

# Development of a Severity Index to measure



## Outcomes in ACT teams

P. Antonio Olmos-Gallo, MHCD  
([aolmos@mhcd.com](mailto:aolmos@mhcd.com))

Robert W Bremer, UCHSC

James H. Zahniser, Greenville College

Marshall R Thomas, Colorado Access

American Evaluation Association Conference  
Reno NV., 2003

# Rationale



- ⌘ Use a combination of interval/ratio and nominal scales to evaluate the outcomes of a program
  - ☑ Indicators make perfect sense to the program stakeholders, and can be very meaningful to everyone involved with the program: from funders to staff, to clients and the community
  - ☑ Might have been used in similar programs across the nation, and may have been used for benchmarking

**Figure IX.c**

**ACT Team Outcomes Tracking Form:**

**\*\*\*Please Read Attached Instructions Carefully\*\*\***

REPORTING PERIOD \_\_\_\_\_  
mm/yyyy

CLINICIAN NUMBER: \_\_\_\_\_

CLINICIAN NAME: \_\_\_\_\_

| Client | Time in Restrictive Settings |           | Housing |       | Work         | Service Engagement |               | Health           |                       |              | Alcohol/Substance Abuse |               |            | Comments |
|--------|------------------------------|-----------|---------|-------|--------------|--------------------|---------------|------------------|-----------------------|--------------|-------------------------|---------------|------------|----------|
|        | Jail Episode                 | Jail Days | Housing | Moves | Current Work | Illness Managm     | Medic. Compl. | Physcn. Linkage? | Last Physical (M/D/Y) | # PCP Visits | Rating Scale            | Detox Episode | Detox Days |          |
|        |                              |           |         |       |              |                    |               |                  |                       |              |                         |               |            |          |
|        |                              |           |         |       |              |                    |               |                  |                       |              |                         |               |            |          |
|        |                              |           |         |       |              |                    |               |                  |                       |              |                         |               |            |          |
|        |                              |           |         |       |              |                    |               |                  |                       |              |                         |               |            |          |
|        |                              |           |         |       |              |                    |               |                  |                       |              |                         |               |            |          |
|        |                              |           |         |       |              |                    |               |                  |                       |              |                         |               |            |          |
|        |                              |           |         |       |              |                    |               |                  |                       |              |                         |               |            |          |

**Housing:**

1 = Independent Living  
2 = Congregate Apt.  
3 = MHCD Group Home  
4 = Resid. Tx. Facil.  
5 = Board & Care  
6 = Board & Care+AFC  
7 = Inpatient Facility  
8 = Homeless-Street  
9 = Homeless-Shelter  
10 = Correctional/Jail  
11 = Nursing Home  
12 = Living with Family  
13 = Other

**Current Work:**

1 = Full-time, Independent  
2 = Part-time, Independent  
3 = Full-time, Supported  
4 = Part-time, Supported  
5 = Part-time, comm. transitional  
6 = Part-time, MHCD transitional  
7 = Non-Paid Work/Volunteer  
8 = Receiving formal training or going to school  
9 = Involved in voc. assessment  
10 = Sheltered Workshop  
11 = Interested in receiving training or looking for work  
12 = Not interested in work  
13 = Not applicable (retired or extremely disabled)

**Illness Management:**

1 = Primary Self-Managing Role- Able to manage own illness for most part; utilizes staff and treatment centers as resources  
2 = Co-Case Manager Role - Able to work as an equal partner with staff in managing illness  
3 = Sees Role in Service/Tx. as Secondary- Participates in managing the illness, but mostly relies on staff to manage illness  
4 = Problem Recognition/No Role - Recognizes need for treatment, but relies entirely on staff to manage illness  
5 = No Problem Recognition/Compliant - Doesn't recognize need for treatment, but is compliant with staff managing illness  
6 = No Problem Recognition/Resistant - Doesn't recognize need for treatment & resists treatment

**Alcohol & Substance Abuse Rating Scale:**

1 = Abstinent  
2 = Use without impairment  
3 = Abuse  
4 = Dependence  
5 = Dependence with institutionalization

**Medications Compliance:**

1 = Compliant/Independent  
2 = Compliant/Monthly Mon.  
3 = Compliant/Weekly Mon.  
4 = Compliant/Daily Mon.  
5 = Compliant/>Daily Mon.  
6 = Some Compl./Monthly  
7 = Some Compl./Weekly  
8 = Some Compl./Daily  
9 = Some Compl./>Daily  
10 = Non-Compl/Weekly Mon  
11 = Non-Compl/Daily Mon.  
12 = Non-Compl/>Daily Mon.  
13 = Non-Compl./No Mon.  
14 = Not applicable  
15 = Not enough information to rate

PLEASE FILL IN ALL BLANKS – THIS IS VERY IMPORTANT

# Rationale (cont)



⌘ However, because of the nature of the measures, these categorical indicators could not be combined as a single measure to generate a "severity index" that may be used to evaluate consumer's improvement either across time, or compared to other members of their program



# UHACT Information Tracking System

## Monthly Report

Number of clients in this report:

133

| <i><b>Jail Episodes/Days</b></i> |     |                                        |         |
|----------------------------------|-----|----------------------------------------|---------|
| Clients without jail episodes:   | 131 | Percent clients without jail episodes: | 98.50%  |
| Number of days in jail:          | 4   | Average number of days in jail:        | 0.03008 |

| <i><b>Housing</b></i>               |    |                                                      |        |
|-------------------------------------|----|------------------------------------------------------|--------|
| Independent Living :                | 34 | Percent clients Independent Living :                 | 25.56% |
| Congregate Apartment :              | 6  | Percent clients Congregate Apartment :               | 4.51%  |
| MHCD Group Home :                   | 15 | Percent clients MHCD Group Home :                    | 11.28% |
| Residential Tx Facility :           | 12 | Percent clients Residential Tx Facility :            | 9.02%  |
| Board and Care :                    | 8  | Percent clients Board and Care :                     | 6.02%  |
| Board and Care +Adult Foster Care : | 19 | Percent clients Board and Care + Adult Foster Care : | 14.29% |
| Inpatient Facility :                | 5  | Percent clients Inpatient Facility :                 | 3.76%  |
| Homeless Street :                   | 2  | Percent clients Homeless Street :                    | 1.50%  |
| Homeless Shelter :                  | 3  | Percent clients Homeless Shelter :                   | 2.26%  |
| Correctional/Jail :                 | 0  | Percent clients Correctional/Jail :                  | 0.00%  |
| Nursing Home :                      | 0  | Percent clients Nursing Home :                       | 0.00%  |
| Living with Family :                | 26 | Percent clients Living with Family :                 | 19.55% |
| Living Other :                      | 3  | Percent clients Living Other :                       | 2.26%  |

