



# Treatment of Comorbid TBI and PTSD

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# Disclaimer

The views expressed in this presentation are those of the presenter and do not reflect the official policy of the

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Defense and Veterans Brain Injury Center

# Learning Objectives

## Participants will be able to:

1. Describe current evidence-based treatment practices for mild TBI and PTSD
2. Describe the treatment elements of two clinical treatment approaches to comorbid TBI and PTSD in service members and veterans
3. Identify the factors associated with positive treatment outcomes
4. Describe the relative/comparative treatment effectiveness of these two approaches

# DoD Health Affairs Workgroup

## TBI Definition

- A traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event.
  1. Any period of loss or decreased level of consciousness;
  2. Any loss of memory for events immediately before or after the injury;
  3. **Any alteration in mental state at the time of the injury** (e.g., confusion, disorientation, slowed thinking);
  4. Neurological deficits (e.g., weakness, balance disturbance, praxis, paresis/plegia, change in vision, other sensory alterations, aphasia.) that may or may not be transient;
  5. Intracranial abnormalities (e.g. contusions, diffuse axonal injury, hemorrhages, aneurysms).

# Mild TBI or Concussion = a traumatically induced physiological disruption of brain function

<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
Structural imaging normal	Normal or abnormal structural imaging	Normal or abnormal structural imaging
LOC $\leq$ 30 min with normal CT &/or MRI	LOC $\leq$ 6 hours with normal or abnormal CT &/or MRI	LOC $>$ 6 hours with normal or abnormal CT &/or MRI
GCS 13-15	GCS 9-12	GCS $<$ 9
AOC up to 24 hrs	24 hours. Severity based on other criteria	
PTA $\leq$ 24hr	PTA $\leq$ 7days	PTA $>$ 7days

# Postconcussive Symptoms

## ➤ Physical

- Headache, dizziness, fatigue, noise/light intolerance, insomnia

## ➤ Cognitive

- Memory complaints, poor concentration

## ➤ Emotional

- Depression, anxiety, irritability, lability

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 Psychology Press  
Taylor & Francis Group

## **CE** Incidence of Postconcussion Symptoms in Psychiatric Diagnostic Groups, Mild Traumatic Brain Injury, and Comorbid Conditions

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Diagnostic conditions ( <i>n</i> )	DSM-IV PCSS		ICD-10 PCSS	
	%	Odds ratio (CI)	%	Odds ratio (CI)
GAD, PTSD, & MTBI (12)	92	71.12 (9.16–552.32)	100	n.a.
Depression, GAD, & PTSD (48)	92	71.12 (25.42–198.99)	96	156.75 (37.90–648.33)
Depression, GAD, PTSD, & MTBI (11)	91	64.65 (8.25–506.40)	100	n.a.
Somatization (21)	91	61.42 (14.25–264.68)	91	64.74 (15.02–279.05)
Depression & PTSD (81)	85	37.18 (19.96–69.24)	86	43.37 (22.76–82.63)
Depression, PTSD, & MTBI (13)	85	35.56 (7.85–161.01)	100	n.a.
GAD & PTSD (87)	83	31.03 (17.62–54.66)	83	32.71 (18.57–57.64)
Depression, GAD, & MTBI (25)	80	25.86 (9.65–69.29)	80	27.26 (10.17–73.06)
GAD & MTBI (45)	76	19.98 (10.04–39.76)	80	27.26 (13.03–57.04)
Depression & GAD (133)	75	19.59 (13.04–29.44)	77	22.42 (14.79–33.99)
PTSD & MTBI (32)	75	19.40 (8.65–43.47)	75	20.45 (9.12–45.84)
Depression & MTBI (39)	72	16.46 (8.13–33.32)	74	19.76 (9.56–40.88)
Depression (58)	57	8.53 (5.02–14.50)	55	8.39 (4.95–14.23)
GAD (141)	50	6.37 (4.51–9.01)	41	4.76 (3.35–6.77)
PTSD (130)	40	4.31 (2.99–6.22)	39	4.26 (2.94–6.16)
MTBI (154)	32	3.02 (2.12–4.30)	27	2.47 (1.70–3.59)
Alcohol abuse/dependence (391)	26	2.25 (1.75–2.89)	24	2.19 (1.70–2.82)
Control subjects (3001)	13	1.00 (n.a.)	13	1.00 (n.a.)

Diagnostic conditions ( <i>n</i> )	Headaches		Dizziness	
	%	Odds ratio (CI)	%	Odds ratio (CI)
GAD, PTSD, & MTBI (12)	67	12.32 (3.69–41.08)	58	12.28 (3.87–38.93)
Depression, GAD, & PTSD (48)	71	14.95 (7.96–28.10)	63	14.62 (8.06–26.54)
Depression, GAD, PTSD, & MTBI (11)	64	10.78 (3.14–36.97)	55	10.53 (3.19–34.69)
Somatization (21)	76	19.70 (7.18–54.07)	81	37.28 (12.47–111.50)
Depression & PTSD (81)	64	11.04 (6.93–17.59)	57	11.53 (7.31–18.18)
Depression, PTSD, & MTBI (13)	62	9.85 (3.21–30.26)	46	7.52 (2.51–22.52)
GAD & PTSD (87)	62	10.08 (6.46–15.73)	54	10.31 (6.65–15.97)
Depression, GAD, & MTBI (25)	52	6.67 (3.02–14.72)	50	8.77 (3.91–19.70)
GAD & MTBI (45)	53	7.04 (3.88–12.76)	50	8.77 (4.80–16.03)
Depression & GAD (133)	51	6.44 (4.52–9.19)	42	6.46 (4.49–9.31)
PTSD & MTBI (32)	50	6.16 (3.06–12.41)	41	6.00 (2.94–12.27)
Depression & MTBI (39)	49	5.85 (3.10–11.05)	45	7.10 (3.71–13.61)
Depression (58)	24	1.96 (1.06–3.61)	19	2.05 (1.05–4.00)
GAD (141)	23	1.88 (1.26–2.82)	22	2.47 (1.63–3.75)
PTSD (130)	29	2.45 (1.65–3.64)	22	2.41 (1.56–3.72)
MTBI (154)	27	2.31 (1.60–3.34)	20	2.14 (1.41–3.24)
Alcohol abuse/dependence (391)	14	1.01 (0.74–1.37)	14	1.44 (1.06–1.96)
Control subjects (3001)	14	1.00 (n.a.)	10	1.00 (n.a.)

