

Introducing Systems Science Approaches to Implementation Science with an Example

Modeling to Learn



Test don't guess.



Lindsey Zimmerman, PhD

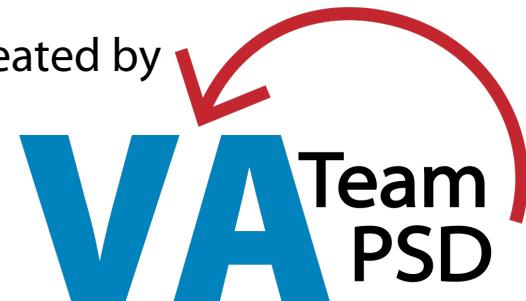
Training in Dissemination & Implementation
Research in Health (TIDIRH)

National Center for PTSD, Dissemination & Training Division

December 7, 2018

Lindsey.zimmerman@va.gov

Created by



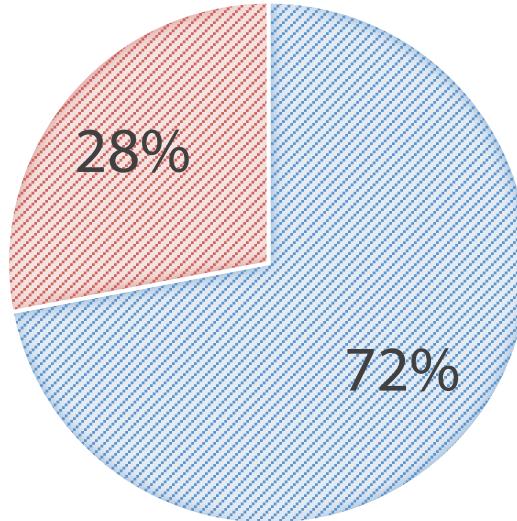
My goal for today is to walk through a systems science example.

Among many systems science approaches we will discuss participatory system dynamics (PSD).

1. Cover one approach concretely and in greater depth.
2. Fit PSD within the language and literature of D&I research and practice.

The problem of EBP reach: How can we reach more patients with our highest quality care?

■ Other services ■ Evidence-based practices



Source: VA Strategic Analytics for Improvement and Learning, FY 2017



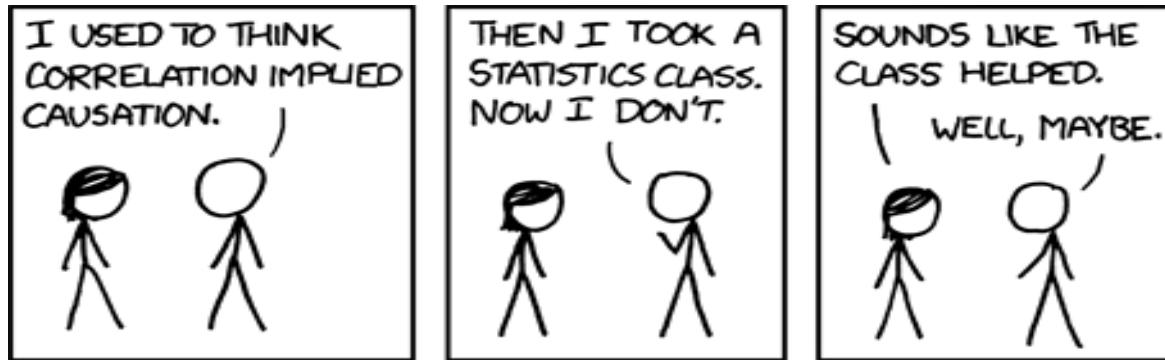
Veterans Health Administration

Model of a US National Health Care System

American J. Public Health 97, 2007

1. VA innovates with national dissemination efforts to train providers in evidence-based mental health practices
2. Enterprise-wide quality measures
3. Clinical practice guidelines and mandates for evidence-based care
4. National electronic health information system
5. Mental health care coordinated in multidisciplinary teams

What works to improve EBP reach, why, and under what conditions?



xkcd.com

Understanding causes of EBP reach in local context,
is critical to our stakeholders.

National Center for PTSD

VA Employee Education
Services

Office of Mental Health &
Suicide Prevention

OUR STAKEHOLDERS

VA policy-makers, patients, and providers from psychiatry, psychology, social work, nursing & certified peer support specialists

Veteran Patients (VAPOR)

Veterans
Engineering
Resource Center

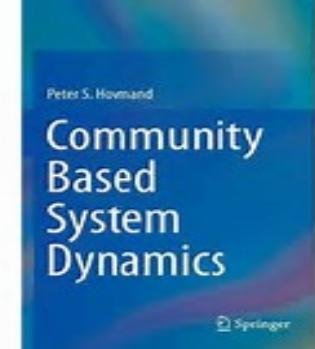
Director of Outpatient
Mental Health, MD

Core Modeling Group of
Frontline Staff

Frontline
Teams

Our PSD approach – Participatory Research:

A partnership approach to research that equitably involves stakeholders in all aspects of the research process and in which all partners contribute expertise and share decision-making and ownership.



Participatory Research is an epistemology.

- Scientific inquiry that actively considers the scope of current knowledge, its limits and validity.
- Participatory research asks, what knowledge is privileged or absent?

We focus on learning among frontline teams making EBP-related care decisions.

