INCORPORATING MULTILEVEL TECHNIQUES INTO QUALITY CONTROL CHARTS

AEA Annual Meeting 2009
Orlando, FL
Nov 14th, 2009

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1

QUALITY CONTROL IN MENTAL HEALTH

➢Evaluate System, Programs, and Client progress

➢Allocate and reallocate clinical resources more efficiently

➢Improve and maintain clinical program fidelity

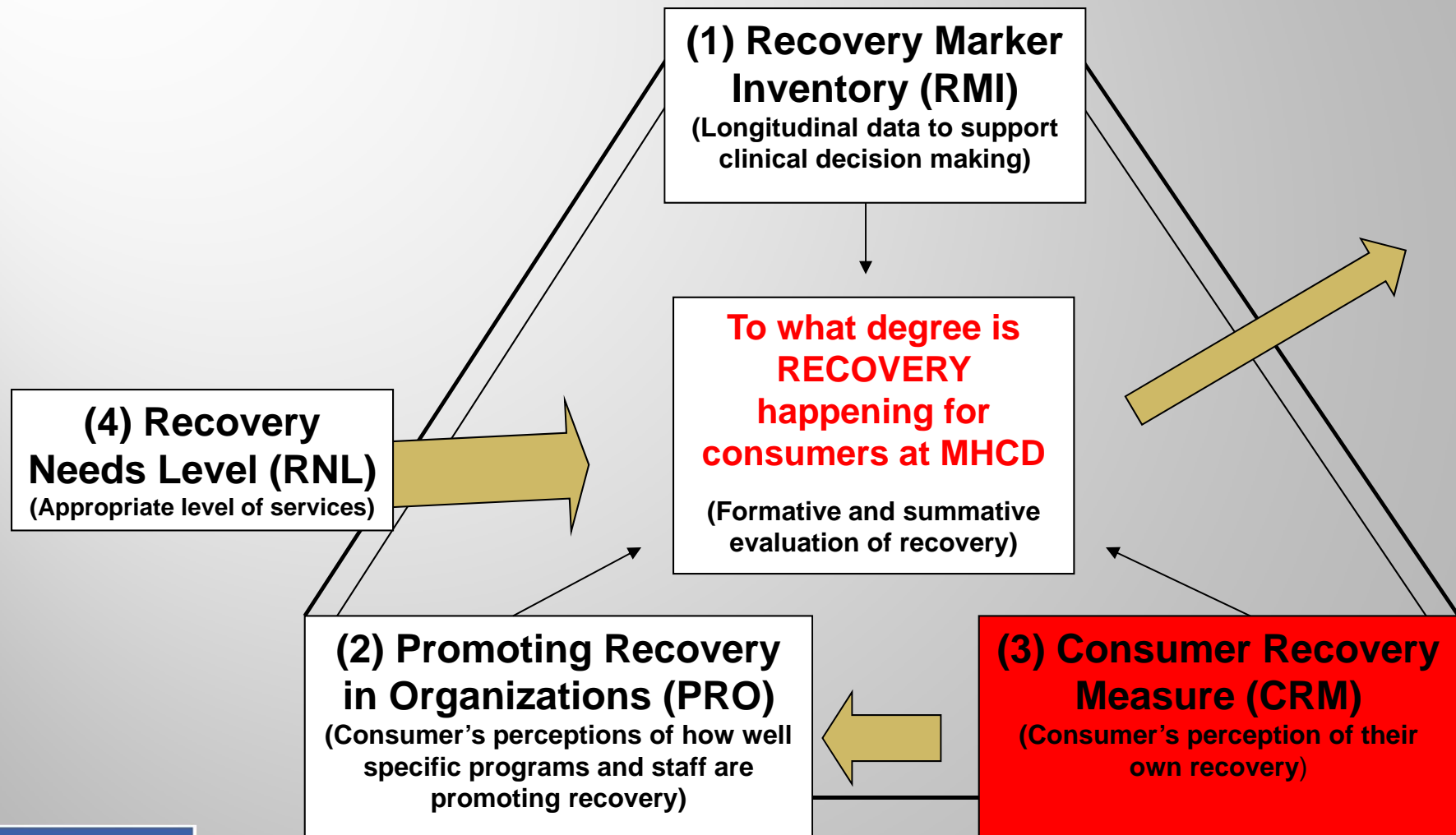➢Identify most effective programs based upon consumer needs

MENTAL HEALTH RECOVERY

Concept of Recovery has taken root around the world

Working Definition (MHCD):

"A _non-linear process_ of growth by which people move from _lower to higher levels of fulfillment_ in the areas of hope, safety, level of symptom interference, social networks, and activity."

3

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RECOVERY OUTCOMES

(1) Recovery Marker Inventory (RMI)
(Longitudinal data to support clinical decision making)

To what degree is RECOVERY happening for consumers at MHCD

(Formative and summative evaluation of recovery)

(4) Recovery Needs Level (RNL)
(Appropriate level of services)

(2) Promoting Recovery in Organizations (PRO)
(Consumer's perceptions of how well specific programs and staff are promoting recovery)

(3) Consumer Recovery Measure (CRM)
(Consumer's perception of their own recovery)

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CONSUMER RECOVERY MEASURE

The CRM V3.0 includes 15 items, some are listed below:

1. Lately I feel like I've been making important contributions (active-growth)

2. I have hope for the future (hope)

3. There are some people who cause me a lot of fear (safety)

4. I get a lot of support during the hard times (social network)

5. Life's pressures lead me to lose control (symptom interference)

QUALITY CONTROL ISSUES IN RECOVERY

➢ Multiple sources of variability

  ➢ Measurement

  ➢ Consumer

  ➢ Therapist

  ➢ System

➢ Changing environmental, treatment, and consumer specific factors affect outcome measurements.