PCSS = Postconcussive syndrome symptoms; GAD = Generalized anxiety disorder; PTSD = Post-traumatic stress disorder; MTBI = Mild traumatic brain injury; Depression = Major depressive disorder; *n* = number of participants; % = Frequencies; CI = confidence intervals; n.a. = not applicable.

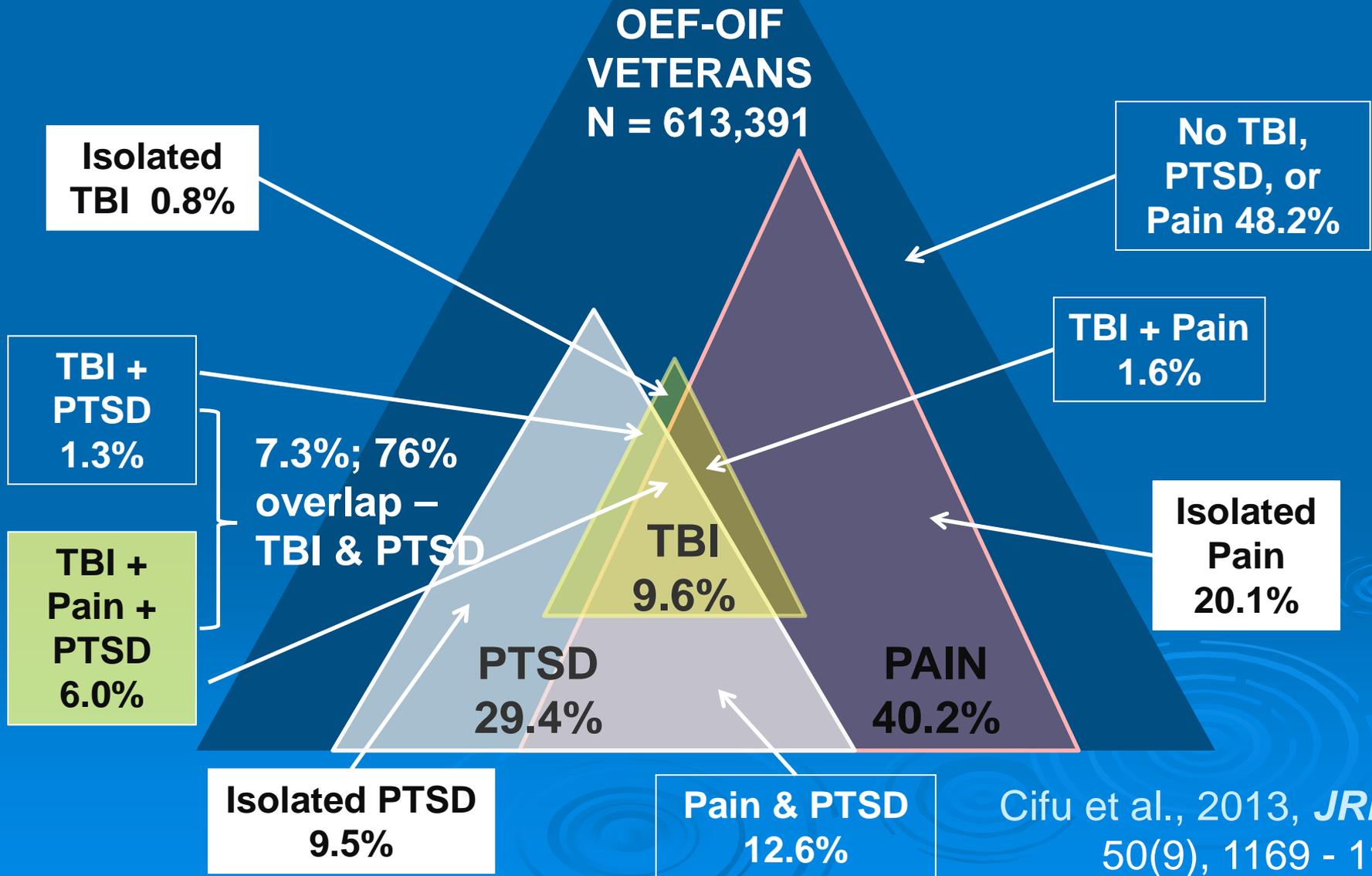
# Posttraumatic Stress Disorder (PTSD)

- A. Experienced a traumatic event like combat, assault, or disaster
- Four Symptom Clusters:
  - B. Intrusive Re-experiencing
    - (includes dissociative reactions)
  - C. Persistent Avoidance
  - D. Negative Alterations of Cognition or Mood
  - E. Hyperarousal and Reactivity

What Diagnostic Conditions  
are we Clinicians  
Trying to “Diagnosis”,  
“Disentangle”, and  
“Treat/Manage”?



# VA National Data



The diagram features a central text block surrounded by seven overlapping, semi-transparent circles of various colors (green, blue, purple, red, orange, teal, grey). Each circle is labeled with a specific condition or symptom. The circles overlap significantly, creating a complex web of intersections that suggests how these conditions are interconnected and often co-occur. The background is a solid blue color with faint, concentric circular patterns at the bottom.