Scientific Model	Problem	<i>Drawn from Hovmand (2014)</i> Why problems persist
General Capacity	Learning	Stakeholders cannot or do not learn and adapt to their situation.
	Coordination	Conflict or lack of stakeholder consensus.
EBP-Specific Capacity	Analysis	Policies are inconsistent with the real system constraints.
	Restructuring	The underlying structure of the system prevents workable solutions.

Target State: Lean SMART Goal

By April 2015, 40% of patients newly seen in outpatient mental health for depression, PTSD, or anxiety disorders will have two psychotherapy visits completed within 28 days from time of intake assessment.

Specific.
Measurable.

Actionable: if never achieved morale may suffer.

Realistic: with the available resources.

Time frame: A due date.

Local clinic strategies are needed to address local differences.

High Resource/High Complexity	Low Resource/Low Complexity/High Demand
3548 unique patients/year	2043 unique patients/year
Lower caseload per provider	Higher caseload per provider
Rare wait for initial appointment	Occasional waitlist to get into clinic
5.2 psychiatrists per 9 EBPsy providers	3.0 psychiatrists per 4 EBPsy providers
Higher EBPsy providers/MD ratio	Lower EBPsy provider/MD ratio
Higher EBPsy base rate	Higher EBPharm base rate
Providers often self refer for EBPs	Referrals to other providers by necessity
Multiple on-site specialty programs	Only telehealth specialty care
Training program site multiple disciplines	No trainees providing care
Most groups "open" (ongoing enrollment)	Most groups "closed" (infrequent opening)
Shorter time to next available appointment	Longer time to next available appointment

Our R21 aims.

- develop a systems understanding of VA addiction and mental health services and the limited reach of evidence-based care.
- empower frontline provider stakeholders to make locally optimized quality improvement decisions.

Saturation achieved during structural behavioral validity testing.

Barlas, 1996

Direct Structure Tests

- Empirical
- Structure-confirmation
- Parameter-confirmation

Systems Theory Tests

- Structure-confirmation
- Parameter-confirmation
- Direct extreme-condition
- Dimensional consistency

Stakeholders & Literature

- Reviews and evaluations
- Exemplar SD Models

Structure-oriented Behavior Tests

- Extreme-condition test
- Behavior sensitivity test
- Modified-behavior prediction
- Boundary adequacy test
- Phase relationship test
- Qualitative features analysis
- Turing test

EBP Reach Behavior pattern tests



Modeling to Learn

Test don't guess.

Adm Policy Ment Health
DOI 10.1007/s10488-016-0754-1

ORIGINAL PAPER

Participatory System Dynamics Modeling: Increasing Stakeholder Engagement and Precision to Improve Implementation Planning in Systems

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Rachel Kimerling¹ · Jodie A. Trafton^{4,5} · Steven E. Lindley^{4,6}

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AND
Mental Health Services
Research

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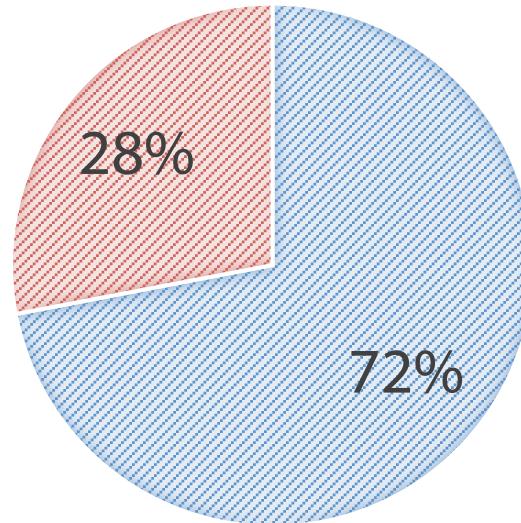
Our R21 approach used participatory system dynamics.
Our developed program is *Modeling to Learn*.



Systems Science: interdisciplinary theory and methods for understanding complexity.

We define limited EBP reach among our patient population as a system behavior.

■ Other services ■ Evidence-based practices



Source: VA Strategic Analytics for Improvement and Learning, FY 2017

Modeling to Learn

Test don't guess.

Virtual
Facilitation

Transparent
Local Data

Real-time
Simulation

1. Equitable access to resources.
2. Mutual learning.
3. Shared decision-making.

We developed a secure website for reviewing team trends over time & patient detailed reports.

BISL CDW VISNs

 **BISL** PTSD_OMHO Drill Down To Your Team Request New Team Folder Request Team Membership Change

PTSD_OMHO

Pages
Administrative
User Guide
Contact Us
Site Contents

Select Your VISN

VISN 1	VISN 2	VISN 4	VISN 5	VISN 6
VISN 8	VISN 9	VISN 10	VISN 12	VISN 15
VISN 17	VISN 19	VISN 20	VISN 21	VISN 22

Row Labels: ptsd depression

2015

Month	ptsd	depression
Oct	93	36
Nov	72	28
Dec	87	40

2016

Month	ptsd	depression
Jan	73	42
Feb	60	33
Mar	78	30
Apr	59	29
May	56	42
Jun	88	39
Jul	73	39
Aug	98	59
Sep	131	70
Oct	117	55
Nov	149	71
Dec	137	83

