The Stages of Implementation Completion for Evidence-Based Practice: Increasing the Chance of Successful Program Start-up and Decreasing Wasted Resources

Lisa Saldana, PhD
Oregon Social Learning Center
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MTFC Implementation Study

Patricia Chamberlain	PI
Lisa Saldana	Co-I
Courtenay Padgett	Project Coordinator
Lawrence Palinkas	Co-I
Hendricks Brown	Co-I
Lynne Marsenich	CDT Facilitator
Todd Sosna	CDT Facilitator
Gerry Bouwman	MTFC Purveyor
CIP	CDT Facilitator

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Background

- Implementation of EBP entails extensive planning, training, and quality assurance
- Involves a complex set of interactions between developers, system leaders, front line staff, and consumers
- Suggested that it takes an agency a minimum of 2 years to complete implementation (Fixen & Blasé, 2009)
- Little is known about which methods and interactions are most important for successful implementation

Stages of Implementation

- Recursive process of well defined stages or steps (Blasé et al., 2010)
- Not necessarily linear
- Developer or purveyor assists programs in navigating through the stages to ensure the elements are delivered as intended

Importance of Better Understanding Stages

- Unknown what stages are necessary for successful implementation
- Unknown what rate of progression is necessary for success
- Unknown if there are key implementation activities needed across EBPs
- Assist purveyors in providing feedback to programs to increase likelihood of success

Measuring Stages of Implementation

- Stages of Implementation Completion

(Chamberlain, Brown, & Saldana)

- Developed as part of an ongoing MTFC implementation trial to fill the gap in the lack of measures available

Current Measurement Gap

- Measure of Implementation Process
  Rate of Implementation
  Implementation Activities
  Patterns of Implementation Behavior
- Measure of Implementation Outcomes
  Implementation Milestones (e.g. program start-up)

MTFC Implementation

- EBP for youth who otherwise would be in congregate care
- Youth placed in well supported foster homes
- Backed by multiple randomized clinical trials
- Currently being implemented in over 100 sites domestically and internationally

MTFC Implementation Trial

- 40 counties in California (plus LA) and 12 counties in Ohio
- Randomized to 2 implementation conditions (CDT or IND)
- Randomized to cohorts for start time
- Total of 53 sites participating

Design

Included / Excluded → **Matched** → **R. A. to Time & Condition**

Included
1. No MTFC
2. Placed 6 or more
   (N = 40)

Excluded
1. Existing MTFC
2. Placed <6
   (N = 19)

1. Population Size (urban / rural)
2. Percentage minority
3. Number placed
4. Poverty

MTFC-SIC Basics

- 8 Stages from Engagement-Competency
- Developed through an iterative process
- Designed to target the general process and steps of implementation
- Involves assessment of implementation behavior of different levels of agents
- Designed to assess implementation activities specific to MTFC
- Both Duration and Proportion driven

Stages of Implementation Completion (SIC)

8 Stages:	Involvement:
1. Engagement	System Leader
2. Consideration of Feasibility	System Leader, Agency
3. Readiness Planning	System, Agency
4. Staff Hired and Trained	Agency, Practitioner
5. Adherence Monitoring Established	Practitioner, Client
6. Services and Consultation begin	Practitioner, Client
7. Ongoing Services, Consultation, Fidelity Monitoring, Feedback	Practitioner, Client
8. Competency (certification)	System Leader, Agency, Practitioner, Client

To Proceed or Not to Proceed: Predicting Implementation Success

Lisa Saldana, PhD — Center for Research to Practice
Wei Wang, PhD — University of South Florida
Patricia Chamberlain, PhD — Center for Research to Practice
Hendricks Brown, PhD — University of Miami

First 3 Stages (System Leaders)

- Engagement
  * Date site informed program available
  * Date interest indicated
- Consideration of Feasibility
  * Date of first contact for pre-implementation planning
  * Date first in-person meeting held
  * Date feasibility questionnaire completed
  * Date of initial feasibility assessment
- Readiness Planning
  * Date of cost/funding plan review
  * Date of staff sequence, time-line, hire plan review
  * Date of foster parent recruitment review
  * Date of referral criteria review
  * Date of communication plan review
  * Date of second in-person meeting held
  * Date written implementation plan complete

Primary Questions

- Does behavior in the first 3 stages successfully predict program start-up?
  * TIME taken in completing these activities
  * PROPORTION of activities fully completed

- Does the SIC have predictive validity?