# Deployment Stress & Post-Deployment Re-Adjustment

PTSD

Physical Injuries

Depression

Mild  
TBI

Anxiety

Substance Use  
Disorder

Pain

# TREATMENT OF TBI AND PTSD



<http://www.healthquality.va.gov/guidelines/Rehab/mtbi/mTBICPGFullCPG50821816.pdf>

**Management of  
Concussion/mild Traumatic  
Brain Injury**

2016



<http://www.healthquality.va.gov/guidelines/MH/ptsd/CPGSummaryFINALMgmtofPTSDfinal021413.pdf>

# Management of Post-Traumatic Stress

Version 2.0

GUIDELINE SUMMARY

2010



**VA/DoD Evidence Based Practice**

# VA/DOD: PTSD & mTBI Clinical Practice Guidelines

## ➤ **Current guidelines for Mild TBI**

- Educate patient and family about concussion/mTBI & expected recovery
- Identify & treat comorbid conditions (e.g., PTSD & Depression)
- Treat other symptoms (e.g., headaches, insomnia) in a symptom-based manner using both psychotherapeutic treatment (e.g., CBT) and symptom-specific pharmacological treatment

## ➤ **Current guidelines for PTSD**

- Prolonged Exposure Therapy
  - Cognitive Processing Therapy
- and Pharmacotherapy:  
SSRIs and the SNRI venlafaxine

# **TREATING COMORBID TBI AND PTSD:**

## **DISCUSSION AND COMPARISON OF TWO TREATMENT STUDIES**





**Cognitive  
Rehabilitation for  
OIF/OEF Service  
Members with mTBI:  
(The SCORE! Trial)**

**Amy Bowles, M.D.**

**Douglas B. Cooper, PhD, ABPP-CN**

**Defense and Veterans Brain Injury Center Study**

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# SCORE

## Manual Development Team

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# SCORE Study Personnel

## SCORE Study Therapists

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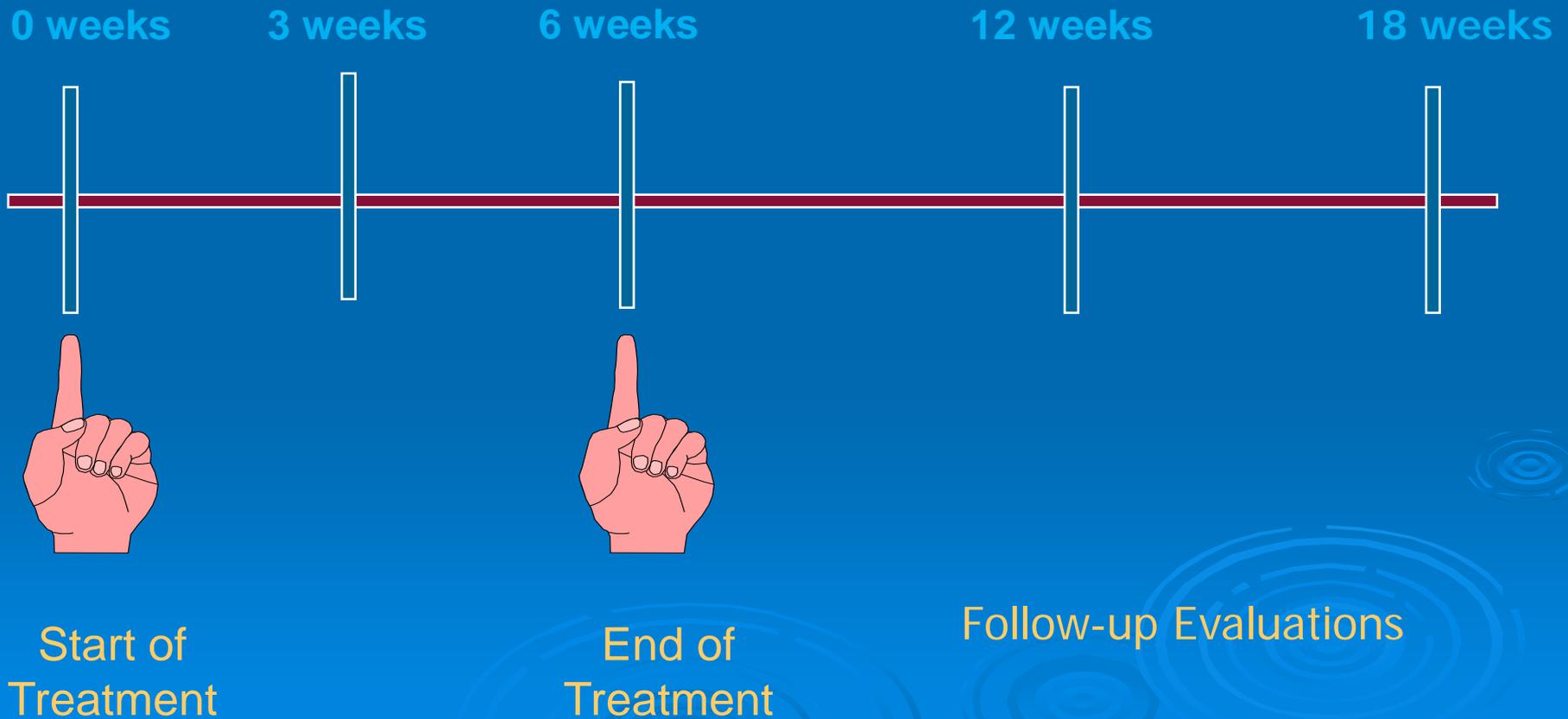
## SCORE Study Staff

Janel Shelton, MPAS, MS, PA-C

Sylvia Davis

Gina Gonzalez

# SCORE! Study Design (Outpatients)



# SCORE! - Outcome Measurement

## ➤ Primary Outcome Measures

1. Symptom Checklist – 90 (SCL-90)
  - Total Score (general mental health)
2. Paced Auditory Serial Addition Test (PASAT)
  - Total Correct Score: Complex and sustained attention
3. Key Behaviors Change Inventory (Total Score)
  - Cognitive Functioning: Inattention; Impulsivity; Apathy; Unawareness of problems
  - Interpersonal Functioning: Interpersonal Difficulties; Communication problems
  - Psychological Functioning: Emotional Adjustment; Somatic Difficulties