➢ Difficulty in detection of small changes due to large variability within and among consumers

MULTILEVEL MODELING AND RECOVERY

➢Multilevel modeling allows for the partitioning of variance among multiple levels of nesting, i.e. measures within consumers within therapists

➢Allows for regression based correction of expected outcomes for any unit at any level, i.e. conditional estimates based upon consumer characteristics in environment or treatment.

➢Can be used to simultaneously monitor multiple aspects of the system from measurements to clinical sites.
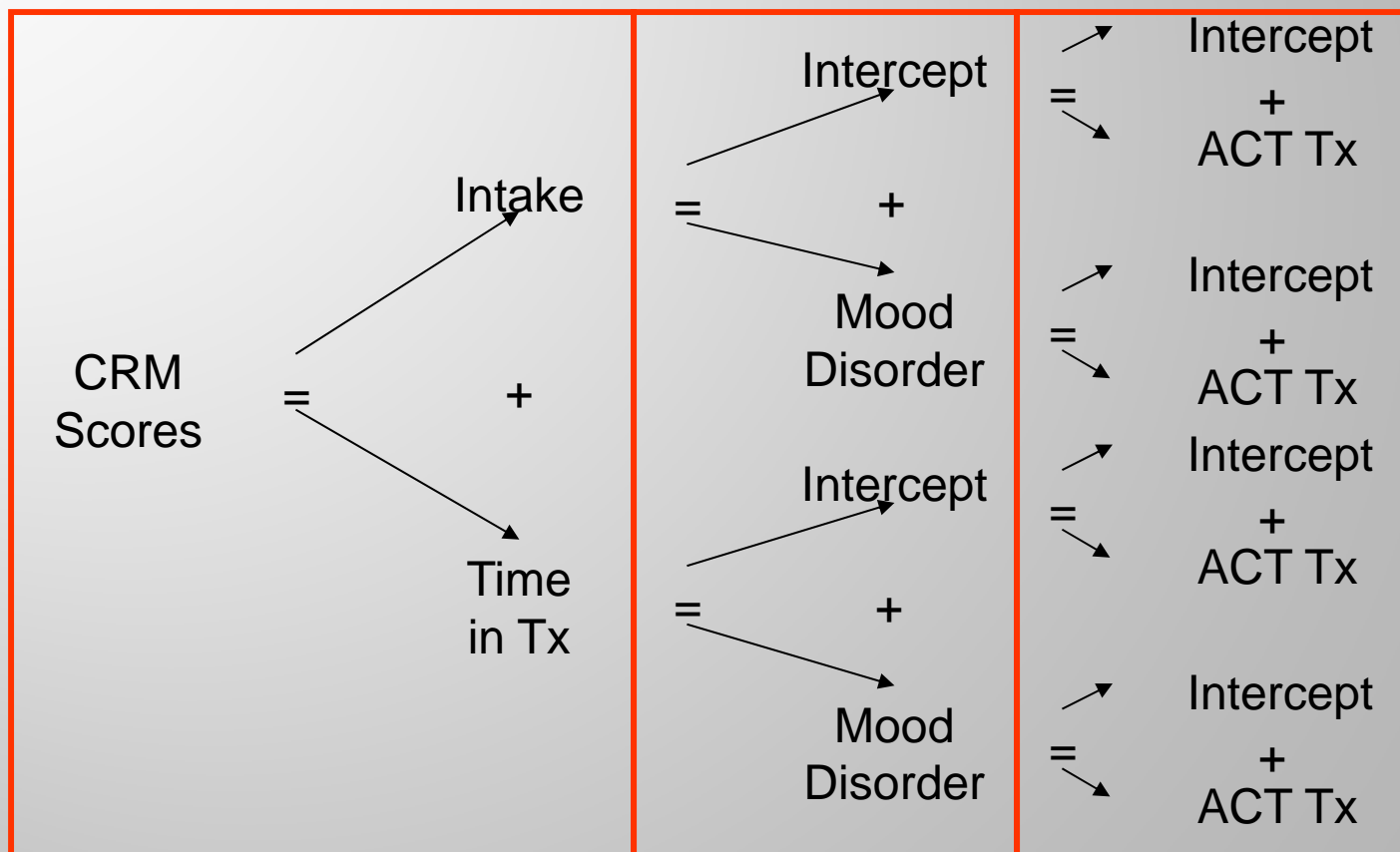
➢Based upon Mixed-Effects ANOVA design

7

EXAMPLE OF MULTILEVEL MODELING CONCEPTS

Consumer Level Effect

Typical SLR Model   **System Level Effect**

CRM Scores = Intake + Time in Tx

Intake = Intercept + Mood Disorder

Time in Tx = Intercept + Mood Disorder

Intercept = Intercept + ACT Tx

Intercept = Intercept + ACT Tx

Intercept = Intercept + ACT Tx

Intercept = Intercept + ACT Tx

← **Higher Level Effects**

8

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Applications of ML Control Charts