Total : 133

| <i><b>Moves</b></i>             |    |                                        |        |
|---------------------------------|----|----------------------------------------|--------|
| Number of Consumers who moved : | 19 | Percent Consumers that moved :         | 14.29% |
|                                 |    | Average number of Moves :              | 0.256  |
|                                 |    | Maximum number of moves per Consumer : | 3      |



⌘ In 2002, as part of an evaluation effort, we were faced with the challenge of using this measure to evaluate consumers in the ACT team and compare them to another group of consumers in a different team. We decided to take this challenge and develop a quantitative score that will allow us to establish such comparison

# Method



⌘ In order to develop the severity score based on the indicators, we first created a rough classification of the outcomes into severity levels

## Team Tracking Form Scoring Table

| DATA SOURCE                                                                 | SEVERE NEED (3)                                       | NEED (2)                                   | MINIMAL NEED (1) | NO NEED (0)                         | WEIGHTING VARIABLE<br>(from survey)                         |
|-----------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------|------------------|-------------------------------------|-------------------------------------------------------------|
| ACT: Claims +<br>chart review for<br>'Care<br>Control: Claims<br>(no 'Care) | 1/>31 or >3/any                                       | 1/>10 or<br>>2/any                         | 1/<11            | 0/0                                 | Episodes/Days of<br>Hospitalization                         |
| ACT: Claims<br>Control: Claims                                              | >3/any                                                | 1/>7 or<br>>2/any                          | 1/<7             | 0/0                                 | Episodes/Days in ATU                                        |
| ACT: Claims<br>Control: Claims                                              | >90 days                                              | 31 - 90 days                               | 1-30 days        | 0/0                                 | Days spent in Residential<br>Units                          |
| ACT: OTF<br>Control: OTF                                                    | > 3 moves/11 mo.                                      | 2 moves/11<br>mo.                          | 1 move/11 mo.    | 1 moves/11<br>mo.                   | Housing Stability/Instability                               |
|                                                                             | Homeless                                              | Res or<br>Group Home<br>or NH              | Boarding Care    | Other<br>Category                   | Housing Status                                              |
| ACT: OTF<br>Control: OTF                                                    | Abuse+ Detox or<br>Rating of Dep or<br>Dep w/ Instit. | Any Detox<br>time or<br>Rating of<br>Abuse |                  | Abst. Or<br>using w/o<br>impairment | Alcohol/Substance Abuse<br>AND/OR Episodes/Days in<br>Detox |
| ACT: OTF<br>Control: OTF                                                    | > 1 in 1 year                                         | 1 in 1 year                                | 0 in one year    | 0 in one year                       | Episodes/Days in Jail                                       |
| ACT: OTF<br>Control: OTF                                                    | 6                                                     | 5 or 4                                     | 3                | 1 or 2                              | Illness Management                                          |
|                                                                             | 13 to 8                                               | 7 to 4                                     | 3                | 2 to 1                              | Medication Compliance                                       |



- 
- ⌘ To determine how to weight these outcome variables, a desirability of outcomes survey was developed and administered to local program managers and experts in the field of Assertive Community Treatment
  - ⌘ Weighting system developed using **Thurstone's method of paired comparisons** (Nunally & Bernstein, 1994)

For all possible pairs of the outcomes listed on the previous page, please place a check mark next to the outcome that you believe is more important to measure in evaluating an ACT team.