Variables

- Stage Duration

  Amount of time between first and last activity completed within a Stage
- Proportion

  Proportion of activities completed within each stage
- Implementation Milestones

  e.g., program startup, certification

Analytic Strategy

- Agglomerative hierarchical clustering method
  - * proportion cluster
  - * duration cluster
- Cox proportional hazard survival model
  - * time to event outcome = days to first placement

Note: Duration categorized as (1) 0-31 days, (2) 32-365 days, (3) greater than 365 days, or (4) missing

Proportion

3 Distinct Clusters

* 25 Sites high proportion (mean = 79%, SD = 11%)
* 23 Sites low proportion (mean = 43%, SD = 8%)
* 5 Sites minimal proportion (mean 18%, SD 3%)

Duration

3 Distinct Clusters

* 26 Sites fast (mean = 54.5 days)
* 20 Sites slow (mean = 316.7 days)
* 7 Sites non completers

Prediction of Program Success

Cluster 1: High Proportion-Relatively Fast

- 23 Sites
- Mean Proportion Completed = 80.5%
- Mean Duration = 116.7 days

Cluster 2: Low Proportion-Relatively Slow

- 22 Sites
- Mean Proportion Completed = 44.5%
- 18 did not complete Stage 3

Cluster 3: Non-Completers

- 8 Sites
- Few activities and non-completion of Stages 2 or 3

Outcome

Sites that both took longer to complete each stage and completed fewer activities had significantly lower hazard of having their first placement within the study period

HR = 0.092, $p < 0.001$

The Stages of Implementation Completion: Measurement Properties and Uses

Lisa Saldana, PhD — Center for Research to Practice
Patricia Chamberlain, PhD — Center for Research to Practice
Jason Chapman, PhD — Medical University of South Carolina
Wei Wang, PhD — University of South Florida

Challenges for Evaluation of Measurement Properties

- Duration cannot be evaluated for internal consistency with typical methods
- Missing data

  for activities, no completion is not the same as typical missing data

  uninitiated stages (right censored data) are due to ineligibility not missingness
- Activities nested within Stages, nested within Sites

Evaluation of Measurement Properties

- IRT-based Rasch models to address challenges
- Proportion: dichotomous Rasch and Many-Facet Rasch models
- Duration: Poisson Rasch and Many-Facet Rasch models
- Probability of an activity being completed is a function of

  (a) the *difficulty* of the activity

  (b) the *implementation level* (adherence)of *the site*

Distributions and Targeting

- Modeling Provides Scores for:
  Activities (least to most difficult)
  Sites (least to most adherent)
- Supported Validity
  Scores matched expert consensus about both activities and sites
- Strong heterogeneity found
  Activities and sites covered wide distribution (≈ 4 logits)
- No evidence of floor or ceiling effects

Reliability

- Rasch Reliability Statistic: Separation

  2-3 different levels of activities found

  2 different levels of sites (those that need intervention and those that do not)

- Activity Reliability (Proportion) = .78
- Site Reliability (Proportion) = .50
- Activity Reliability (Duration) = .79
- Site Reliability (Duration) = .63

If look at the overall scale and not nesting then reliabilities increase

Fit and Misfit

- Proportion did not show any significant misfit for activities or site
- Duration indicated 4 "noisy" activities and 4 "noisy" sites (Outfit Mean Square > 2.0)

* checked against expert knowledge:

(a) Misfitting activities were mandatory

(b) Misfitting sites were known to be sporadic in implementation efforts

Utility: Implementation Trial

Saldana, Chamberlain, Wang, & Brown (2011)

- SIC yielded 3 distinct clusters of sites based on Pre-Implementation Behavior (Stages 1-3)
  - Cluster 1: High Proportion-Relatively Fast (23 Sites)
  - Cluster 2: Low Proportion-Relatively Slow (22 Sites)
  - Cluster 3: Non-Completers (8 Sites)
- Sites that both took longer to complete each stage and completed fewer activities had significantly lower hazard of successful program start-up during the study period

$$HR = 0.090, p < 0.001$$

(Cox Proportional Hazard Survival Model)