- Program Level
  - Recovery Change Chart
  - Recovery versus Environmental Support Chart
- Team Level
  - Recovery Change Chart
  - Recovery versus Environmental Support Chart
- Consumer Level
  - Recovery Detection Chart

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9

Recovery Change Chart

- Allows view of starting point and rate of change
- Bivariate Control Chart for plotting of regression parameters (intercept and slopes)
- Corrects for consumer demographics, environmental factors, and treatment factors.
    - Allows for standardized comparisons

Recovery Change Chart

Recovery Measures Change Slope (y-axis): 0.3, 0.2, 0.1, 0, -0.1, -0.2, -0.3

Recovery Measures Intercept (x-axis): 1, 3, 5, 7

Quadrants: I, II, III, IV

Legend:
◆ Average
◆ Moderate Outlier
◆ Extreme Outlier

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11
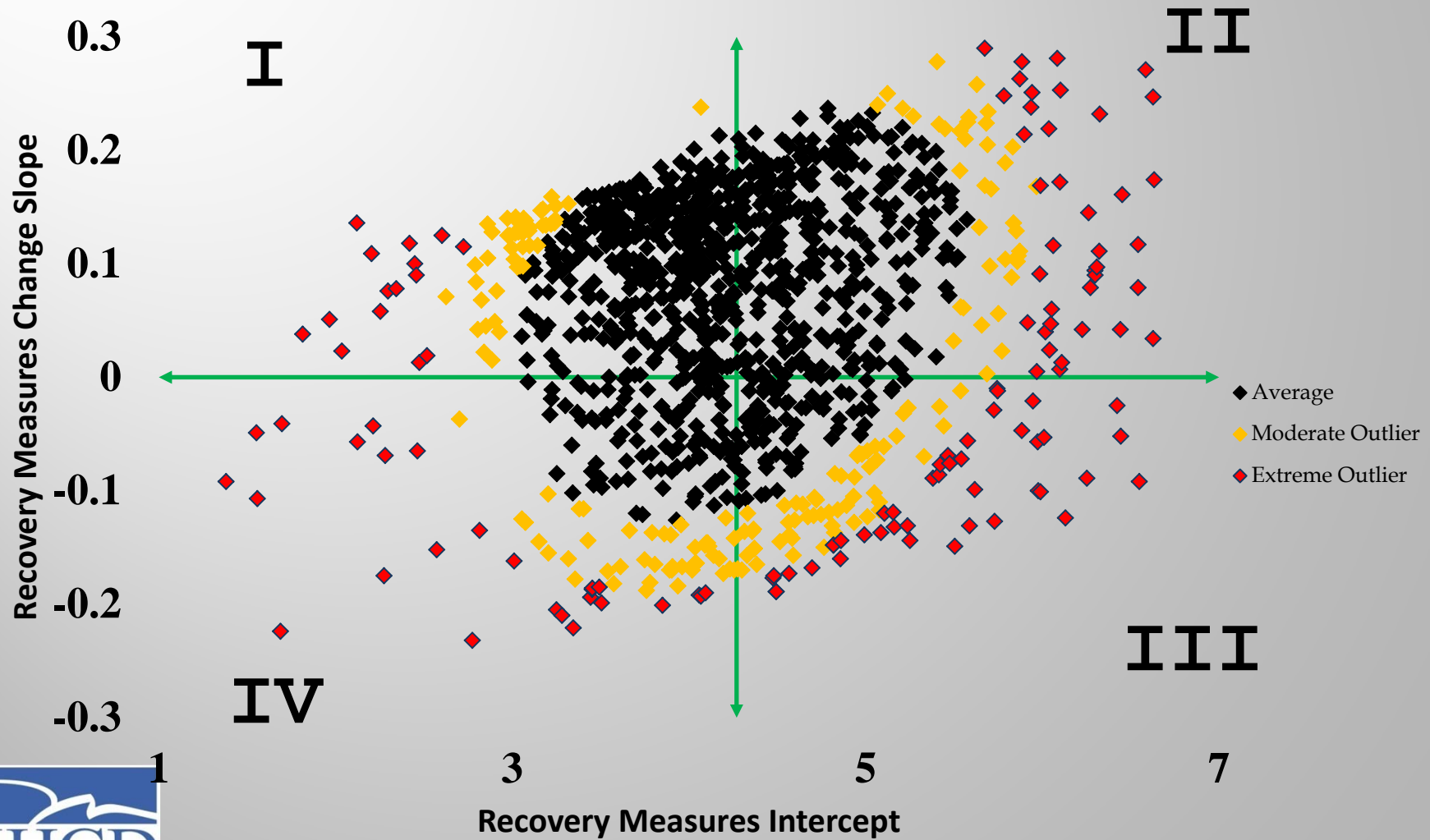
Interpretation

CRM Intercept

BELOW AVG.   ABOVE AVG.

CRM Slope

Increasing   Decreasing

|	BELOW AVG.	ABOVE AVG.
Increasing	I	II
Decreasing	IV	III

NOTE: ANY Outlier within a quadrant indicates it is farther away from the average than would be expected under typical circumstances.