2017

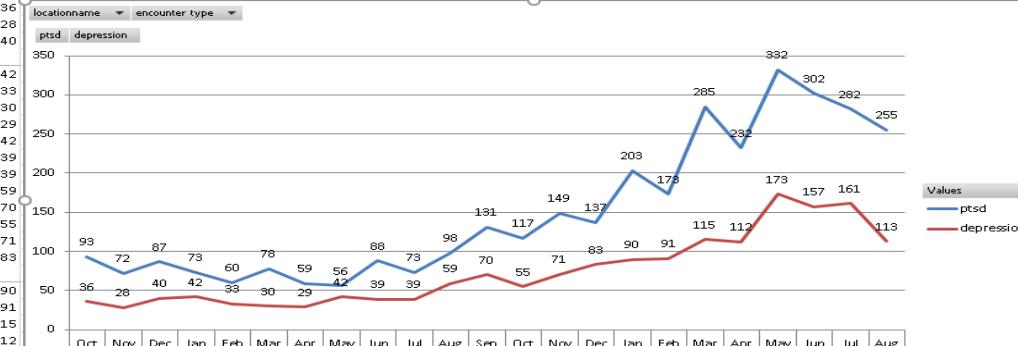
Month	ptsd	depression
Jan	203	90
Feb	173	91
Mar	285	115
Apr	232	112
May	332	173
Jun	302	157
Jul	282	161
Aug	255	113

Grand Total: 3435 1708

locationname encounter type

Values: ptsd depression

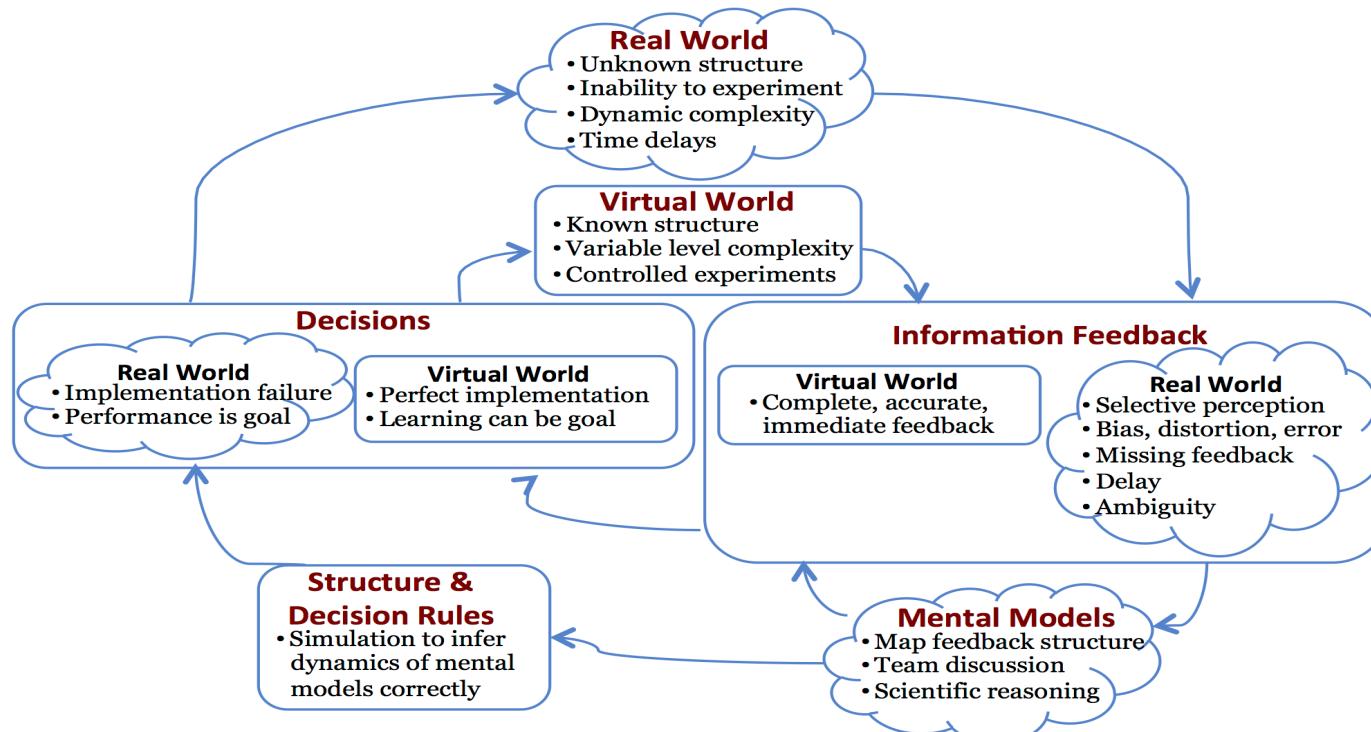
Years: visitdatetime



mtl
mtl.how

VA Team PSD

Why is PSD effective? Two Causal Theories: Systems and Decision Science



Sterman, 2000; Sterman 2006

MTL resources help teams
look back two years
and look ahead two years.



Why is PSD effective?

Participatory Learning to develop Systems Thinking.