# SCORE!

- **Arm 1 – Psychoeducational “Control” Group**
  - All participants in all treatment arms receive this education and “standard of care” interventions
- **Arm 2 – Non-Therapist Directed Computerized CR**
  - 10 hours of in-clinic, computerized treatment each week throughout the 6-weeks (2 hrs/day)
- **Arm 3 –Therapist-Directed Individualized CR**
  - 10 hours of individual and group treatment each week throughout the 6-weeks (2 hrs/day)
    - 5 = Individual, 2 = Group, 3 = Homework
- **Arm 4 –Integrated Interdisciplinary CR**
  - 10 hours of individual and group treatment each week
    - 4 Individual hours: 3 cognitive rehabilitation; 1 psychotherapy
    - 3 Group hours: 2 cognitive rehabilitation; 1 psychotherapy
    - 3 Homework hours (2 cognitive rehabilitation; 1 psychological)

# Traditional Cognitive Rehabilitation (CR) Interventions

➤ **Treatment Goal:** Using both compensatory and restorative approaches, utilize Cog Rehab to address common cognitive complaints of Service Members with chronic mTBI.

- Core Treatment Domains

- Goal Setting
- Prospective Memory & Assistive Technology
- Planning & Organization
- Sustained Attention
- Alternating Attention & Working Memory
- Memory & Learning

# Psychotherapeutic Intervention

- **Treatment Goal:** Improved functional day-to-day cognitive performance by addressing factors known to influence maintenance of postconcussive symptoms
  - Individual Psychotherapy
    - Traditional CBT approach – situations/thoughts/feelings
    - Relaxation training
    - Diffusion Techniques – CBT approach to reduce the impact of distressing thoughts
  - Group Psychotherapy
    - Symptom Re-Attribution
    - Universality of Combat
    - Improve Self-Care (e.g., improved sleep hygiene)

# Primary Outcome: SCL-90-R (Overall Psychological Functioning)

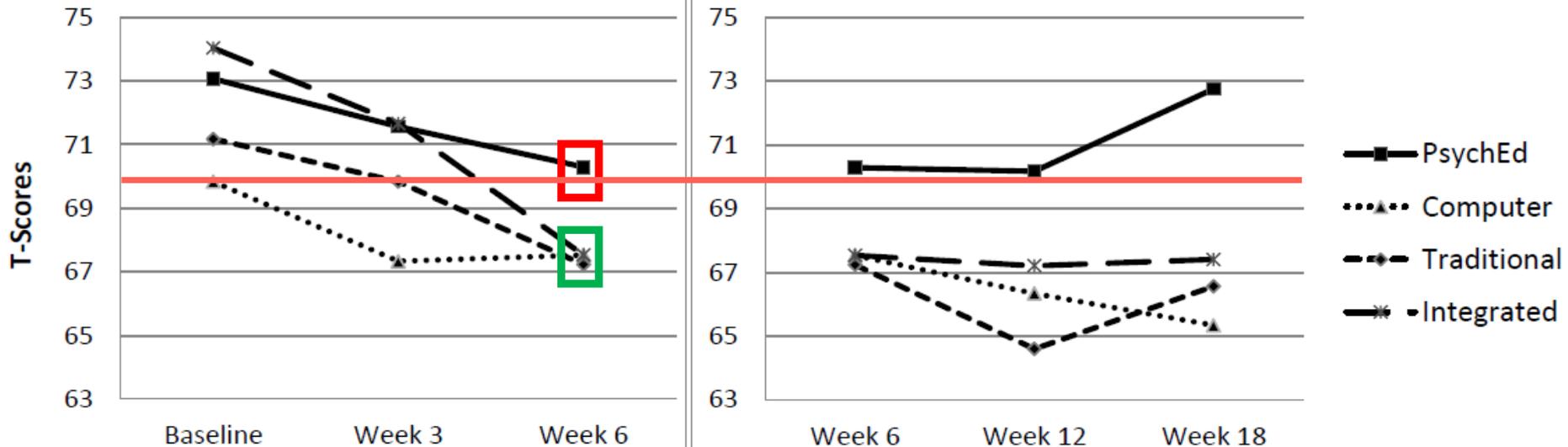
## SCL-90-R

2c

2d

Treatment Outcome

Treatment Maintenance



No Differential Outcomes Across Groups  
(Group by Time Interaction:  $p = .08$ )

but the Treatment Groups end up in the subclinical range

# SCL-90-R GSI: 90% Confidence Interval Reliable Change

➤ 90% Confidence Interval for Reliable change  
(7.6 T-score points):