Recovery versus Environmental Chart

- Allows simultaneous view of raw recovery and environmental scores

Recovery versus Environmental Factors Chart
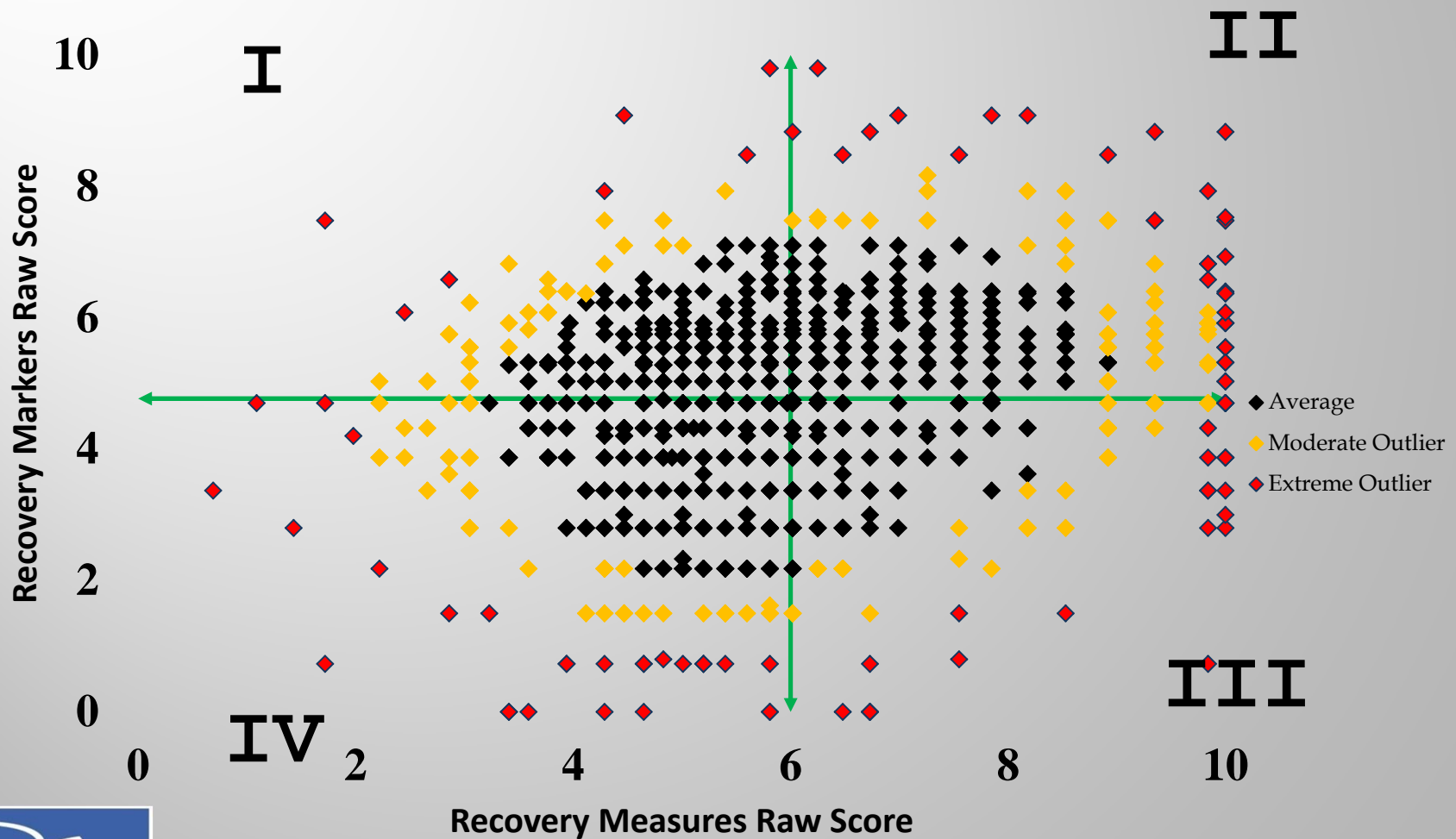
Interpretation

RECOVERY MEASURES

	BELOW AVG.	ABOVE AVG.
ABOVE AVG.	I	II
BELOW AVG.	IV	III

RECOVERY MARKERS

NOTE: ANY Outlier within a quadrant indicates it is farther away from the average RMI and CRM than would be expected under typical circumstances.

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Recovery versus Environmental Chart – ML Corrected

- Allows for simultaneous view of consumer deviations from the Multi-level predicted recovery and environmental scores.

- ML model corrects for consumer demographics, environmental, and treatment factors.