Outputs samplefile.xls < BACK

 Medication Management

 **Our Question**
Briefly describe what your team wants to learn from this experiment.

If we get an increase in opioid use disorder referrals, will it increase the wait-time for 

 **Our Hypothesis**
Outline the systems story your team believes will cause the outcomes your team expects to observe.

 **Our Findings**
Describe your team's findings, insights and conclusions from this experiment.

 **Our Decisions**
Based on what was learned in this experiment, what changes is the team ready to make in their practice?

Save Copy Export

Calendar - Week 02
0 010
  Advance End Wks



MTL Fidelity Checklist for 12-session Plan

Session Summaries across MTL Modules

session 01. Today we're *modeling to learn* how to align our team vision.

session 02. Today we're *modeling to learn* how to check our patient data and team trends.

session 03. Today we're *modeling to learn* how to produce team data for simulation.

 session 04. Today we're *modeling to learn* how to prioritize team needs.

session 05. Today we're *modeling to learn* how to log-in to our team world.

session 06. Today we're *modeling to learn* how to tell a **systems story**.

session 07. Today we're *modeling to learn* how to evaluate our **base case** of no new decisions.

 session 08. Today we're *modeling to learn* how to test a **dynamic hypothesis**.

session 09. Today we're *modeling to learn* how to **compare alternatives**.

session 10. Today we're *modeling to learn* how to use **systems thinking**.

session 11. Today we're *modeling to learn* how to make future **team decisions**.

 session 12. Today we're *modeling to learn* how to turn **team learning** into a **team plan**.

Fidelity to
Participatory Learning
to develop *Systems Thinking*.



Session

Join Current Session

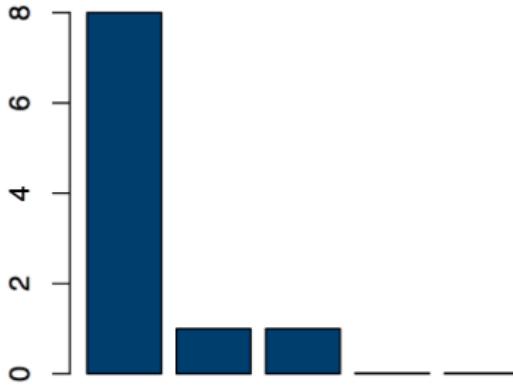
Suicide Prevention -- Week 0
100a1_abc_team_a_2018_1_01.xlsx

Play

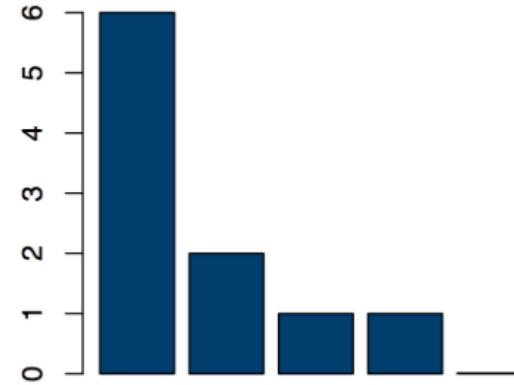
Start a New Session

Care Coordination
Medication Management
Psychotherapy
Aggregate
Suicide Prevention

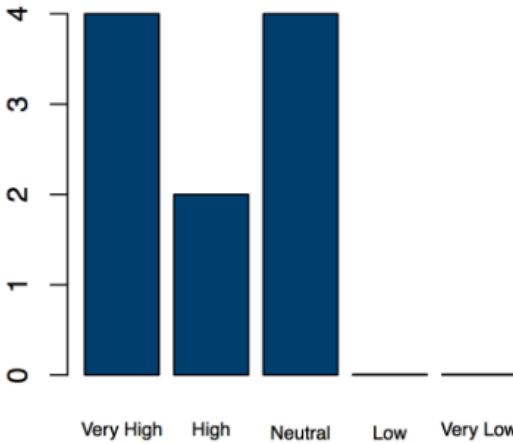
Schedule – How to manage team schedules (i.e. clinics/grids) to meet patients needs.



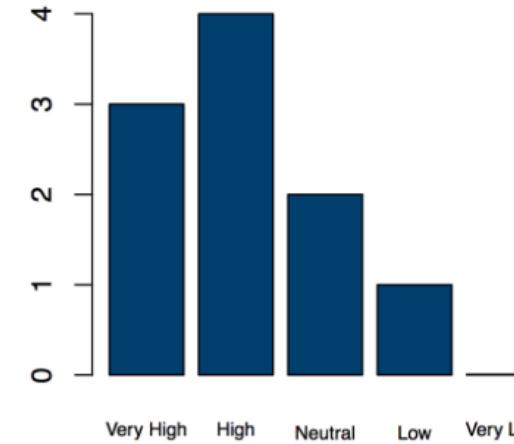
New patients – How to get new patients in care, while meeting existing patients needs.