- Psychoed = 14.7%
- Computer = 26.7%
- Traditional = 30.0%
- Integrated = 46.9%

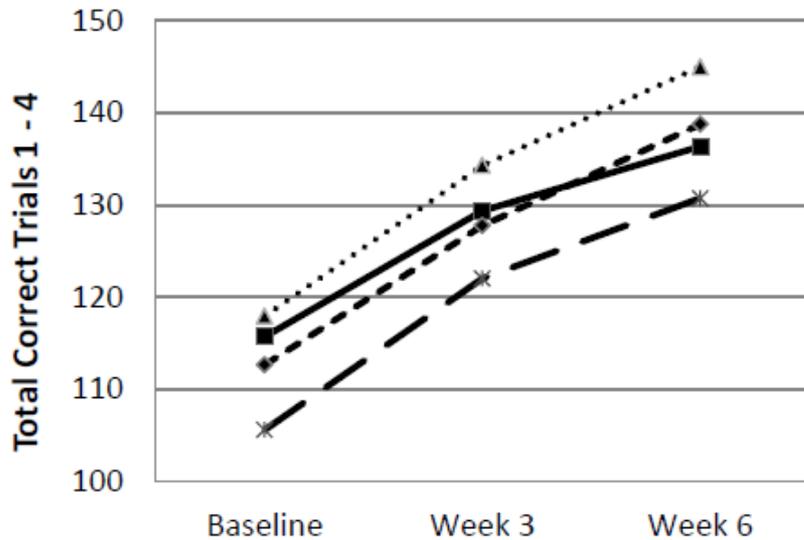
$p < .005$

# Primary Outcome: PASAT (Cognitive Test of Attention)

## PASAT

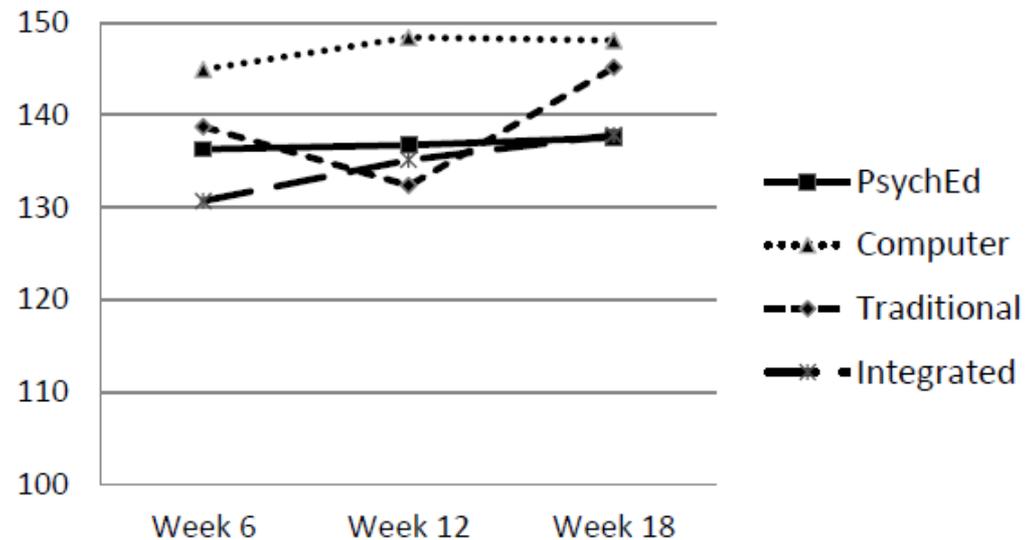
2a

Treatment Outcome



2b

Treatment Maintenance



No Differential Outcomes Across Groups  
(Group by Time Interaction:  $p > .90$ )

# Primary Outcome: KBCI (Day-to-day Functional Cognitive Abilities)

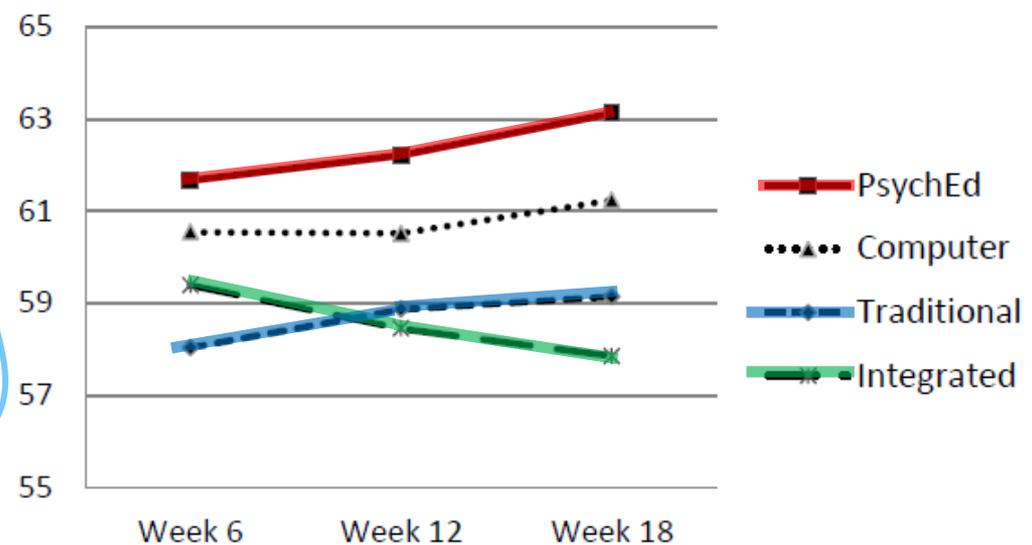
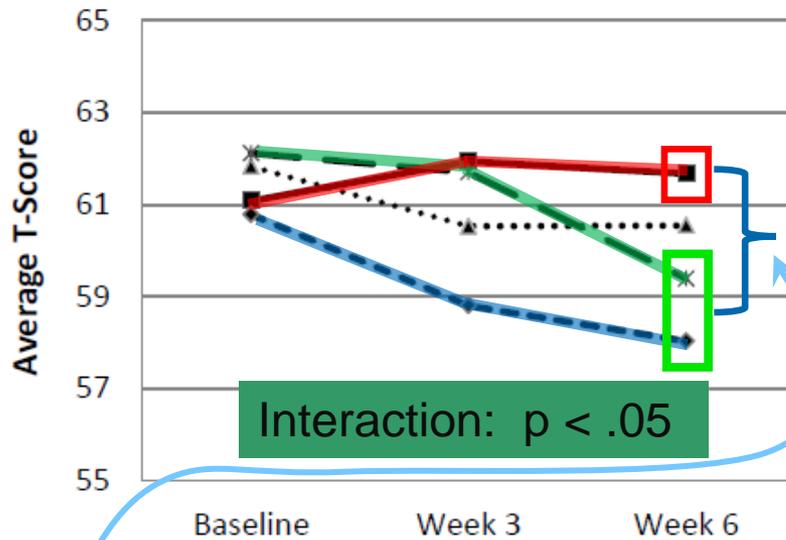
## Key Behaviors Change Inventory

2e

2f

### Treatment Outcome

### Treatment Maintenance



Traditional Cog Rehab & **Integrated Cog Rehab** have superior post-tx outcomes compared to the **(d = 0.53)** Psychoeducational Control Group