|                                  |                          |    |                          |                                  |
|----------------------------------|--------------------------|----|--------------------------|----------------------------------|
| Alcohol/Substance                | <input type="checkbox"/> | 1  | <input type="checkbox"/> | Days spent in                    |
| Episodes/Days in ATU             | <input type="checkbox"/> | 2  | <input type="checkbox"/> | Episodes/Days in Detox           |
| Episodes/Days of Hospitalization | <input type="checkbox"/> | 3  | <input type="checkbox"/> | Episodes/Days in Jail            |
| Housing Status                   | <input type="checkbox"/> | 4  | <input type="checkbox"/> | Housing Stability/Instability    |
| Illness Management               | <input type="checkbox"/> | 5  | <input type="checkbox"/> | Medication Compliance            |
| Alcohol/Substance Abuse          | <input type="checkbox"/> | 6  | <input type="checkbox"/> | Episodes/Days in ATU             |
| Days spent in Residential Units  | <input type="checkbox"/> | 7  | <input type="checkbox"/> | Episodes/Days in Detox           |
| Episodes/Days in Jail            | <input type="checkbox"/> | 8  | <input type="checkbox"/> | Housing Status                   |
| Housing Stability/Instability    | <input type="checkbox"/> | 9  | <input type="checkbox"/> | Episodes/Days of Hospitalization |
|                                  | <input type="checkbox"/> | 10 | <input type="checkbox"/> | Alcohol/Substance Abuse          |
| Illness Management               | <input type="checkbox"/> | 11 | <input type="checkbox"/> | Days spent in Residential Units  |
| Episodes/Days in ATU             | <input type="checkbox"/> | 12 | <input type="checkbox"/> | Episodes/Days of Hospitalization |
| Episodes/Days in Detox           | <input type="checkbox"/> | 13 | <input type="checkbox"/> | Housing Status                   |
| Episodes/Days in Jail            | <input type="checkbox"/> | 14 | <input type="checkbox"/> | Housing Stability/Instability    |
| Housing Status                   | <input type="checkbox"/> | 15 | <input type="checkbox"/> | Illness Management               |
| Housing Stability/Instability    | <input type="checkbox"/> | 16 | <input type="checkbox"/> | Medication Compliance            |
| Days spent in Residential Units  | <input type="checkbox"/> | 17 | <input type="checkbox"/> | Episodes/Days in ATU             |
| Episodes/Days in Detox           | <input type="checkbox"/> | 18 | <input type="checkbox"/> | Episodes/Days in Jail            |
|                                  | <input type="checkbox"/> | 19 | <input type="checkbox"/> | Housing Status                   |
| Housing Stability/Instability    | <input type="checkbox"/> | 20 | <input type="checkbox"/> | Alcohol/Substance Abuse          |
| Episodes/Days in ATU             | <input type="checkbox"/> | 21 | <input type="checkbox"/> | Illness Management               |
| Episodes/Days in Jail            | <input type="checkbox"/> | 22 | <input type="checkbox"/> | Days spent in Residential Units  |
|                                  | <input type="checkbox"/> | 23 | <input type="checkbox"/> | Episodes/Days in Detox           |
| Episodes/Days of Hospitalization | <input type="checkbox"/> | 24 | <input type="checkbox"/> | Illness Management               |
| Housing Status                   | <input type="checkbox"/> | 25 | <input type="checkbox"/> | Alcohol/Substance Abuse          |
| Days spent in Residential Units  | <input type="checkbox"/> | 26 | <input type="checkbox"/> | Housing Stability/Instability    |
|                                  | <input type="checkbox"/> | 27 | <input type="checkbox"/> | Episodes/Days in ATU             |
| Illness Management               | <input type="checkbox"/> | 28 | <input type="checkbox"/> | Episodes/Days in Detox           |
| Episodes/Days in Jail            | <input type="checkbox"/> | 29 | <input type="checkbox"/> | Medication Compliance            |
| Days spent in Residential Units  | <input type="checkbox"/> | 30 | <input type="checkbox"/> | Episodes/Days of Hospitalization |
| Alcohol/Substance Abuse          | <input type="checkbox"/> | 31 | <input type="checkbox"/> | Episodes/Days in Jail            |
| Housing Stability/Instability    | <input type="checkbox"/> | 32 | <input type="checkbox"/> | Episodes/Days in ATU             |
| Episodes/Days of Hospitalization | <input type="checkbox"/> | 33 | <input type="checkbox"/> | Housing Status                   |
| Episodes/Days in Detox           | <input type="checkbox"/> | 34 | <input type="checkbox"/> | Housing Stability/Instability    |
| Illness Management               | <input type="checkbox"/> | 35 | <input type="checkbox"/> | Episodes/Days in Jail            |
| Episodes/Days of Hospitalization | <input type="checkbox"/> | 36 | <input type="checkbox"/> | Alcohol/Substance Abuse          |
| Housing Status                   | <input type="checkbox"/> | 37 | <input type="checkbox"/> | Days spent in Residential Units  |
| Housing Stability/Instability    | <input type="checkbox"/> | 38 | <input type="checkbox"/> | Illness Management               |
| Episodes/Days in ATU             | <input type="checkbox"/> | 39 | <input type="checkbox"/> | Episodes/Days in Jail            |
| Days spent in Residential Units  | <input type="checkbox"/> | 40 | <input type="checkbox"/> | Medication Compliance            |
| Episodes/Days in Detox           | <input type="checkbox"/> | 41 | <input type="checkbox"/> | Episodes/Days of Hospitalization |
| Alcohol/Substance Abuse          | <input type="checkbox"/> | 42 | <input type="checkbox"/> | Illness Management               |
| Housing Status                   | <input type="checkbox"/> | 43 | <input type="checkbox"/> | Episodes/Days in ATU             |
| Episodes/Days of Hospitalization | <input type="checkbox"/> | 44 | <input type="checkbox"/> | Medication Compliance            |
| Episodes/Days in Detox           | <input type="checkbox"/> | 45 | <input type="checkbox"/> | Alcohol/Substance Abuse          |

Thurstone's method of paired comparisons (after Nunnally & Bernstein, 1994: Psychometric theory (pp 60-62))



- ⌘ Raters are presented with all possible pairs of desired outcomes. Then indicates which member of the pair will be preferred under the specific conditions. The result of that comparison is converted into a percent.
- ⌘ A matrix is created indicating the percent of times that each one of the outcomes was chosen over its counterparts



| PERCENT OF TIMES COLUMN WAS CHOSEN OVER ROW |              |              |              |              |              |              |              |              |              |              |
|---------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                                             | AA           | RU           | ATU          | DETOX        | HOSP         | JAIL         | H_STT        | H_STAB       | IM           | MC           |
| AA                                          | <b>0.500</b> | 0.267        | 0.600        | 0.133        | 0.867        | 0.467        | 0.733        | 0.467        | 0.533        | 0.600        |
| RU                                          | 0.733        | <b>0.500</b> | 0.800        | 0.333        | 0.933        | 0.800        | 0.600        | 0.200        | 0.733        | 0.600        |
| ATU                                         | 0.400        | 0.200        | <b>0.500</b> | 0.133        | 0.867        | 0.667        | 0.467        | 0.533        | 0.600        | 0.533        |
| DETOX                                       | 0.867        | 0.667        | 0.867        | <b>0.500</b> | 1.000        | 0.867        | 0.733        | 0.867        | 0.667        | 0.667        |
| HOSP                                        | 0.133        | 0.067        | 0.133        | 0.000        | <b>0.500</b> | 0.400        | 0.200        | 0.000        | 0.267        | 0.200        |
| JAIL                                        | 0.533        | 0.200        | 0.333        | 0.133        | 0.600        | <b>0.500</b> | 0.733        | 0.600        | 0.467        | 0.267        |
| H_STT                                       | 0.267        | 0.400        | 0.533        | 0.267        | 0.800        | 0.267        | <b>0.500</b> | 0.467        | 0.467        | 0.333        |
| H_STAB                                      | 0.533        | 0.800        | 0.467        | 0.133        | 1.000        | 0.400        | 0.533        | <b>0.500</b> | 0.600        | 0.467        |
| IM                                          | 0.467        | 0.267        | 0.400        | 0.333        | 0.733        | 0.533        | 0.533        | 0.400        | <b>0.500</b> | 0.467        |
| MC                                          | 0.400        | 0.400        | 0.467        | 0.333        | 0.800        | 0.733        | 0.667        | 0.533        | 0.533        | <b>0.500</b> |