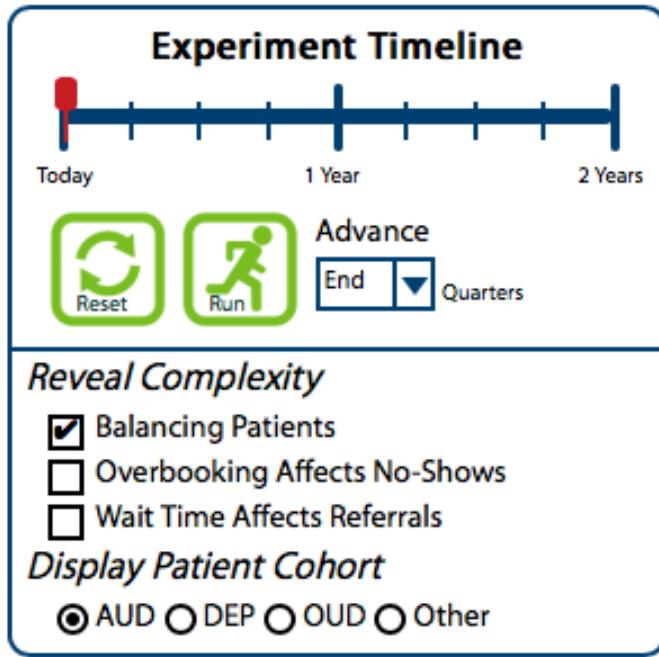
Return to clinic – How return to clinic orders free free us to get patients to the right treatment at the right time.



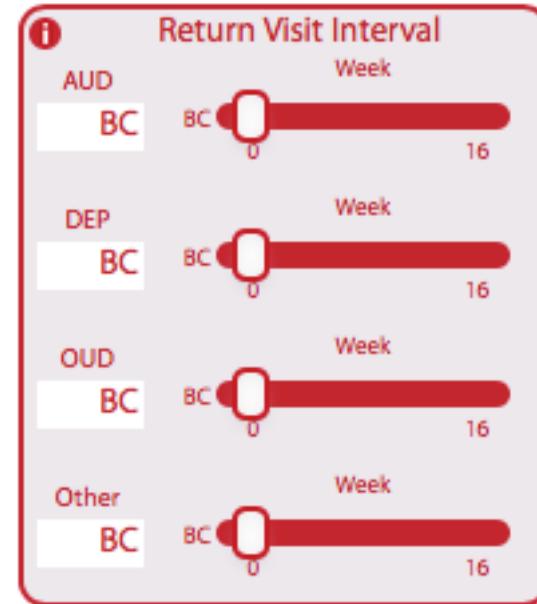
Overwork – How overbooking or overworking increases patient no shows.



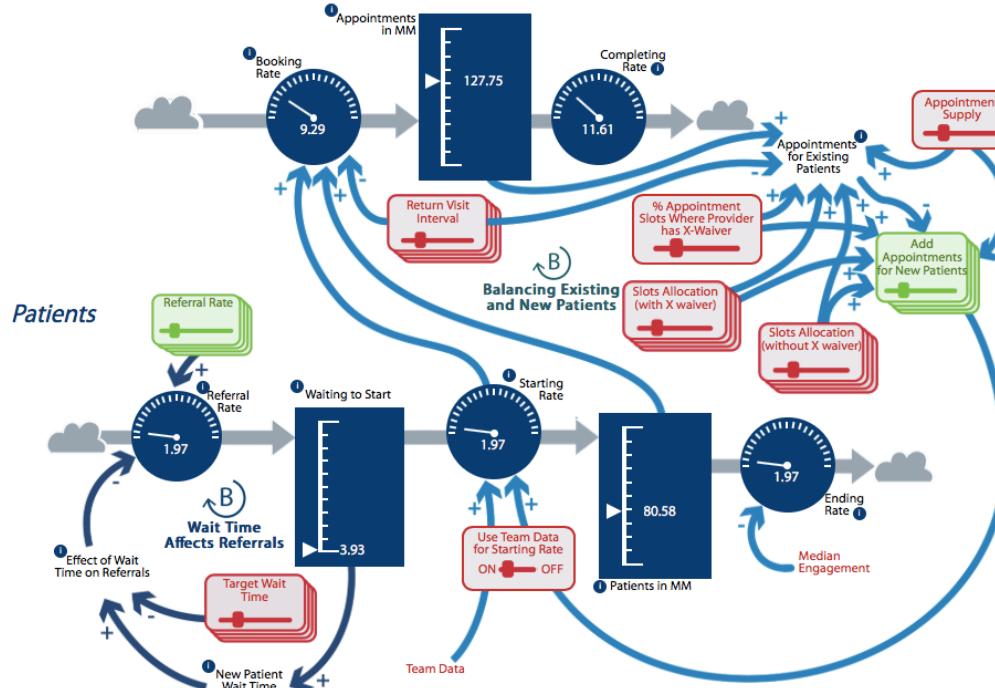
"Staff" & "Time" barriers/determinants as dynamics.



Engagement Pattern



Causal mechanisms (dynamics) of EBP reach are made transparent for local learning.