Recovery versus Environmental Factors Chart – ML Corrected

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17
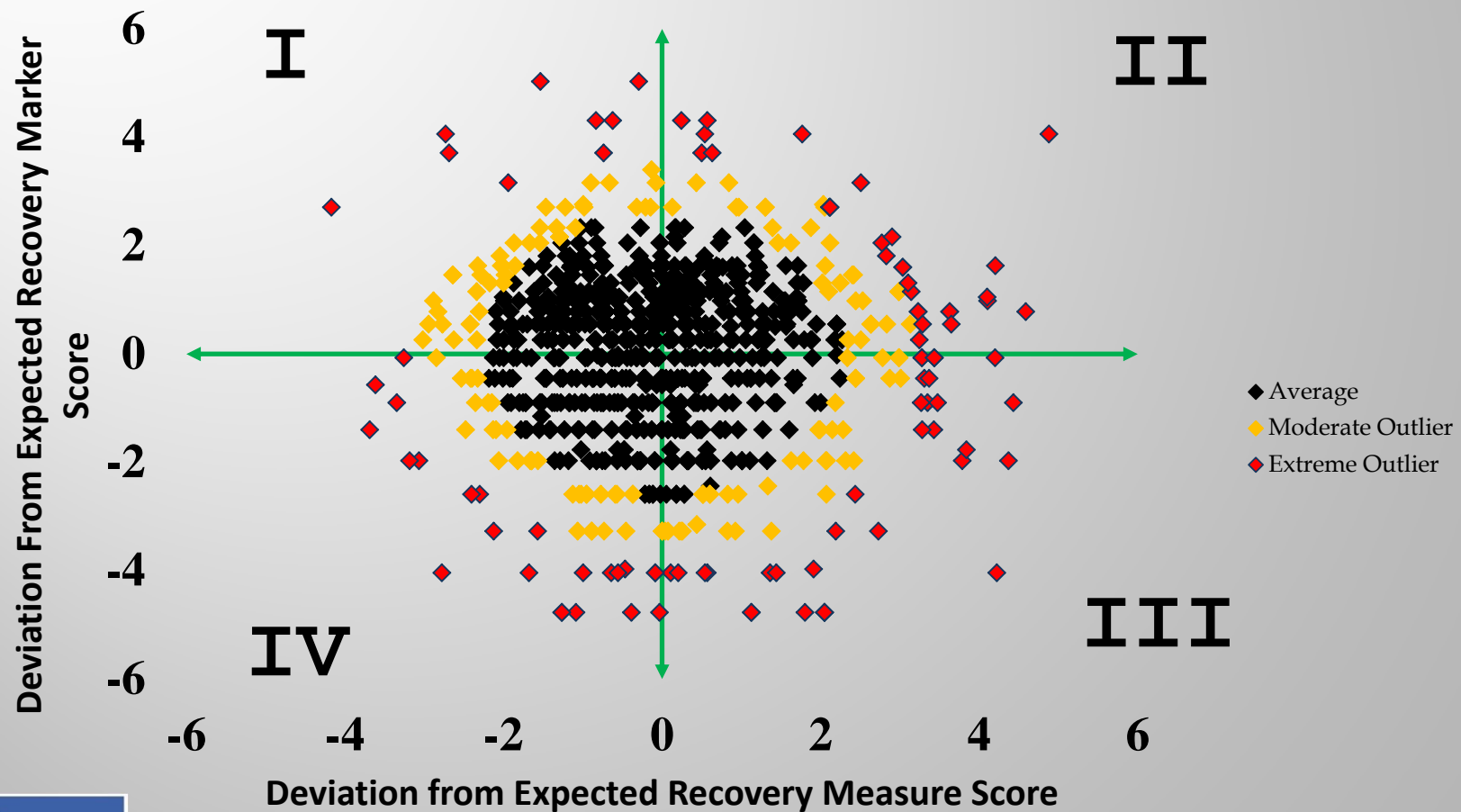
Interpretation

RECOVERY MEASURES

	BELOW Expected	ABOVE Expected
RECOVERY MARKERS **ABOVE** Expected	I	II
BELOW Expected	IV	III

NOTE: ANY Outlier within a quadrant indicates it is farther away from the expected RMI and CRM than would be typical.