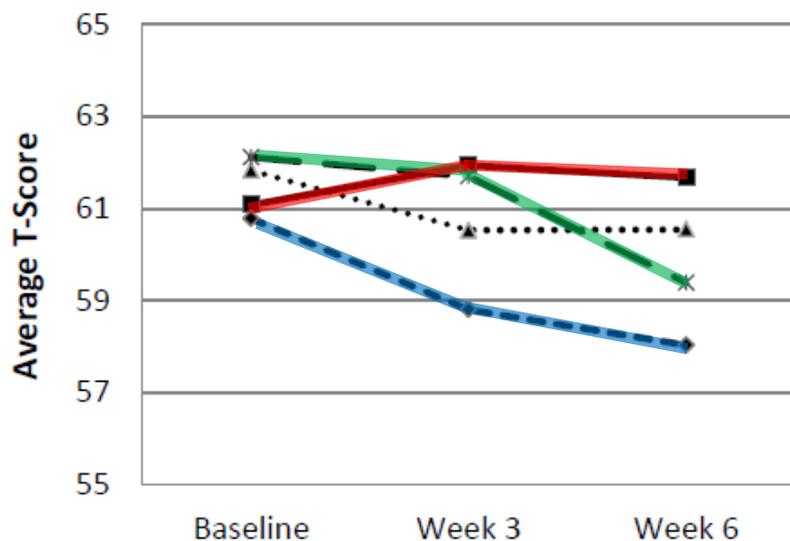
# Primary Outcome: KBCI (Day-to-day Functional Cognitive Abilities)

## Key Behaviors Change Inventory

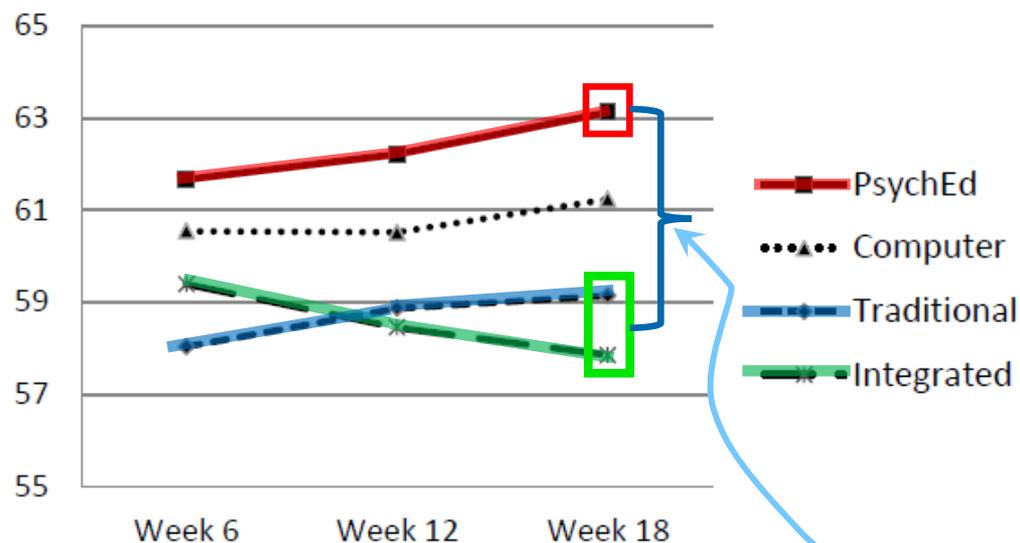
2e

2f

### Treatment Outcome



### Treatment Maintenance



Traditional Cog Rehab & **Integrated Cog Rehab** have superior follow-up outcomes compared to the **Psychoeducational Control Group** ( $d = 0.58$ )

# KBCI: 90% Confidence Interval Reliable Change

➤ 90% Confidence Interval for Reliable change  
(6.9 T-score points):

• Psychoed = 0.0%

• Computer = 6.7%

• Traditional = 23.3%

• Integrated = 18.8%

$p < .01$

# Secondary Outcome Measures

- **No treatment differences across groups** on any of the following secondary outcomes:
  - Neurobehavioral Symptom Inventory (NSI)
  - PTSD Checklist (PCL-C)

# What Affects Treatment Outcome?

or

(What are the **Effective Components** of Treatment?)

- Demographics (not related)
- Injury Characteristics
  - Time Since TBI\*\*
- Comorbid Mental Health Condition(s)
  - Depression\*\*
- Patient Motivation\*\* (# homework hours completed)
- Non-Specific Treatment Effects (Team/Clinic setting)
- Specific Treatment Effects (# hours of treatment)