Utility: Replication

- 75 most recently implemented real-world teams
- SIC completed retrospectively by naïve coder
- Found that *Expanded* sites did not complete the implementation process as thoroughly as *newly adopting* sites
- Limit to 35 newly adopting sites

Utility: Real-World Sites

- Sites were successfully clustered
- Failed Sites spent significantly longer in pre-implementation than successful sites
- Sites that took longer to complete Stages 1-3 significantly lower hazard of successful program start-up

$$HR = 26.50,\ p < 0.002$$

(Cox Proportional Hazard Survival Model)

Discussion

- SIC is a promising tool to fill the measurement gap in implementation science
- SIC operates as intended and can distinguish varying implementation behavior
- Successfully measures both Stages and Sites
- Successfully replicated outcomes for real-world sites
- Potential to be adapted for other EBPs

Limitations

- Only evaluated for a single EBP
  - Initial adaptation underway for other EBPs in children's mental health
- Unknown if it would accurately assess implementation in other service sectors
  - Study proposed to examine this potential
- SIC scores are a proxy for implementation behavior
  - Mixed methods design proposed to understand this further

THE COST OF IMPLEMENTING NEW STRATEGIES (COINS)

Lisa Saldana, PhD*
Patricia Chamberlain, PhD*
David Bradford, PhD$^{\Delta}$
Mark Campbell, MS*

* Center for Research to Practice $^{\Delta}$ University of Georgia

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The Importance of Cost in Implementation

- When communities weigh the value of implementing EBPs, they must consider the cost of implementation over and above the cost of the intervention.
- Need to consider what implementation steps are necessary for success and the resources necessary to complete them.
- Varying costs might be associated with different implementation strategies.

Costs are Understudied in Implementation Science

- Leading theories and frameworks note importance of cost considerations (Proctor et al., 2011; Damschroder et al., 2009)
- Vast time and resources are unaccounted for by not measuring implementation processes (Liu et al, 2009)
- No standardized measures or strategies currently exist to measure implementation costs

Value of Developing Standardized Costing Strategy

Decision makers:

- Viability of adopting new EBPs
- Implementation method best suited for community
- Reduce over/under estimation of resources needed
- Better informed of varying costs over time for planning

Researchers:

- Economic evaluations of implementation trials
- Increased understanding of how to decrease implementation costs in order to increase uptake

Implementation Strategies

Individual Implementation (IND)

- Work individually with purveyor
- Complete standard implementation process

Community Development Teams (CDT)

- Work together in groups with CDT facilitator versed in local knowledge as well as EBP
- Maintain ongoing contact for support and problem-solving

- Both Conditions received standard clinical consultation and QA procedures

COINS: Measurement of Implementation Costs

- Used the Stages of Implementation Completion (SIC) a tool to measure implementation processes
- Considered direct and indirect costs
- Assessment of actual receipts (e.g., travel)
- Assessment of clinical staff salaries
- Assessment of hours
- Assessment of fixed EBP fees

