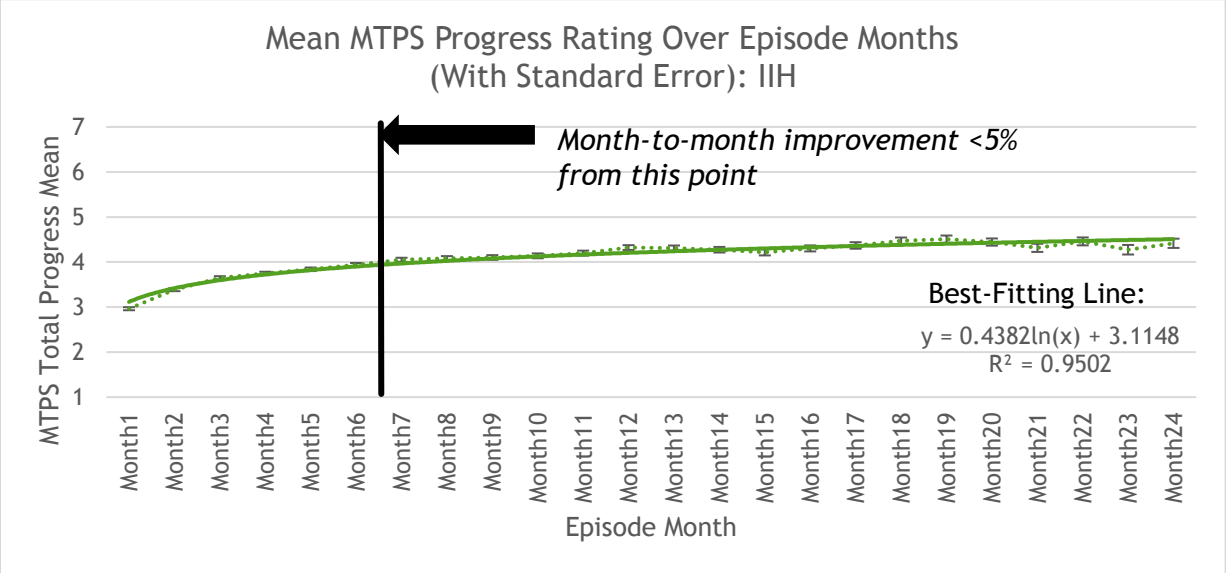




For FFT, the CAFAS trajectory suggest that a point of diminishing improvement may exist sometime after 4 months. The MTPS means show an atypical exponential trajectory due to a small number of youth with extremely high progress ratings in months 8 and 9.

Intensive In-Home (IIH)





For IIH, the CAFAS and MTPS trajectories suggest that a point of diminishing improvement may exist around 6-10 months.

Discussion

A summary of findings across levels of care is provided in Table 12. Also included is a column with findings from the previous technical report for comparison.

Table 12. Summary of Times (in Months) to Point of Diminishing Improvement.

	MTPS	CAFAS	Range	Previous Findings
Hospital-Based Residential	5	5	5	2-3
Community High Risk	6	11	6-11	10-12
Community Based Residential II	7	6	6-7	7-11
Community-Based Residential III	8	7	7-8	5-6
Transitional Family Home	6	5	5-6	6-8
Multisystemic Therapy	6	3	3-6	4-6
Functional Family Therapy	--	4	4	4-6
Intensive In-Home	6	10	6-10	5-7

Overall, the new sample and methods do not seem to result in any consistent pattern of differences between the current and previous findings across levels of care. For some levels of care, the new findings include lower ranges, and for some levels of care there are higher ranges. Thus, an examination by level of care may be more meaningful.

Hospital-Based Residential showed a point of diminishing returns that was higher than the previous method. In examining the actual trajectories, a similar pattern exists between the new sample and the previous sample, suggesting that the differences are largely due to analytic methodology and not due to differences in youth, treatment characteristics, or rate of improvement. In the current sample, a majority of youth complete episodes by month 3, similar to the previous sample. It is that some youth in this sample continued to improve after month 3, which contributed to the continuing trend of improvement up to approximately 5 months. However, 5 months is surely too long of a service authorization period for a highly restrictive and costly service such as HBR.

For the two sexual offender/sexual deviancy programs, Community High Risk and Community Based Residential II, while the point of diminishing improvements criteria reveal a shorter time than the previous method, youth who remain in services do continue to improve slightly and a majority of youth are still in services for a longer period of time (about 20 months in CHR and 13 months in CBR II). Thus, use of the previous method would have result in longer timeframes. However, it is not clear whether the benefits outweigh the costs for longer service episodes. The shorter service authorization timeframe based on the point of diminishing improvement criteria may be more prudent.