- 
- ⌘ Next, we convert the percents to normal deviates  $Z_{jk}$  (i.e., Z-scores from statistical tables)
  - ⌘ Calculate for each category (i.e., column) sums and then averages. However, remove first pairs that are "widely separated" (i.e., the blank cells in the table) since those combinations never "overlap" (i.e., the rater will never pick the other category)

|            | Z-SCORE Table |         |        |          |         |        |        |            |        |         |
|------------|---------------|---------|--------|----------|---------|--------|--------|------------|--------|---------|
|            | AA            | RU      | ATU    | DETOX    | HOSP    | JAIL   | H_STT  | H_STA<br>B | IM     | MC      |
| AA         | 0             | -0.622  | 0.253  | -1.112   | 1.112   | -0.083 | 0.622  | -0.083     | 0.083  | 0.253   |
| RU         | 0.622         | 0       | 0.842  | -0.432   | 1.499   | 0.842  | 0.253  | -0.842     | 0.622  | 0.253   |
| ATU        | -0.253        | -0.842  | 0      | -1.112   | 1.112   | 0.432  | -0.083 | 0.083      | 0.253  | 0.083   |
| DETOX      | 1.112         | 0.432   | 1.112  | 0        | .       | 1.112  | 0.622  | 1.112      | 0.432  | 0.432   |
| HOSP       | -1.112        | -1.499  | -1.112 | .        | 0       | -0.253 | -0.842 | .          | -0.622 | -0.842  |
| JAIL       | 0.083         | -0.842  | -0.432 | -1.112   | 0.253   | 0      | 0.622  | 0.253      | -0.083 | -0.622  |
| H_STT      | -0.622        | -0.253  | 0.083  | -0.622   | 0.842   | -0.622 | 0      | -0.083     | -0.083 | -0.432  |
| H_STA<br>B | 0.083         | 0.842   | -0.083 | -1.112   | .       | -0.253 | 0.083  | 0          | 0.253  | -0.083  |
| IM         | -0.083        | -0.622  | -0.253 | -0.432   | 0.622   | 0.083  | 0.083  | -0.253     | 0      | -0.083  |
| MC         | -0.253        | -0.253  | -0.083 | -0.432   | 0.842   | 0.622  | 0.432  | 0.083      | 0.083  | 0       |
| Sum        | -0.423        | -3.659  | 0.327  | -6.366   | 6.282   | 1.88   | 1.792  | 0.27       | 0.938  | -1.041  |
| Average    | -0.0423       | -0.3659 | 0.0327 | -0.70733 | 0.78525 | 0.188  | 0.1792 | 0.03       | 0.0938 | -0.1041 |



⌘ Finally, the value of the lowest score (i.e., the most negative mean) is subtracted from each other score so as to avoid negative scores:

☑ These weights were used to underscore the importance of one outcome over the other as defined by experts in the field. We used these results to create a weighting schema for our severity score



Minimum score: Episode/Days in Detox. Z-score: -0.70733  
Categories sorted in descending order:

| Mean   |                                  | WEIGHT  |
|--------|----------------------------------|---------|
| 0.785  | Episodes/Days of Hospitalization | 1.49258 |
| 0.188  | Episodes/Days in Jail            | 0.89533 |
| 0.179  | Housing Status                   | 0.88653 |
| 0.094  | Illness Management               | 0.80113 |
| 0.033  | Episodes/Days in ATU             | 0.74003 |
| 0.030  | Housing Stability/Instability    | 0.73733 |
| -0.042 | Alcohol/Substance Abuse          | 0.66503 |
| -0.104 | Medication Compliance            | 0.60323 |
| -0.366 | Days spent in Residential Units  | 0.34143 |
| -0.707 | Episodes/Days in Detox           | 0.00000 |



# Regression Discontinuity



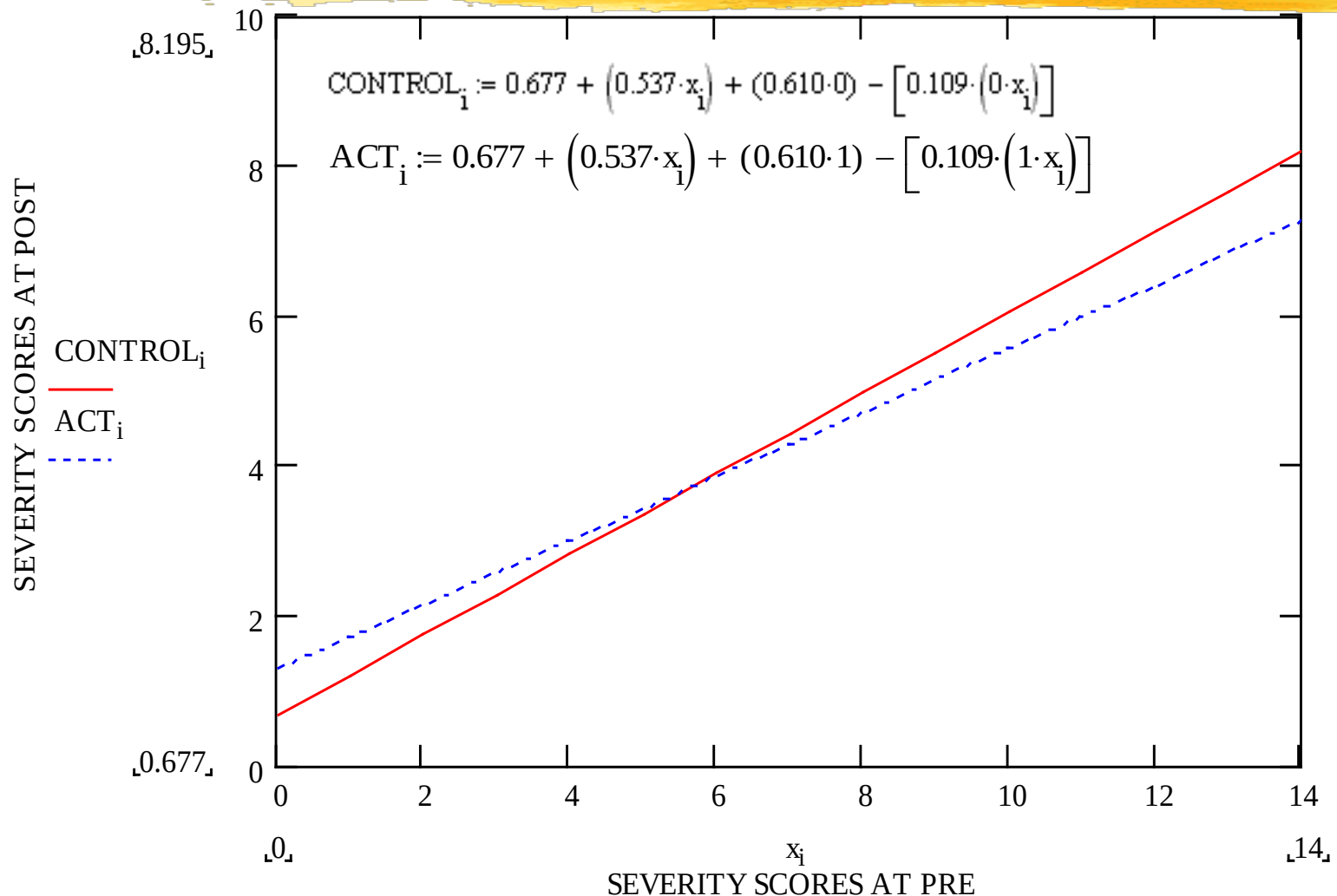
- ⌘ Pre-test and post-test scores were determined from data collected at a nine month interval by the consumers' clinicians
- ⌘ Clear trend toward significance with the ACT team scores being higher than those of the control group (those that benefit the most from ACT services are those with a higher severity score at PRE)