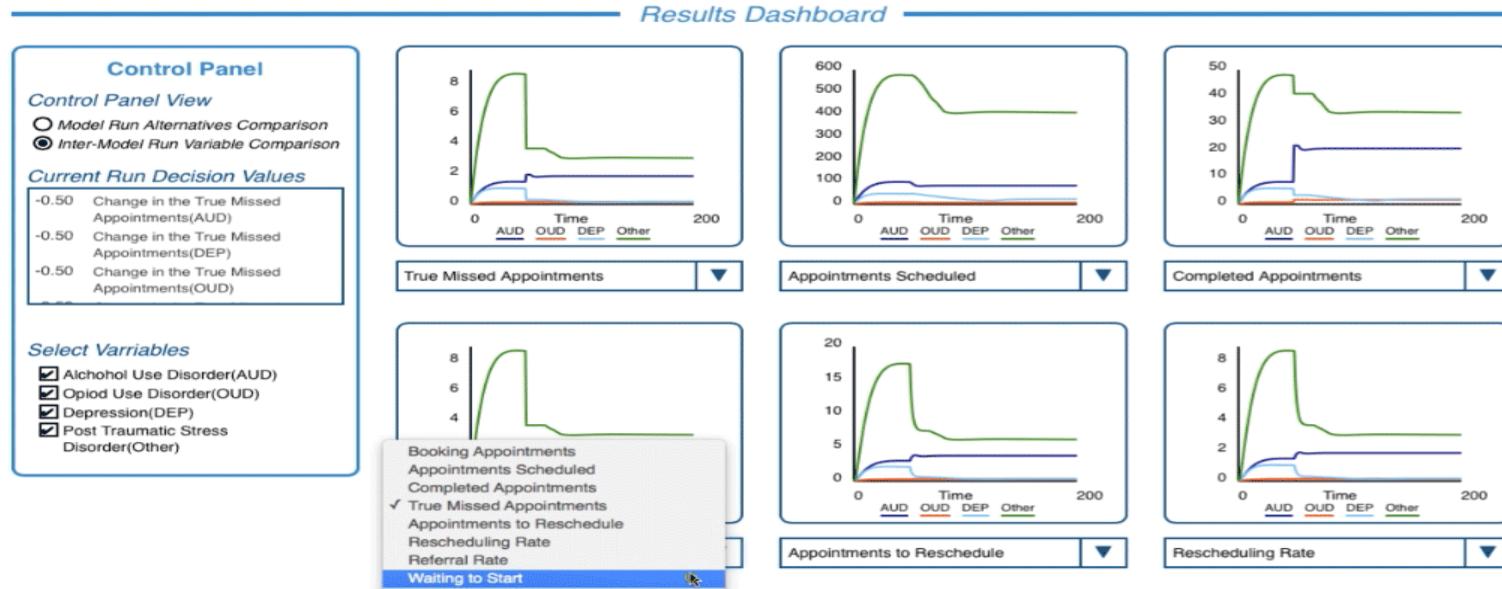


Red =
- Read in
From existing
team data
- Standardized

mtl.how/sim

Modeling to Learn

Test don't guess.

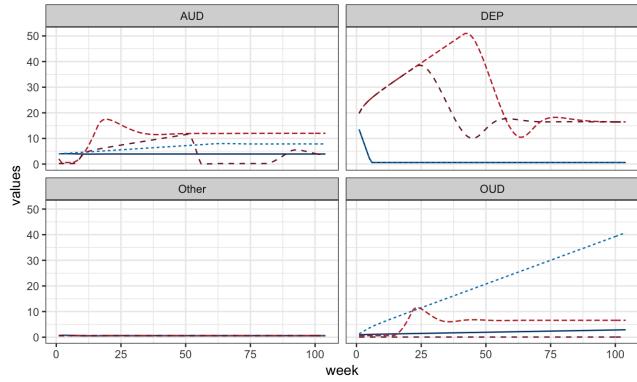


MTL tools helps frontline staff find the best local changes faster.



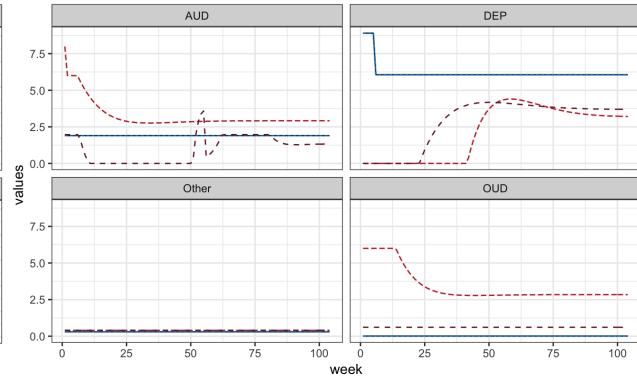
Compare Patient Cohort: Waiting to Start