Recovery versus Environmental Factors Chart ML Corrected– Team Level

19
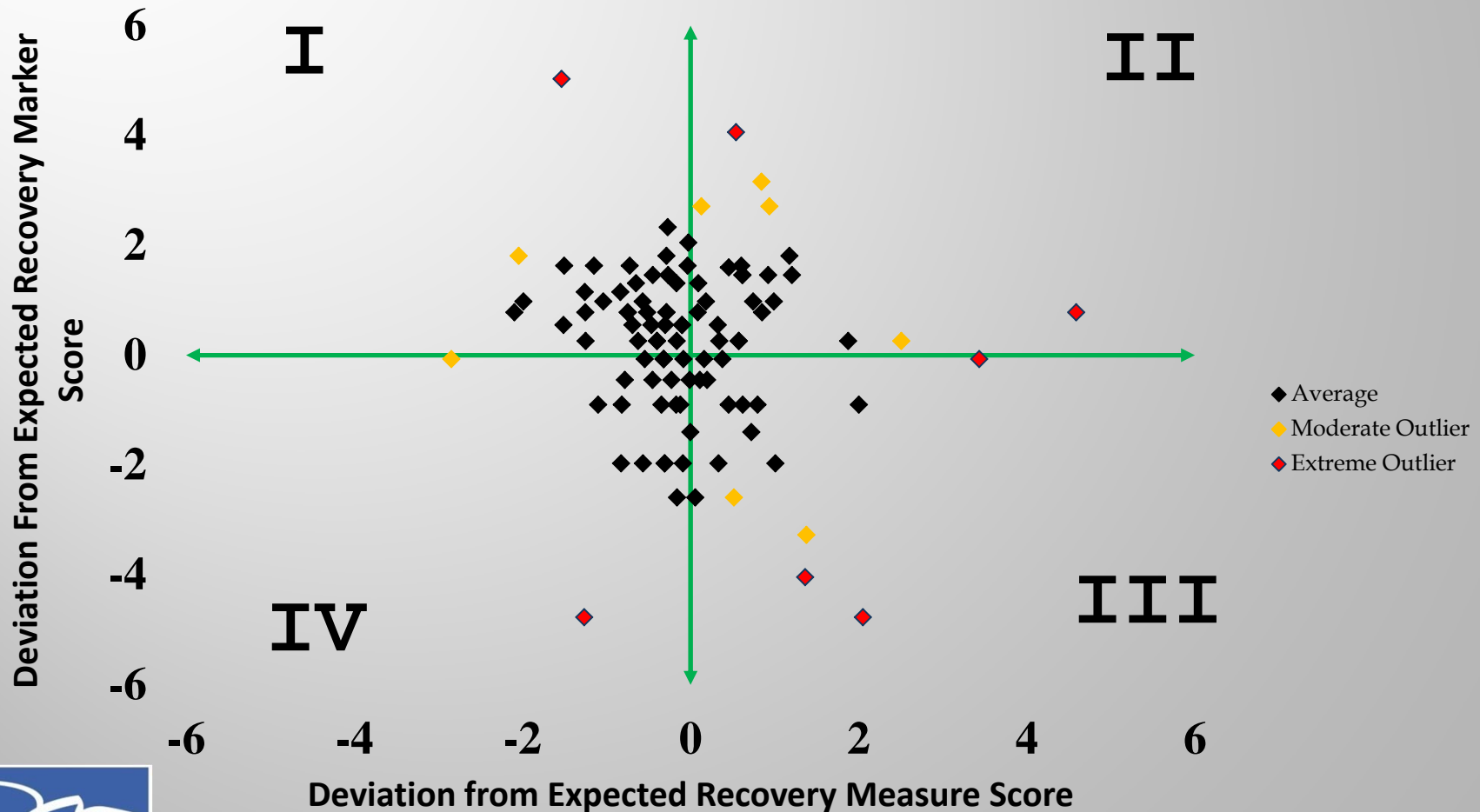
Recovery versus Environmental Factors Chart ML Corrected– Team Level
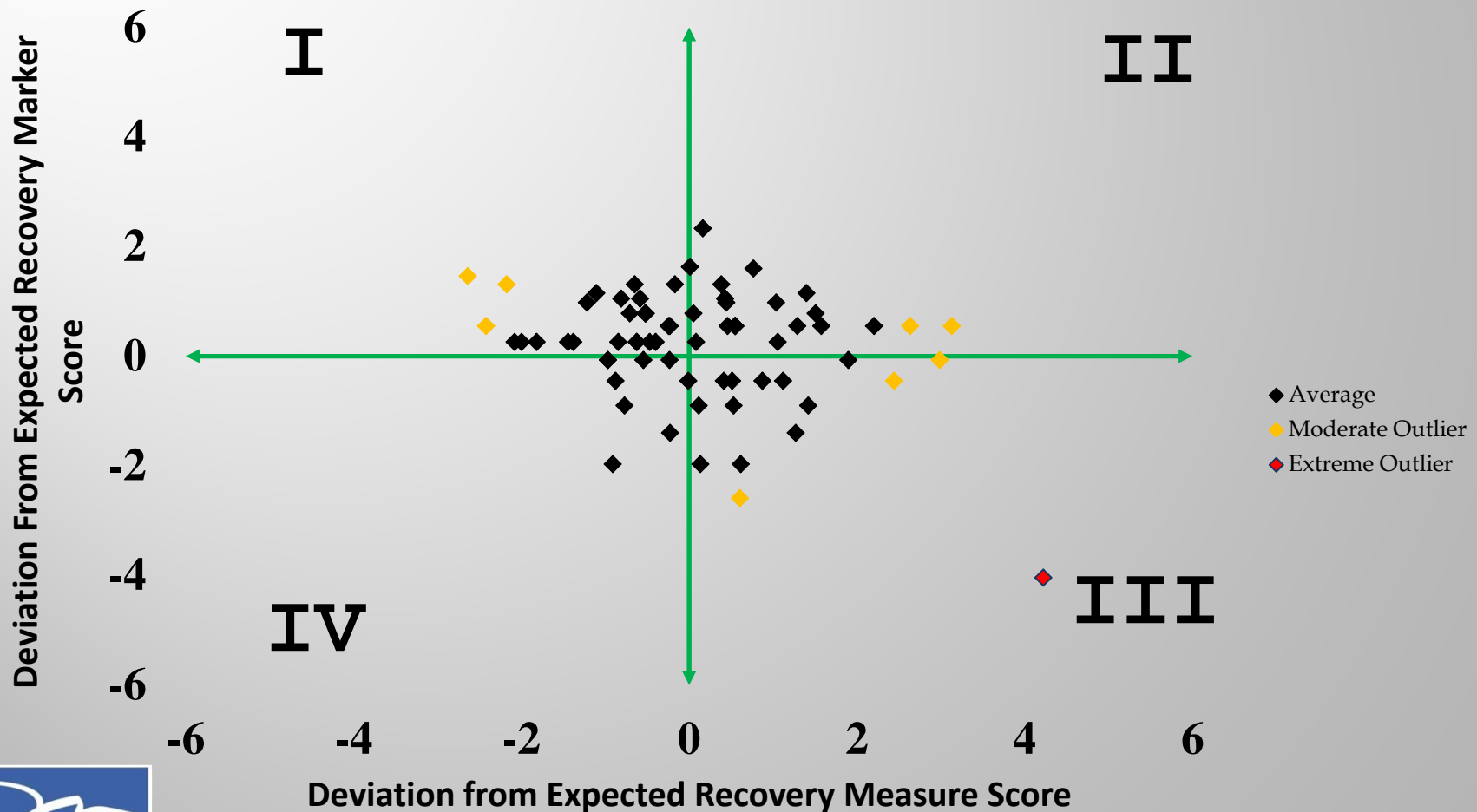
UTILIZATION OF BIVARIATE CONTROL CHART

➤Identify "outlying" consumers to help determine aspects of a program that promote self-perceived recovery, and those aspects that may be a deterrent to improvement in self-perceived recovery.