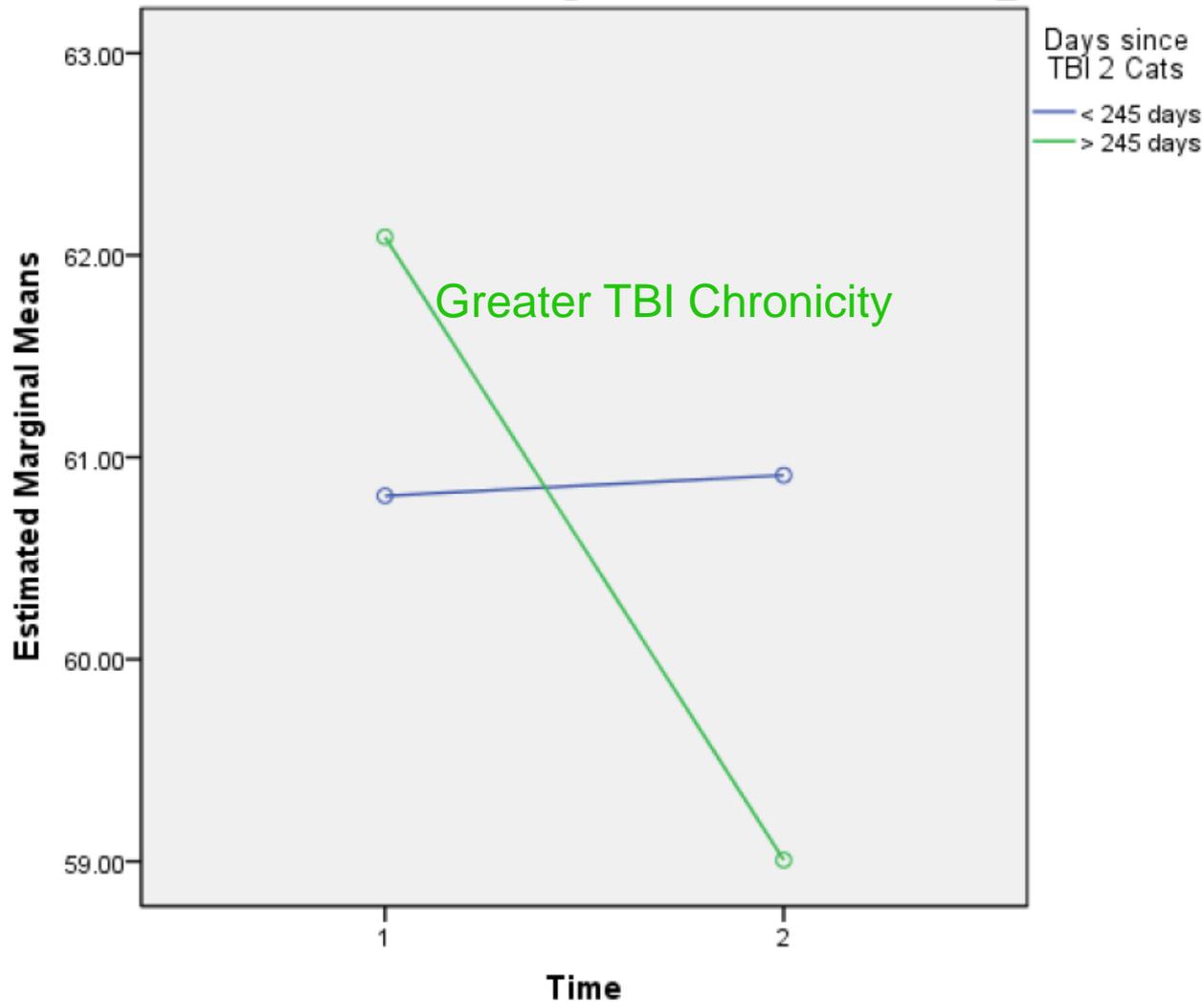
Entire Sample: N = 126

**KBCI 90% CI RCI:** Logistic Regression Nagelkerke R-Square

Variable(s)	Nagelkerke R-Square	Cumulative Nagelkerke R-Square
Block 1 (Injury Characteristics)	.077*	
Time since TBI (days)	.077*	
Model after Block 1		.077*
Block 2 (Comorbidities)	.123**	
Current Depression	.123**	
Model after Block 2		.200***
Block 3 (Patient Motivation)	.069*	
Total Homework Hours	.069*	
Model after Block 3		.269***
Block 4 (Non-specific Tx Effects)	.076 (p = .053)	
Team	.038 (p = .303)	
Clinic	.013 (p = .998)	
(Shared variance)	(.025)	
Model after Block 4		.345***
Block 5 (Specific Tx Effects)	.030 (p = .794)	
Cog Rehab Computer 1:1 Hrs	.001	
Cog Rehab Restorative 1:1 Hrs	.003	
Cog Rehab Group Hours	.001	
Psych 1:1 Hours	.005	
Psych Group Hours	.001	
(Shared variance)	(.019)	
Model after Block 5		.375**

Note. \*p < .05. \*\*p < .01. \*\*\*p < .001.

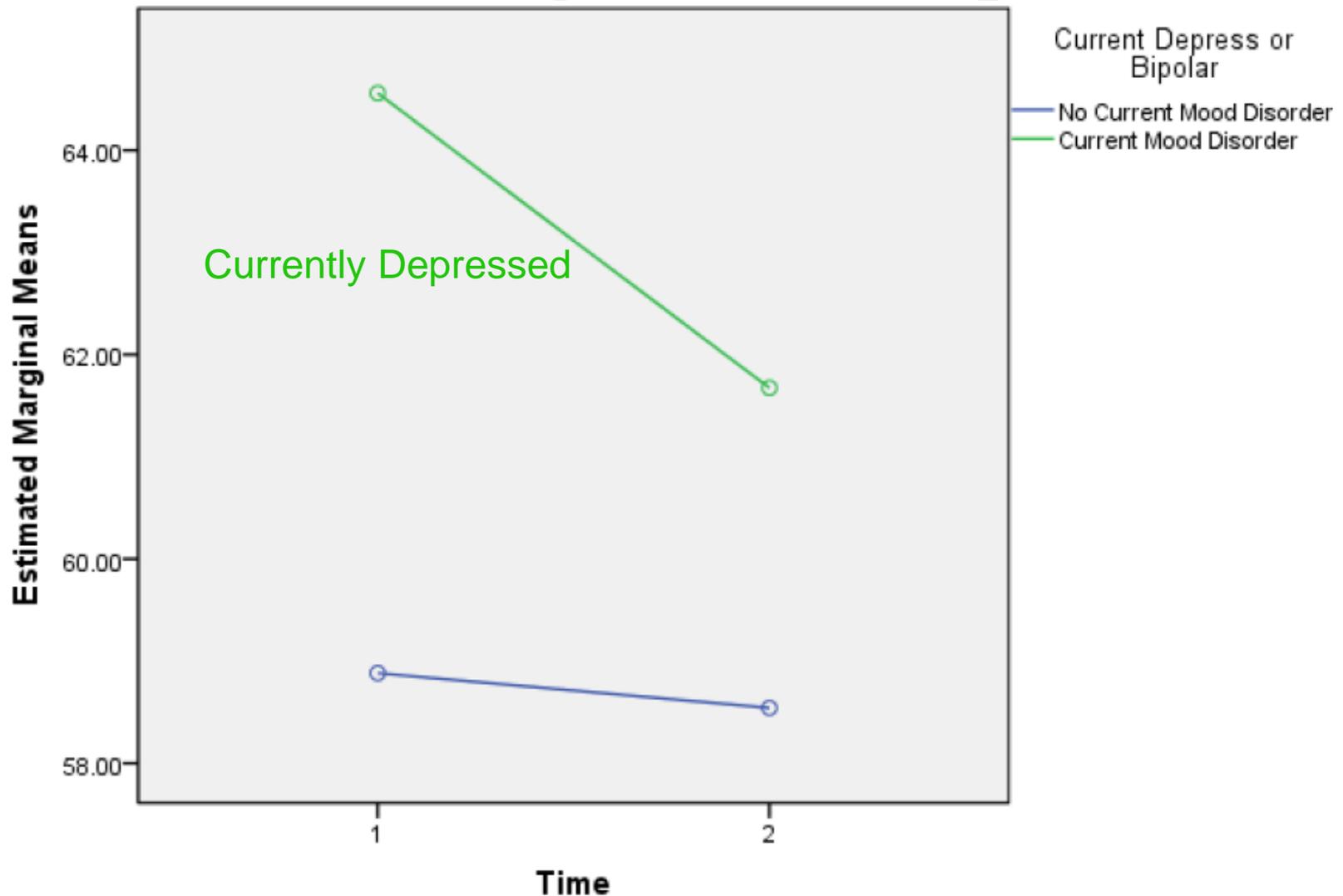
### Estimated Marginal Means of MEASURE\_1