— Base Case ··· Experiment 1 - - Experiment 2 - - Experiment 3



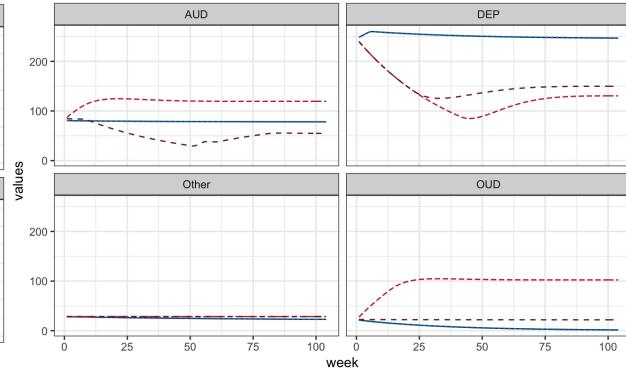
Compare Patient Cohort: Starting Rate

— Base Case ··· Experiment 1 - - Experiment 2 - - Experiment 3



Compare Patient Cohort: Patients in MM

— Base Case ··· Experiment 1 - - Experiment 2 - - Experiment 3

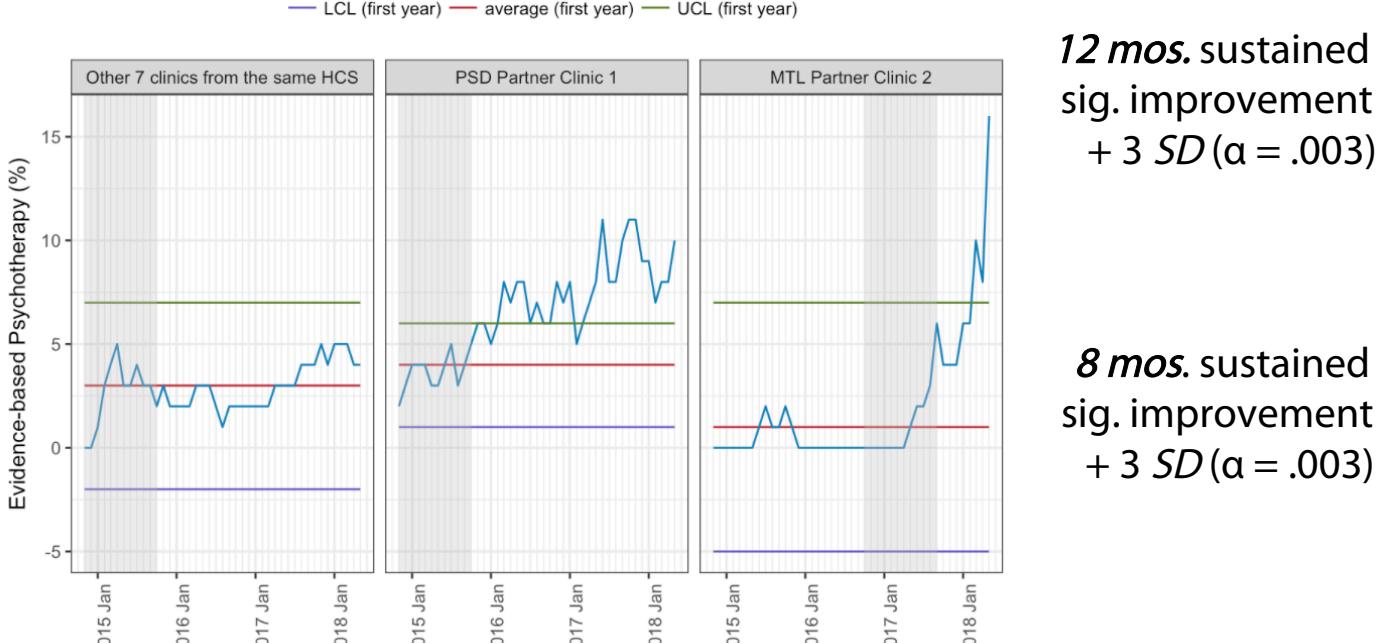


MTL separates states & flows and shows system behaviors that may get better before worse or worse before better.

Is PSD/MTL effective for improving EBP reach? Strong signal in R21 pilot clinics.

OBSERVED FINDINGS

HCS = Regional
health care system



Key:

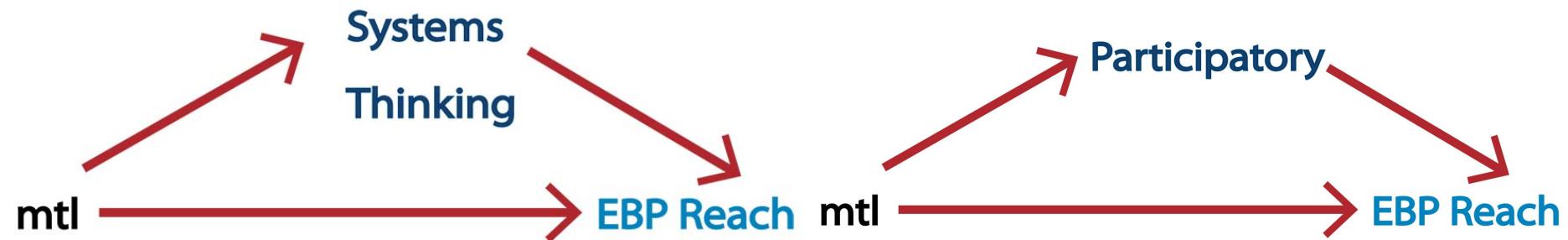
Green = Upper control limit (UCL)

Red = 12-month pre-PSD EBP proportion

Purple = Lower control limit (LCL)

SD = standard deviations

We submitted two *Modeling to Learn* multisite implementation research trials.