# Study Population

## Sample Demographics of Treatment and Comparison Group

|                                                                      | ACT Team (Tx)<br>(N=46) | Control Group<br>(University Hills<br>AOP) (N=164) |
|----------------------------------------------------------------------|-------------------------|----------------------------------------------------|
| Age                                                                  | 37.29 years             | 41.6 years                                         |
| Percent Male                                                         | 51.3%                   | 39.0%                                              |
| Drug Abuse Dx                                                        | 41.0%                   | 62.5%                                              |
| Alcohol Abuse Dx                                                     | 15.4%                   | 37.5%                                              |
| Married                                                              | 7.7%                    | 9.8%                                               |
| Lives independently                                                  | 64.1%                   | 90.9%                                              |
| Lives alone                                                          | 17.3%                   | 33.3%                                              |
| Not in labor force                                                   | 89.7%                   | 68.9%                                              |
| Primary Dx schizophrenia,<br>schizoaffective, or bipolar<br>disorder | 92.3%                   | 70.2%                                              |
| Overall degree of problem<br>severity (1-min to 7-max)               | 5.28                    | 4.27                                               |
| Severity score categories<br>(serious)                               | 82.10%                  | 43.50%                                             |
| Severity score categories<br>(critical)                              | 5.10%                   | 3.70%                                              |
| White                                                                | 38.50%                  | 62.80%                                             |
| Hispanic                                                             | 30.80%                  | 19.50%                                             |
| African American                                                     | 28.20%                  | 14.60%                                             |

# Regression Discontinuity results (control n = 111, ACT n = 39)



# Evaluation of consumer's improvement over time



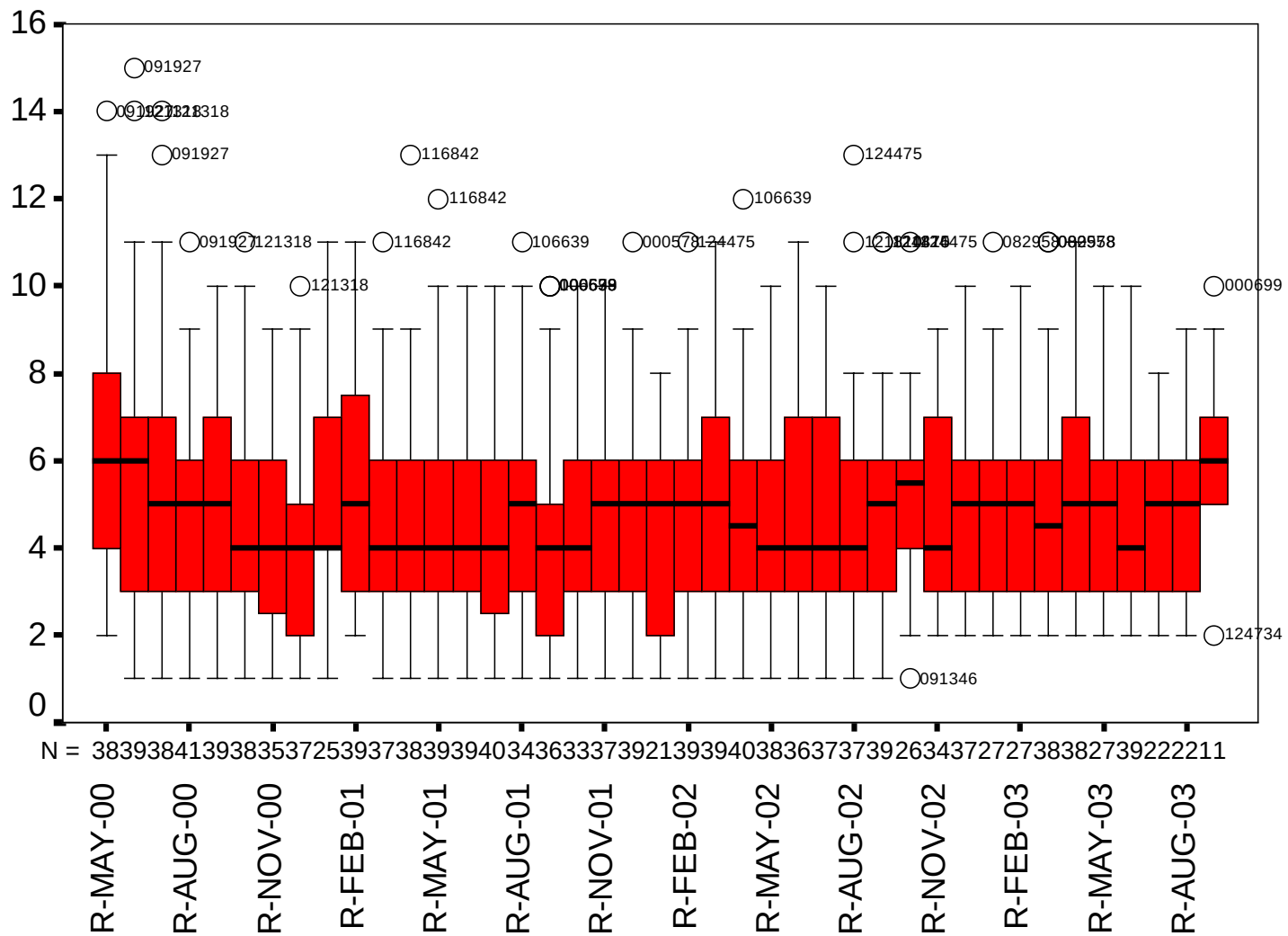
- ⌘ Determine if consumers are either improving or maintaining gains, and whether the changes noticed in the severity score parallels the clinical observations performed by the team clinicians
- ⌘ Data compiled for consumers (period: May 00 - Sept 03). The number of consumers varied as consumers were admitted and discharged from the team