Resource Allocation

Fee Structure by Phases

MTFC Program Cost and Sites Progression between Conditions

	Stages	Activities	Description	IND Condition Costs	IND Condition Stage Survival	CDT Condition Cost	CDT Condition Stage Survival
PRE-IMPLEMENTATION	Stage 1	1_1	Date of Interest Indicated				
		1_2	Date Agreed to Consider Implementation				
	Stage 2	2_1	Date of 1st County Response to 1st Planning Cont				
		2_2	Date Feasibility Assessment/CDT Meeting #1 Held				
		2_3	Date MTFC Feasibility Qnaire Completed				
	Stage 3	3_1	Date of Cost Calculator / Funding Plan Review				
		3_2	Date of Staff Sequence, Timeline, Hire Plan Review				
		3_3	Date of FP Recruitment Review				
		3_4	Date of Referral Criteria & Liaison Review				
		3_5	Date of Communication Plan Review				
		3_6	Date Stakeholder's Meeting / CDT Meeting # 2 Held				
		3_7	Date Written Implementation Plan Completed				
		3_8	Date MTFC Service Provider Selected				
IMPLEMENTATION	Stage 4	4_1	Date Agency Checklist / Qnaire Completed				
		4_2	Date 1st MTFC Staff Hired	$18,205 a month (S)			
		4_3	Date Program Supervisor Trained				
		4_4	Date Clinical Training Held (CDT Meeting #3)	$6,950 (F), $5,250 (T&L)	36%	$6,950 (F), $5,250 (T&L)	40%
		4_5	Date Foster Parent Training held (CDT meeting #4)	$5,630 (F)		$5,630 (F)	
		4_6	Date Site Consultant Assigned to Site				
	Stage 5	5_1	Date PDR Training Held	$3,600 (F)		$3,600 (F)	
		5_2	Date of 1st "Developer"/Program Admin Call		36%		40%
	Stage 6	6_1	Date of 1st Placement	$2,200 a month (S)		$2,200 a month (S)	
		6_2	Date of 1st Consult Call	$1,500 a month (F)		$1,500 a month (F)	
		6_3	Date of 1st Clinical Meeting Video Review		32%		40%
		6_4	Date of 1st Foster Parent Meeting Video Review				
SUSTAINMENT & MODEL ADHERENCE	Stage 7	7_1	Date Site Visit #1	$2,640 (F)		$2,640 (F)	
		7_2	Date Site Visit #2	$2,640 (F)		$2,640 (F)	
		7_3	Date Site Visit #3	$2,640 (F)		$2,640 (F)	
		7_4	Date Implementation Review #1	$1,020 (F)	16%	$1,020 (F)	32%
		7_5	Date Implementation Review #2	$1,020 (F)		$1,020 (F)	
		7_6	Date Implementation Review #3	$1,020 (F)		$1,020 (F)	
		7_7	Date Program Assessment #1	$1,840 (F)		$1,840 (F)	
	Stage 8	8_1	Date of Certification Application				
		8_2	Date Certified	$2,050 (F)	4%	$2,050 (F)	12%

$1,500 (fixed) vs $1,200 (travel & lodging)

$2,500 (fixed) vs $1,200 (travel & lodging)

$0 vs $7,500 (fixed)

Note. MTFC Fee (F), CDT Fee (CF), Staff/Foster Parent Cost (S), Travel and Lodging (T&L)

Represents the proportion of sites within that stage, there are still active sites in stages 6-8, thus the proportions for stages 7 and 8 could increase.