R01 mtl vs audit & feedback

1. Effective
2. Systems Thinking Mechanism
3. Generalizable

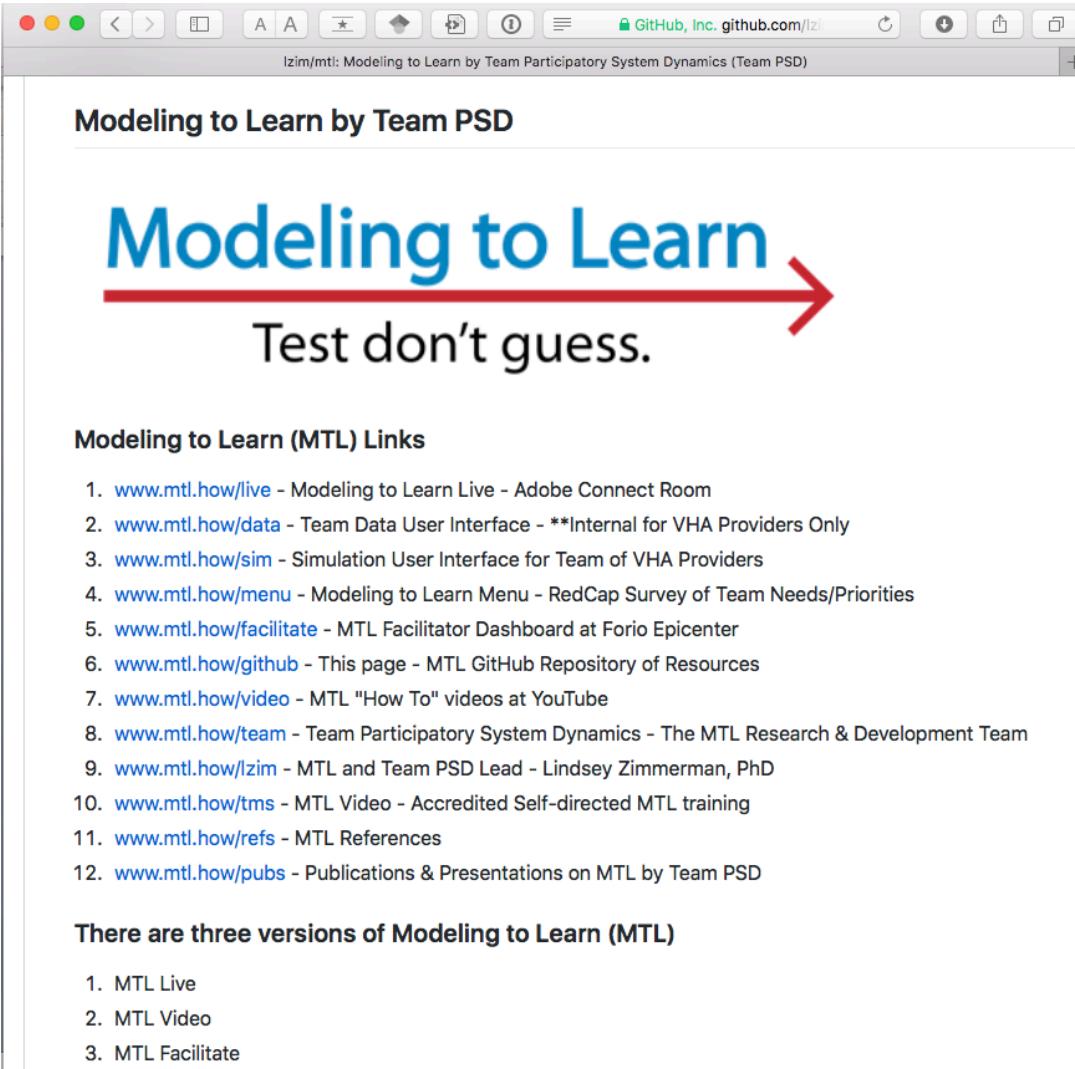
IIR mtl vs usual QI

1. Effective
2. Participatory Mechanism
3. Affordable



Principles of the open science movement:

- collaborative
- free and open
- transparent and reproducible science.



The screenshot shows a web browser window with the following details:

- Title Bar:** Izim/mtl: Modeling to Learn by Team Participatory System Dynamics (Team PSD)
- Content Area:**
 - Section Header:** Modeling to Learn by Team PSD
 - Main Title:** Modeling to Learn →
 - Text Below Title:** Test don't guess.
 - Section:** Modeling to Learn (MTL) Links
 - 1. [www.mtl.how/live](#) - Modeling to Learn Live - Adobe Connect Room
 - 2. [www.mtl.how/data](#) - Team Data User Interface - **Internal for VHA Providers Only
 - 3. [www.mtl.how/sim](#) - Simulation User Interface for Team of VHA Providers
 - 4. [www.mtl.how/menu](#) - Modeling to Learn Menu - RedCap Survey of Team Needs/Priorities
 - 5. [www.mtl.how/facilitate](#) - MTL Facilitator Dashboard at Forio Epicenter
 - 6. [www.mtl.how/github](#) - This page - MTL GitHub Repository of Resources
 - 7. [www.mtl.how/video](#) - MTL "How To" videos at YouTube
 - 8. [www.mtl.how/team](#) - Team Participatory System Dynamics - The MTL Research & Development Team
 - 9. [www.mtl.how/lzim](#) - MTL and Team PSD Lead - Lindsey Zimmerman, PhD
 - 10. [www.mtl.how/tms](#) - MTL Video - Accredited Self-directed MTL training
 - 11. [www.mtl.how/refs](#) - MTL References
 - 12. [www.mtl.how/pubs](#) - Publications & Presentations on MTL by Team PSD
 - Section:** There are three versions of Modeling to Learn (MTL)
 - 1. MTL Live
 - 2. MTL Video
 - 3. MTL Facilitate

Modeling to Learn on GitHub

Modeling to Learn

Test don't guess.



Look before you leap.



Measure twice cut once.

Questions?



Co-Investigators

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