# How does the weighted severity score compare to raw scores?

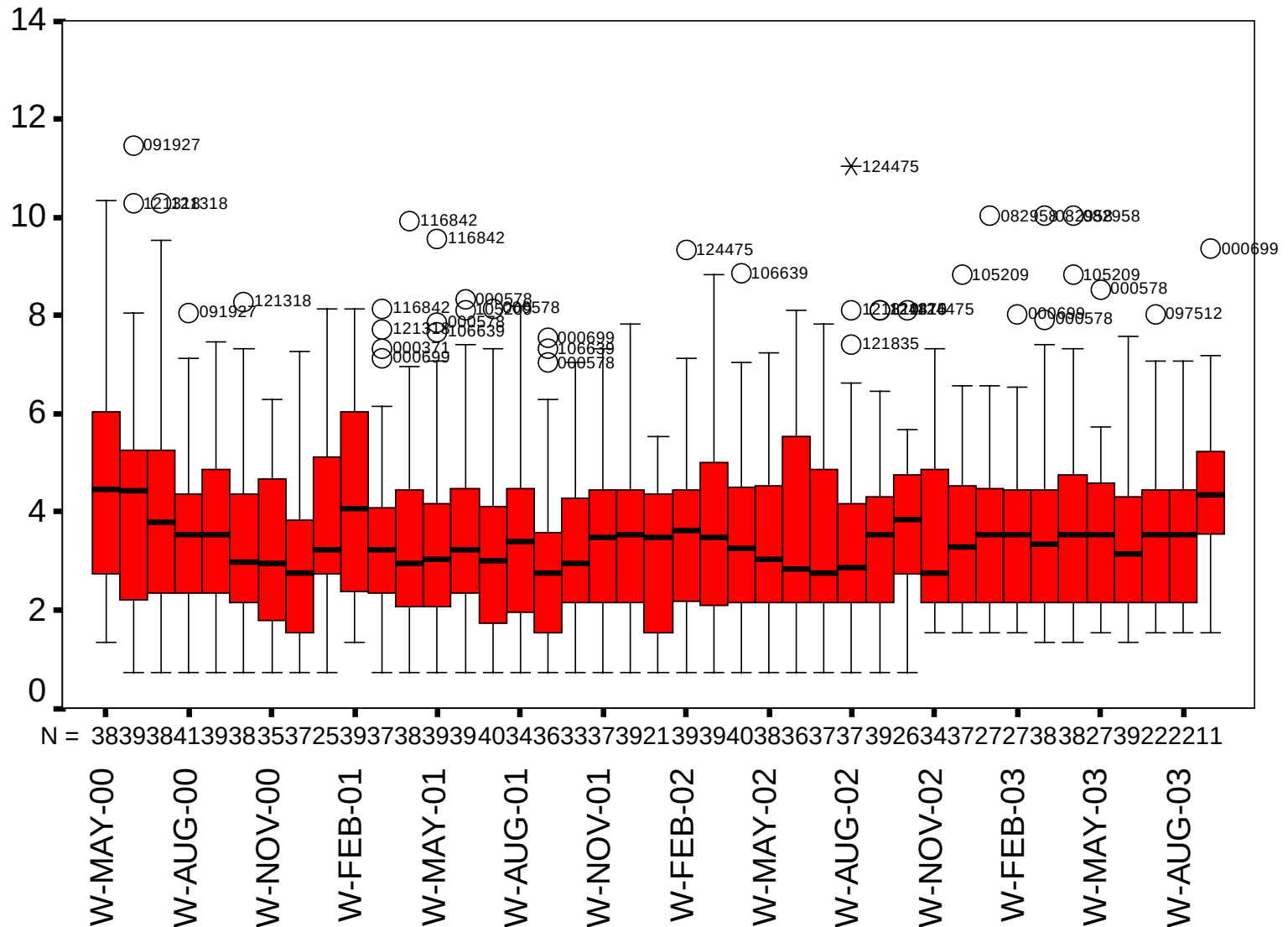


- ⌘ Areas deemed more important get more weight, therefore able to flag potential outliers at the high end of the scale
- ⌘ We lose outliers on the negative side (consumers with very low scores)

# Raw Scores



# Weighted Scores



# Consumers improvement



⌘ Due to their own recovery path, consumers' recovery can sometimes be unstable

- ☐ Common with consumers who have a crisis or are just getting engaged in the team
- ☐ Chronic consumers with unresolved issues of substance abuse