➤Allow for identification of consumers who may need further resources or different treatment.

➤Allows for overview of consumer progress, where comparisons over time may allow for evaluation of process changes and overall consumer effect.
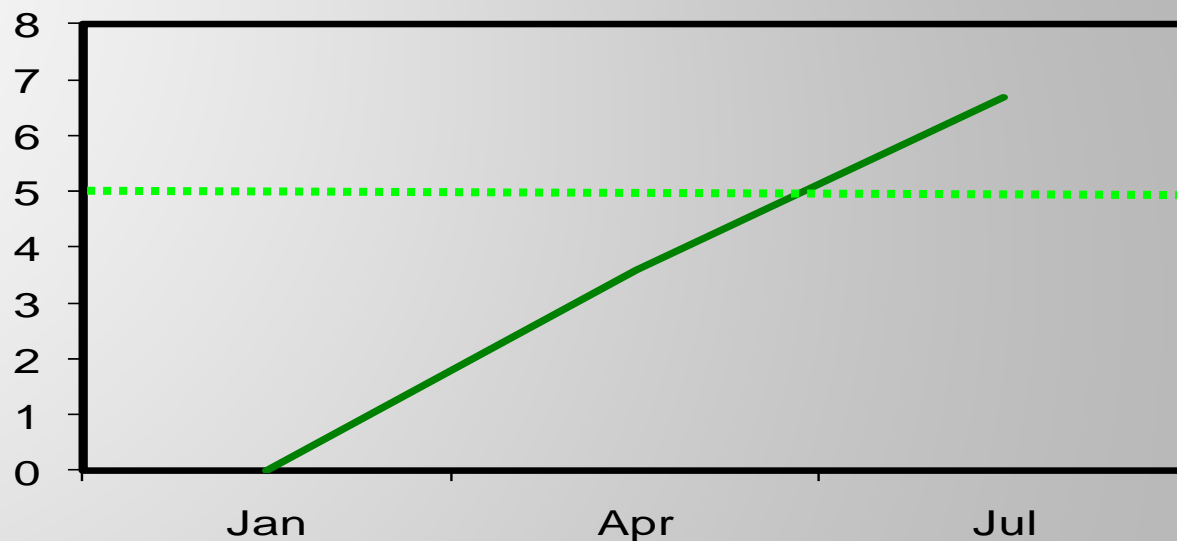
RECOVERY DETECTION CHART

- CUSUM for Consumers (between consumer comparisons)
- 2 Parts
    - Self-Comparing – Accumulates residuals from consumer's comparison point
    - Peer-Comparing – Accumulates residuals from ML predicted values.
- Allows for determination of a consumer's progress as compared to themselves and peers in same treatment with environmental and demographic similarities
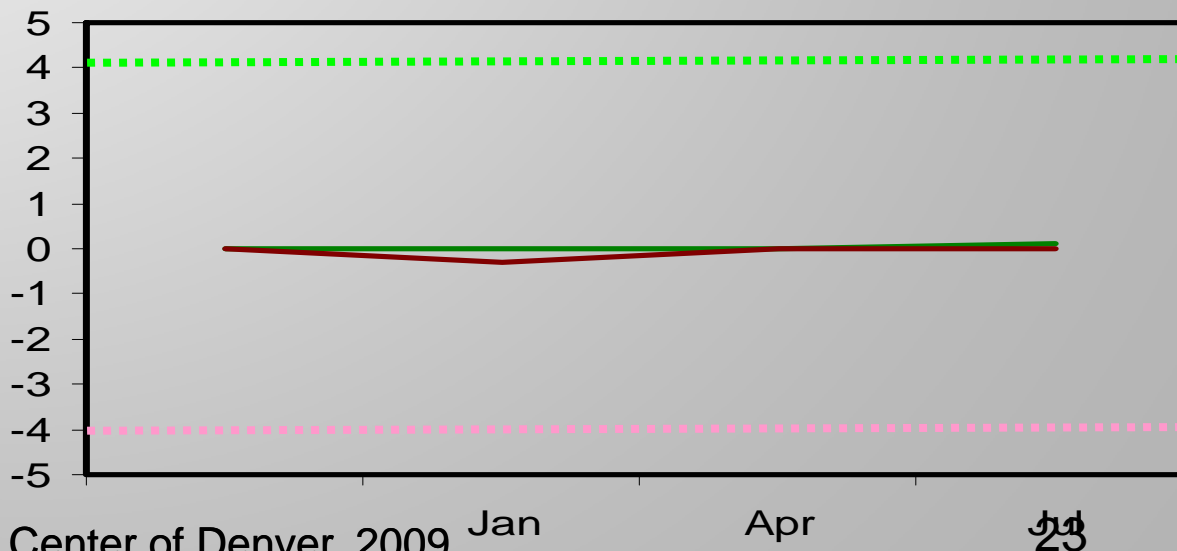
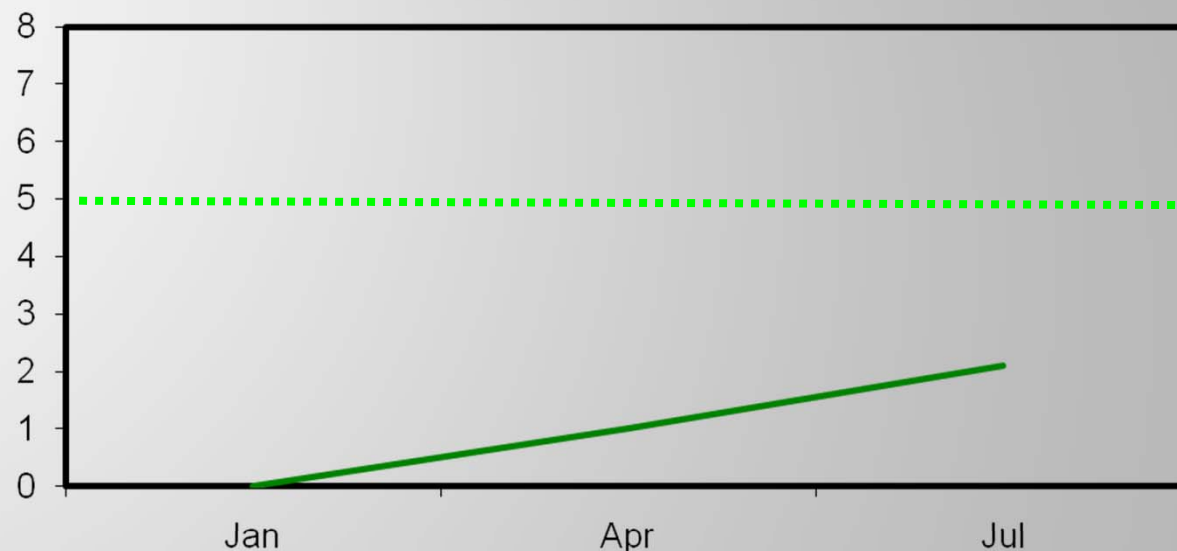# EXAMPLE ML CORRECTED RECOVERY DETECTION CHART