Community-Based Residential III shows a slightly longer time using the point of diminishing improvements criteria. Also, a majority of youth remain in services longer than they did in the previous sample. Therefore, the new point of diminishing improvement timeframe may be appropriate.

Transitional Family Home, Multisystemic Therapy, and Functional Family Therapy all showed timeframes close to (maybe slightly lower than) the timeframes generated from the previous

method. Considering this consistency of findings across methods, it appears that the point of diminishing improvement timeframes for each of these may be appropriate.

The new timeframe for Intensive In-Home is longer than the previous timeframe. This may be due to the new method of service episode creation (services that resume after 60 days or less of a break in service are considered the same episode). IIH service episodes are particularly sensitive to such a change. This definition of service episodes more accurately reflects longer treatment lengths that are actually occurring. Thus, the timeframe defined by the point of diminishing improvement may be appropriate.

Overall, with the exception of HBR, it seems the point of diminishing improvement criteria is a suitable guide for service authorization timeframes. Due to the characteristics of youth in hospital-based services, those youth should be monitored frequently regardless, and the findings here may be less applicable for them.

Limitations

Overall, it is a challenge to find a one-size-fits-all approach to determining appropriate timeframes for service authorization decisions because different patterns exist for different levels of care. Youth who have more intensive needs in higher levels of care may display a greater amount of CAFAS improvement, while youth with less intensive needs in lower levels of care may display a more restricted range of improvement. The speed at which youth improve may also differ across levels of care who serve youth with different problems. In addition, criteria for improvement or success in one level of care may differ from other levels of care. Finally, while highly restrictive levels of care can contribute to decreases in CAFAS scores simply due to being a locked and/or highly monitored facility, it does not follow that youth should be authorized for extended stays in those facilities. In particular, while youth may show improvement over many months in HBR on an assessment such as the CAFAS, according to CAMHDs principle of "least restrictive care" it is not always best practice to place youth in such a restrictive setting long-term. Future research may take a closer examination of each level of care and whether they possess a unique set of criteria that better translate into service authorization timeframes.

Lastly, the use of "less than 5%" as a criterion for when improvement has sufficiently diminished is somewhat subjective. In some levels of care, there is a consistent and gradual slowing of the improvement rate (e.g., IIH), which makes identifying a cutoff point difficult. In others (smaller levels of care such as CBR II), there is sizable month-to-month variation in averages, which also makes it difficult to determine when improvement may be occurring. The best-fitting line was used in attempt to provide some consistency in method and the 5% cutoff appeared to capture a substantial amount of change in most levels of care. However, these criteria may be adjusted based on a more clinical judgment of change.

Overall Summary:

This examination of youth outcome patterns in CAMHD mental health services provides information that may assist in the development of policies and standards around treatment

provision and monitoring. The findings suggest that there are useful time points at which a case can be reviewed and decisions can be made about the appropriateness of services, the intensity with which to monitor youth in a service, or the level of additional supports needed for a youth in a level of care. Such decisions can be thought of as taking place at different stages on the treatment timeline, including: 1) the initial selection of level of care, 2) the client's early response to that level of care, and 3) the client's progress at the time when youth on average have typically shown significant improvement.

At the initial selection of a level of care, the clients CAFAS score at that point can provide a risk indicator that signals the probability of success. If the risk indicator shows a low probability of success, then more careful consideration of placement in that level of care can be made, or a decision made to increase the frequency of treatment monitoring or the amount of additional supports put in place for that youth in that level of care.

If a client is placed and continues services within a level of care, early lack of progress is also indicative of risk of an unsuccessful discharge. MTPS progress ratings and CAFAS scores can serve as an indicator of when a youth is "off-track" from a successful discharge. Again, a youth at-risk can be reconsidered for more service supports or a different level of care, and/or can be monitored more frequently.

If improvements are being made as hoped, another checkpoint exists to ensure that services remain appropriate. The level of progress of individual cases can be reviewed around the time frame when youth on average have made significant gains in treatment. This can be the time at which clinical-level review and approval must be provided to continue, discontinue, or modify services. That is, a clinical authorization for services must be given when continued services are justified.

It cannot be overemphasized that these findings should not be used to dictate a youth's length of service. The findings presented here are only averages and do not reflect the uniqueness of each case. Youth improve at different rates and decisions about treatment strategies and lengths must be made on an individual basis. This study examined *probabilities* of successful discharges and when youth *on average* have shown the most benefit from a level of care, information that is only a portion of many factors needed to evaluate an individual case.

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