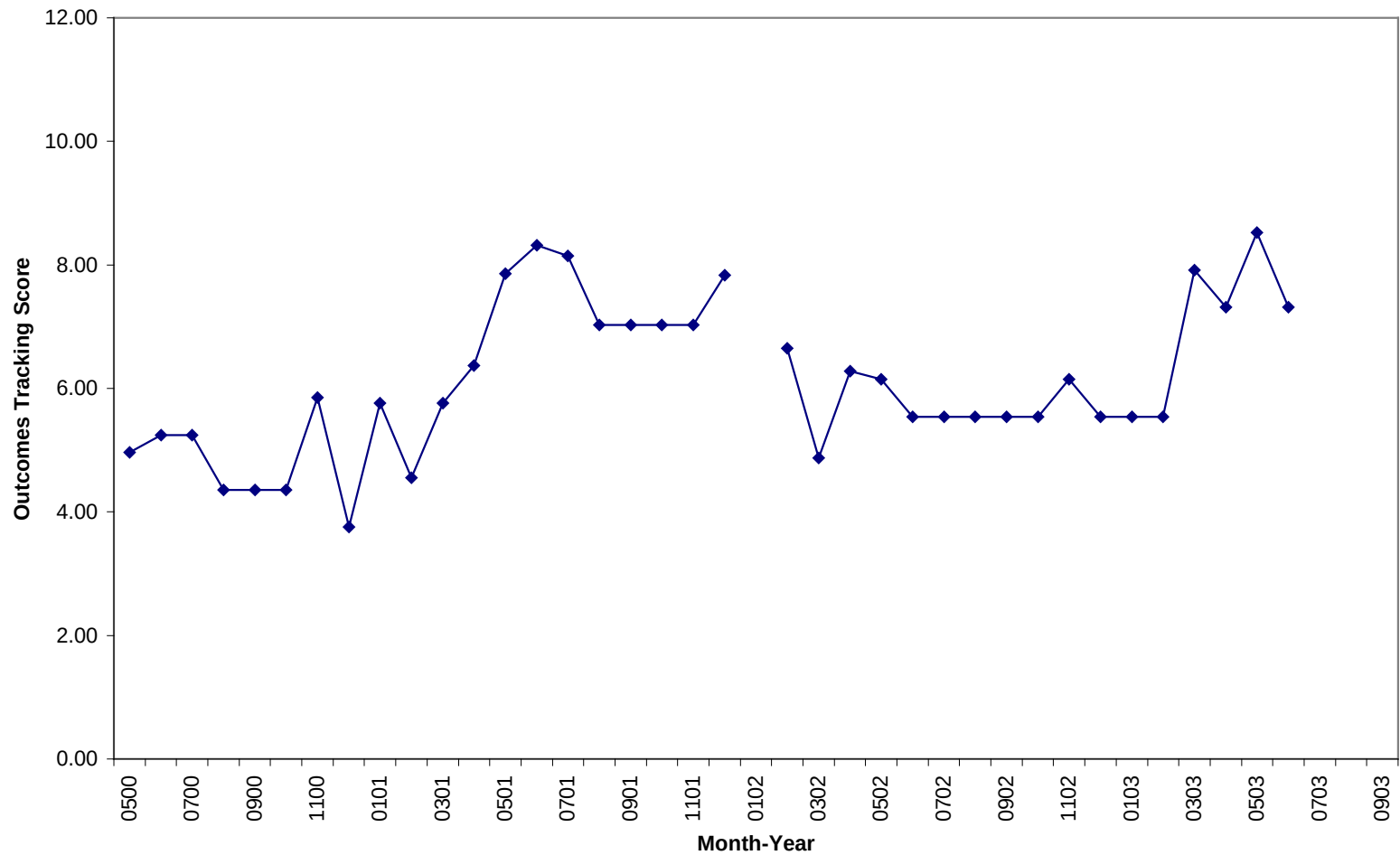
# Stability/Instability



- ⌘ With the help of clinicians it was found that statistical analyses used to determine periodicity (i.e., Autocorrelation) provide a fair assessment of stability/instability in consumers
  - ☑ Periodicity with significant short lags (i.e., lag 1-6 larger than 2 std-errors) can be considered as UNSTABLE
  - ☑ Clinicians/Program manager agreed with the judgments of stability/instability from the Autocorrelation

# Unstable consumer

V000578



# Unstable consumer (cont)

Autocorrelations: V000578

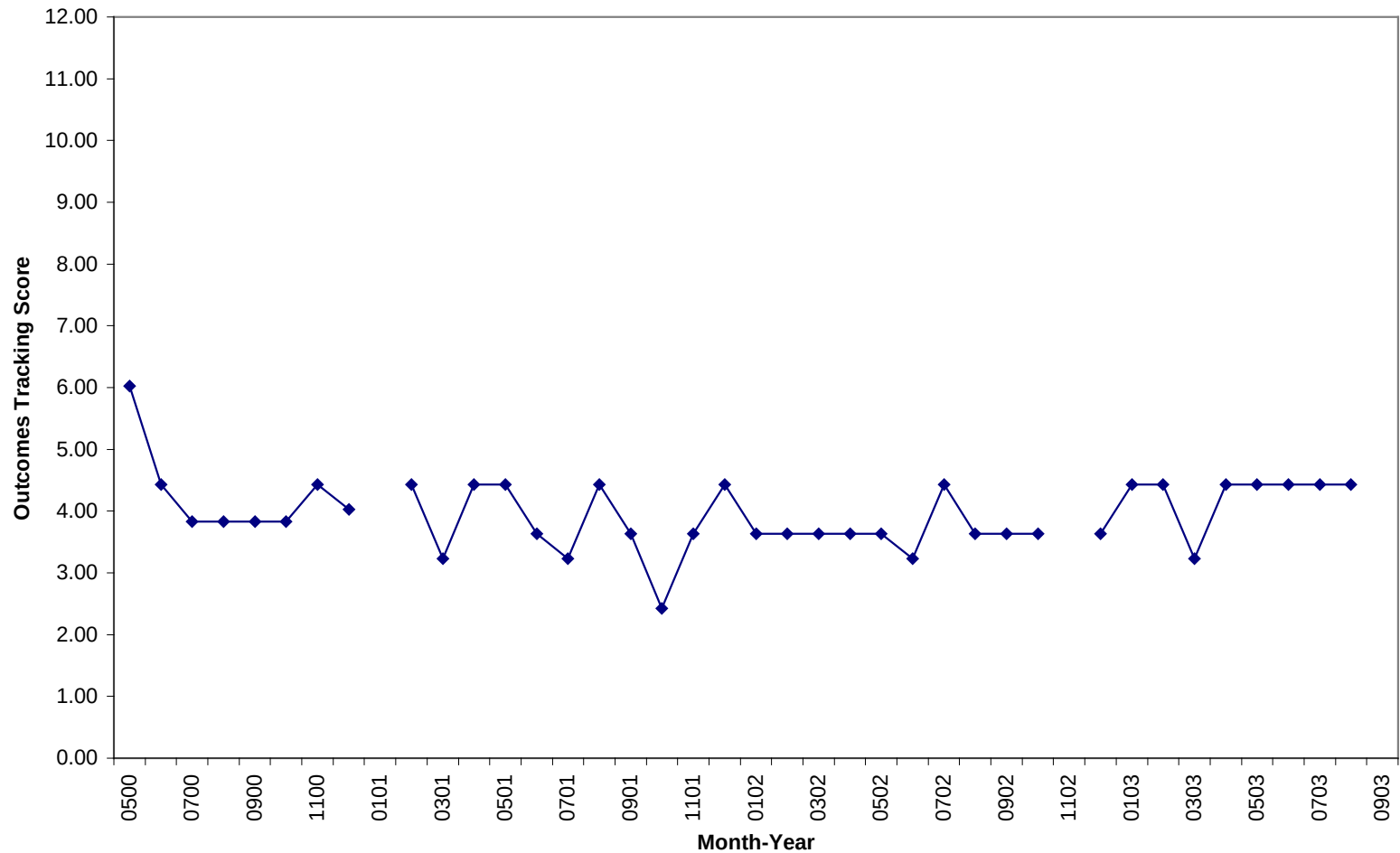
| Lag | Auto-<br>Corr. | Stand.<br>Err. | -1                                                                | -.75 | -.5 | -.25  | 0     | .25   | .5    | .75 | 1 | Box-Ljung | Prob. |
|-----|----------------|----------------|-------------------------------------------------------------------|------|-----|-------|-------|-------|-------|-----|---|-----------|-------|
|     |                |                | -----+-----+-----+-----+-----+-----+-----+-----+-----+-----+----- |      |     |       |       |       |       |     |   |           |       |
| 1   | .635           | .156           |                                                                   |      |     |       |       | ***** | ***** |     |   | 16.641    | .000  |
| 2   | .587           | .153           |                                                                   |      |     | .     |       | ***** | ***** |     |   | 31.251    | .000  |
| 3   | .284           | .151           |                                                                   |      |     | .     |       | ***** |       |     |   | 34.784    | .000  |
| 4   | .214           | .149           |                                                                   |      |     | .     |       | ****  | .     |     |   | 36.853    | .000  |
| 5   | .089           | .147           |                                                                   |      |     | .     |       | **    | .     |     |   | 37.223    | .000  |
| 6   | .010           | .144           |                                                                   |      |     | .     | *     | .     | .     |     |   | 37.228    | .000  |
| 7   | -.111          | .142           |                                                                   |      |     | .     | **    | .     | .     |     |   | 37.842    | .000  |
| 8   | -.304          | .139           |                                                                   |      |     | ***** |       | .     | .     |     |   | 42.598    | .000  |
| 9   | -.373          | .137           |                                                                   |      |     | **    | ***** | .     | .     |     |   | 50.018    | .000  |
| 10  | -.415          | .134           |                                                                   |      |     | ***   | ***** | .     | .     |     |   | 59.555    | .000  |
| 11  | -.330          | .132           |                                                                   |      |     | **    | ***** | .     | .     |     |   | 65.857    | .000  |
| 12  | -.418          | .129           |                                                                   |      |     | ***   | ***** | .     | .     |     |   | 76.354    | .000  |
| 13  | -.268          | .126           |                                                                   |      |     |       | ***** | .     | .     |     |   | 80.852    | .000  |
| 14  | -.354          | .123           |                                                                   |      |     | **    | ***** | .     | .     |     |   | 89.053    | .000  |
| 15  | -.120          | .121           |                                                                   |      |     | .     | **    | .     | .     |     |   | 90.045    | .000  |
| 16  | -.093          | .118           |                                                                   |      |     | .     | **    | .     | .     |     |   | 90.675    | .000  |