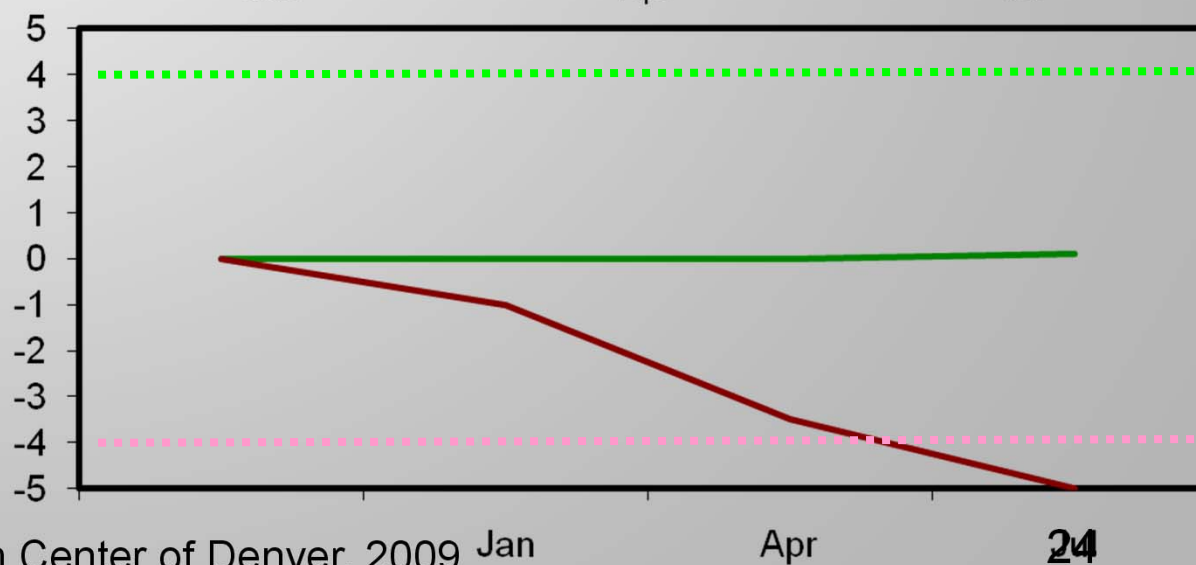**Self-Comparing CUSUM**

Peer-Comparing CUSUM

EXAMPLE ML CORRECTED RECOVERY DETECTION CHART

Self-Comparing CUSUM

Peer-Comparing CUSUM

24

SUMMARY OF BENEFITS

➢Allow for more efficient allocation of treatment and resources.

➢Identify program aspects that promote or deter improvement in self-perceived recovery.

➢Identify consumer in need of additional treatment or resources.

➢Allow for the identification of consumer and system factors that affect or interact with consumer outcomes and program effectiveness.

➢Being able to cater to differing needs of the wide variety of consumers served.

➢Identification of Episodes of Care

FUTURE DIRECTIONS

- Identify clinically significant patterns
- Develop objective method for interpretation by clinical staff
- Expand to other recovery measures and aspects.
- Coordinate with data mining to identify relationships between services and recovery outcomes
- Automate quality control process

LITERATURE

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QUESTIONS???

MORE INFORMATION.......

If you would like to see more information concerning MHCD's work with Recovery please visit:

http://www.outcomesmhcd.com/