MTFC Program Costs and Hours Involved between Conditions

	Stages	Description	IND Condition			CDT Condition		
			Costs	County Hours	Site Hours	Cost	County Hours	Site Hours
PRE-IMPLEMENTATION	Stage 1							
		1_1 Date of Interest Indicated						
		1_2 Date Agreed to Consider Implementation		2 hrs			2 hrs	
	Stage 2							
		2_1 Date of 1st County Response to 1st Planning Contact						
		2_2 Date Feasibility Assessment/CDT Meeting #1 Held						
		2_3 Date MTFC Feasibility Qnaire Completed						
	Stage 3							
		3_1 Date of Cost Calculator / Funding Plan Review						
		3_2 Date of Staff Sequence, Timeline, Hire Plan Review						
		3_3 Date of FP Recruitment Review						
		3_4 Date of Referral Criteria & Liaison Review						
		3_5 Date of Communication Plan Review						
		3_6 Date Stakeholder's Meeting / CDT Meeting # 2 Held						
		3_7 Date Written Implementation Plan Completed						240 hrs
		3_8 Date MTFC Service Provider Selected		5 hrs			5 hrs	5 hrs
IMPLEMENTATION	Stage 4							
		4_1 Date Agency Checklist / Qnaire Completed						
		4_2 Date 1st MTFC Staff Hired	$18,205[d] a month		15 hrs	$19,598[d] a month		15 hrs
		4_3 Date Program Supervisor Trained						
		4_4 Date Clinical Training Held (CDT Meeting #3)	$6,950[a] & $5,250[b]		1 week	$6,950[a] & $5,250[b]		1 week
		4_5 Date Foster Parent Training held (CDT meeting #4)	$5,630[a]		1 day	$5,630[a]		1 day
		4_6 Date Site Consultant Assigned to Site						
	Stage 5							
		5_1 Date PDR Training Held	$3,600[a]		2 days	$3,600[a]		2 days
		5_2 Date of 1st "Developer"/Program Admin Call			1 hr/month			2 hrs/month
	Stage 6							
		6_1 Date of 1st Placement	$2,200[d] a month			$2,200[d] a month		
		6_2 Date of 1st Consult Call	$1,500[a] a month		1 hr/week	$1,500[a] a month		1 hr/week
		6_3 Date of 1st Clinical Meeting Video Review			2 hrs/week			2 hrs/week
		6_4 Date of 1st Foster Parent Meeting Video Review			2 hrs/week			2 hrs/week
SUSTAINABILITY	Stage 7							
		7_1 Date Site Visit #1	$2,640[a]		2-3 days	$2,640[a]		2-3 days
		7_2 Date Site Visit #2	$2,640[a]		2-3 days	$2,640[a]		2-3 days
		7_3 Date Site Visit #3	$2,640[a]		2-3 days	$2,640[a]		2-3 days
		7_4 Date Implementation Review #1	$1,020[a]			$1,020[a]		
		7_5 Date Implementation Review #2	$1,020[a]			$1,020[a]		
		7_6 Date Implementation Review #3	$1,020[a]			$1,020[a]		
		7_7 Date Program Assessment #1	$1,840[a]		3-4 hrs	$1,840[a]		3-4 hrs
	Stage 8							
		8_1 Date of Certification Application			40-80 hrs			40-80 hrs
		8_2 Date Certified	$2,050[a]			$2,050[a]		