Plot Symbols: Autocorrelations \* Two Standard Error Limits .

Total cases: 41 Computable first lags: 35

# Stable consumer

V002309



# Stable consumer (cont)

Autocorrelations: V002309

| Lag | Auto-<br>Corr. | stand.<br>Err. | -1                                                          | -.75 | -.5 | -.25 | 0     | .25  | .5 | .75 | 1 | Box-Ljung | Prob. |
|-----|----------------|----------------|-------------------------------------------------------------|------|-----|------|-------|------|----|-----|---|-----------|-------|
|     |                |                | -----+-----+-----+-----+-----+-----+-----+-----+-----+----- |      |     |      |       |      |    |     |   |           |       |
| 1   | .105           | .152           |                                                             |      |     |      | .     | **   | .  |     |   | .479      | .489  |
| 2   | -.110          | .150           |                                                             |      |     | .    | **    | .    |    |     |   | 1.023     | .600  |
| 3   | .206           | .147           |                                                             |      |     | .    |       | **** | .  |     |   | 2.978     | .395  |
| 4   | .137           | .145           |                                                             |      |     | .    |       | ***  | .  |     |   | 3.874     | .423  |
| 5   | -.075          | .143           |                                                             |      |     | .    | **    | .    |    |     |   | 4.152     | .528  |
| 6   | .144           | .140           |                                                             |      |     | .    |       | ***  | .  |     |   | 5.203     | .518  |
| 7   | .186           | .138           |                                                             |      |     | .    |       | **** | .  |     |   | 7.008     | .428  |
| 8   | -.035          | .136           |                                                             |      |     | .    | *     | .    |    |     |   | 7.074     | .529  |
| 9   | -.006          | .136           |                                                             |      |     | .    |       | *    | .  |     |   | 7.076     | .629  |
| 10  | -.118          | .136           |                                                             |      |     | .    | **    | .    |    |     |   | 7.836     | .645  |
| 11  | .105           | .133           |                                                             |      |     | .    |       | **   | .  |     |   | 8.461     | .672  |
| 12  | .023           | .131           |                                                             |      |     | .    |       | *    | .  |     |   | 8.492     | .746  |
| 13  | -.084          | .128           |                                                             |      |     | .    | **    | .    |    |     |   | 8.921     | .779  |
| 14  | -.090          | .126           |                                                             |      |     | .    | **    | .    |    |     |   | 9.435     | .802  |
| 15  | -.015          | .123           |                                                             |      |     | .    |       | *    | .  |     |   | 9.450     | .853  |
| 16  | -.266          | .120           |                                                             |      |     | .    | ***** | .    |    |     |   | 14.346    | .573  |

Plot Symbols: Autocorrelations \* Two Standard Error Limits .

Total cases: 41 Computable first lags: 35

# Potential use



- ⌘ In an informal pool, clinicians/program manager found this information as potentially very useful when performing their 6-month reviews
- ⌘ Also when evaluating transitions to other teams/discharge from ACT services.

# Future directions



- ⌘ Fine-tuning of the scores to set thresholds for different levels of severity
- ⌘ Linkage of this data to other sources of information that may help validate the scale
- ⌘ Rescoring of the severity scores using a different group of experts
- ⌘ Analysis of the severity scores using Rasch models
- ⌘ Linkage of the scores to other measures of improvement