3 System Leader hrs vs. 6 System Leader hrs

23 System Lead hrs vs. 36 System Lead hrs
181 Site hrs 118.5 Site hrs

Abbreviation: MTFC, Multi-Demensional Foster Care; IND, Individual (Control); CDT, Community Development Team (Treatment).

[a]MTFC Fee [c]CDT Fee

[b]Travel and Lodging [d]Staff Cost

Cost Analysis

Failure Cost of Program Rollout Prior to Staffing a Site							
Condition	Total Cost of Failures prior to Stage 2	Percentage of the Population Failing Prior to Stage 2	Total Cost of Failures prior to Stage 3	Percentage of the Population Failing Prior to Stage 3	Total Cost of Failures prior to Stage 4	Percentage of the Population Failing Prior to Stage 4	Active Sites Ratio Entering Stage 4
CDT	$0	4%	$1,563	36%	$14,433	60%	10/25
IND	$0	4%	$22,500	64%	$22,500	64%	9/25

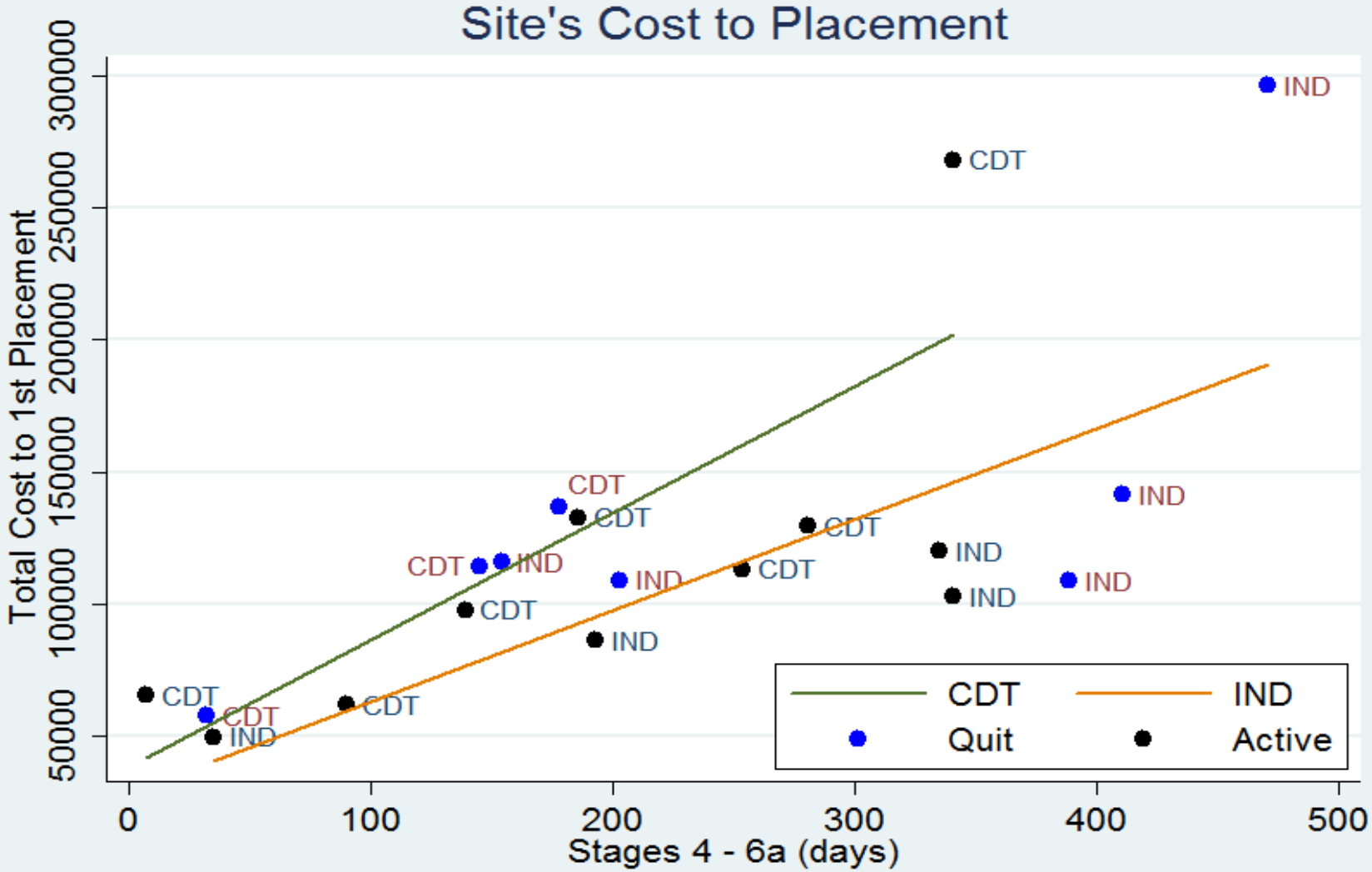
- Direct costs associated with the failed sites
- Does not account for the time associated with System Leader involvement in pre-implementation.
- Every site that hired and trained staff through SIC Stages 4 & 5 place a youth in Stage 6.

Sunk Cost by Condition

	A	B	C	(A+B)/C
	Failed Sites' Cost	Successful Sites' Sunk Cost	Number of Placing Sites	Average Sunk Cost
CDT	$14,433	$1,362,531	10	$137,696
IND	$22,500	$1,285,410	9	$145,323

- Sunk Costs are defined as start-up costs

Sunk Cost to Placement



Average Youth Cost by Condition

		A	B	A/B	
	Average Sunk Cost	Total Site Cost Beyond Placement	Total Youth Placed	Average Youth Cost	Average Youth Placement Duration
CDT	$137,696	$7,277,618	152	$47,879	176 days
IND	$145,323	$3,342,070	59	$56,645	161 days

Average youth cost includes fees for services, staff, foster parents, building expense, insurance, taxes, equipment and utilities.

- Difference not a function of youth placement duration
- Average CONDITION cost includes Total Site cost from Stage 6a onward + Youth costs
- The average youth cost does NOT include the average sunk cost because we do not want this to skew figures based on program start-up

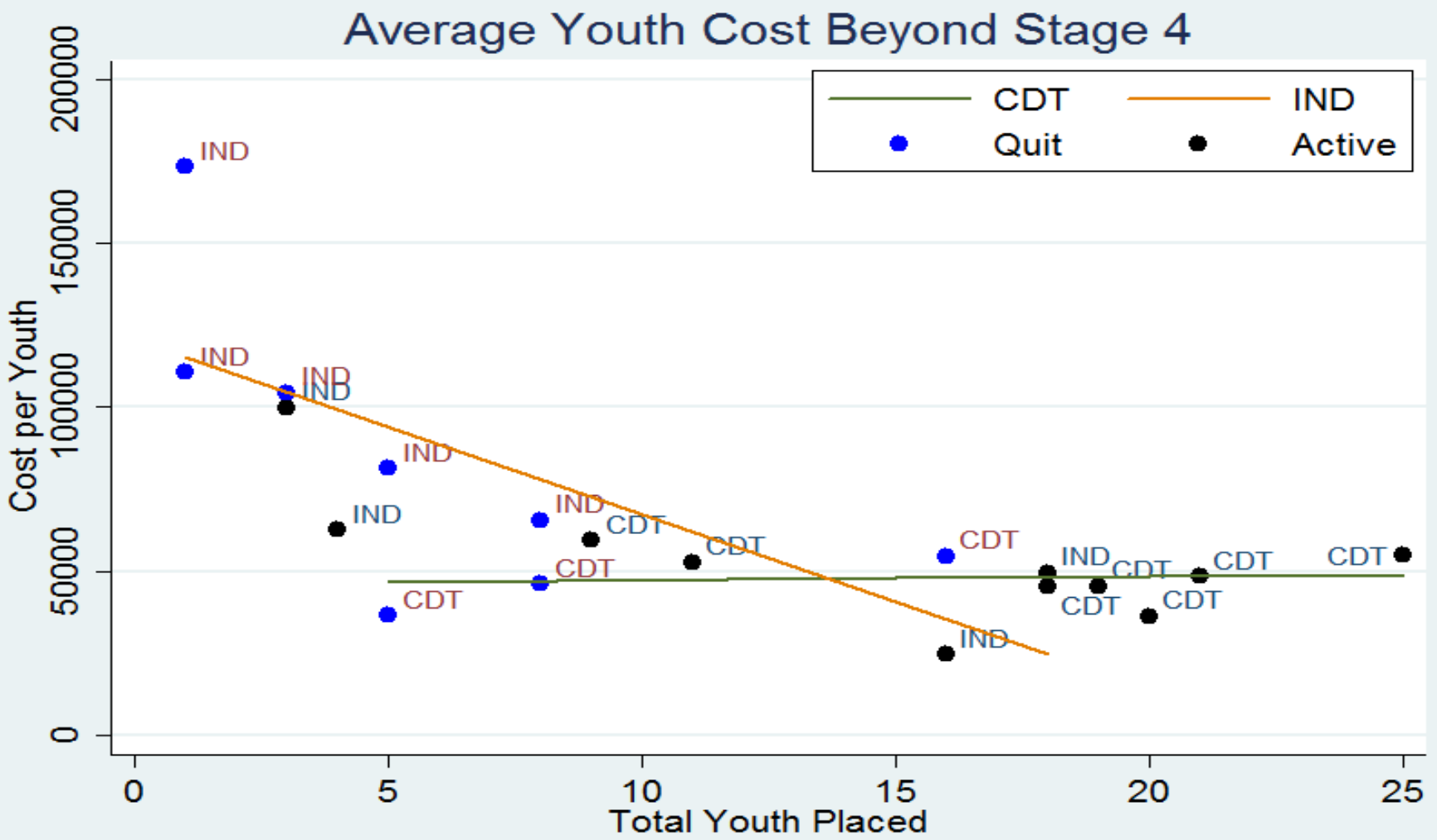
Average Placement and Youth Cost Across Sites within Condition

Condition	Sites	Average Site's Placement*	Average Site's Youth Cost **
CDT	10	15.2	$47,567
IND	9	6.56	$85,287

* T-Test of the Mean Difference, t(17)= 2.9198

** T-Test of the Mean Difference, t(17)= -2.7437

Average Youth Cost



Conclusions: COINS Costing Strategy

- The SIC is a promising tool for defining implementation costs
- Allows for measurement of both direct and indirect resource allocation
- Illustrates balance of person hours versus up front dollars
- Allows for measurement of Duration (time) of implementation activities which affects costs
- Successfully distinguishes resource allocation between implementation strategies

Conclusions: Implementation Costs

- This study considers implementation costs over and above standard MTFC costs
- To determine implementation costs, decision makers need to consider:

  Sunk Cost: Start-up cost prior to program start-up

  Fixed Cost: Costs incurred regardless of having a youth in placement (cost of doing business)

  Variable Cost: (Marginal) Costs of service dependent on the volume of clients served. Typically discussed figures, revolving around the question of, “How much would it cost to serve one more youth.”

- Following program start-up, the focus changes to marginal costs in order to maximize site profit (cost minimization per client)

General Discussion

- How many of the items are universal? What's missing?
- Can the Stages represent EBPs generally?
- Is there value in having a standardized measure of implementation?
- Can the value be bolstered with cost mapping?

Thank You

Lisa Saldana, PhD

lisas@cr2p.org

lisas@oslc.org