Median Split (N = 63 in both groups. < 245 days: mean of 152 days. > 245 days: mean of 421 days)

Days Since TBI by Time Interaction: Wilks' Lambda = .922;  $F(1,124) = 10.432$ ;  $p < .002$ .

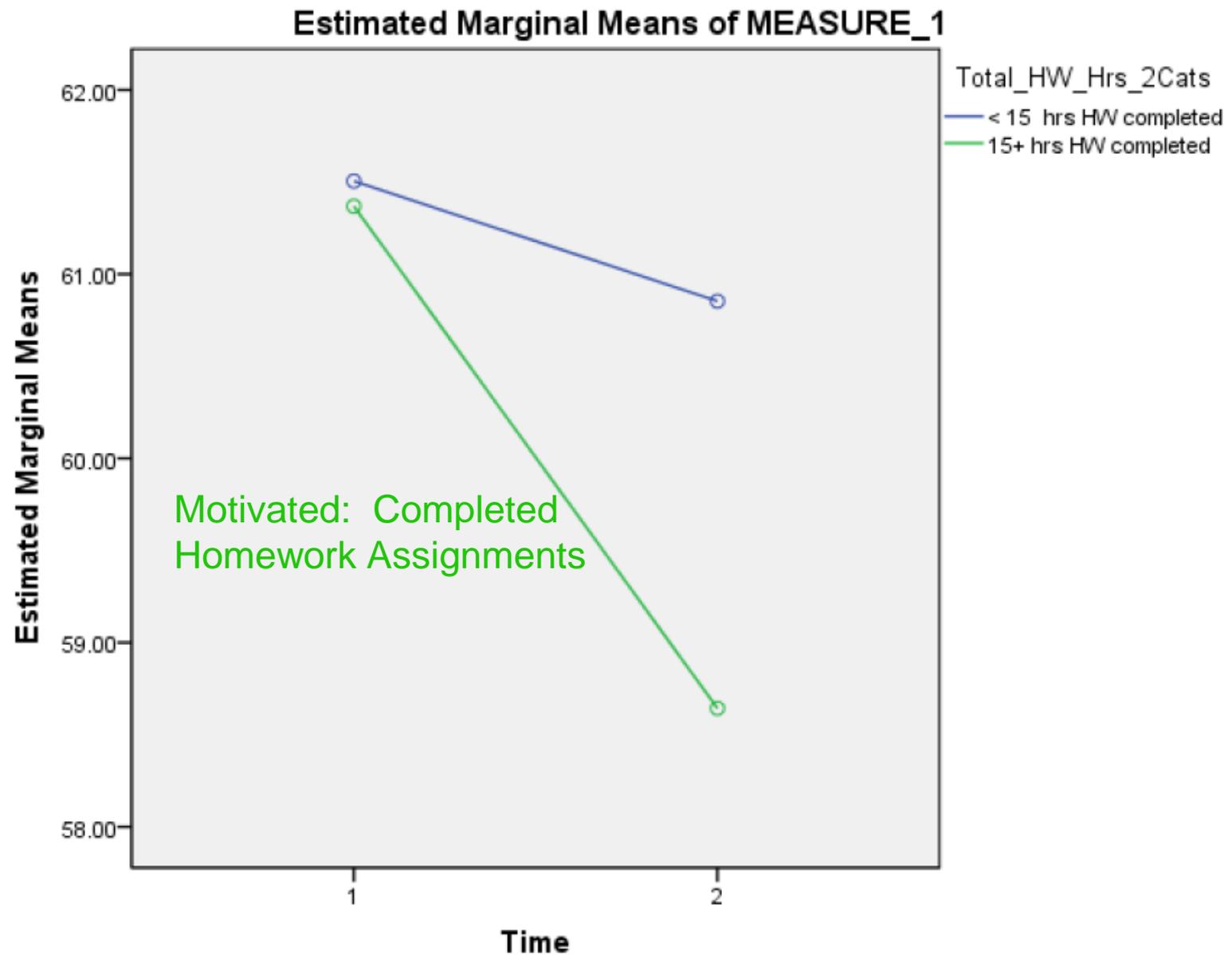
## Estimated Marginal Means of MEASURE\_1



Covariates appearing in the model are evaluated at the following values: Time Since Last TBI (Days) = 286.49

With One Covariate: Time Since Injury

Depression by Time Interaction: Wilks' Lambda = .950;  $F(1,123) = 6.516$ ;  $p < .05$



(Arms 3 and 4: HW hrs ranges from 0 to 18. < 15 Hrs n = 11. 15+ hrs n = 51)

All arms: 15+ hrs n = 51. < 15 hrs n = 75.

HW Hours by Time Interaction: Wilks' Lambda = .968;  $F(1,124) = 4.057; p < .05$

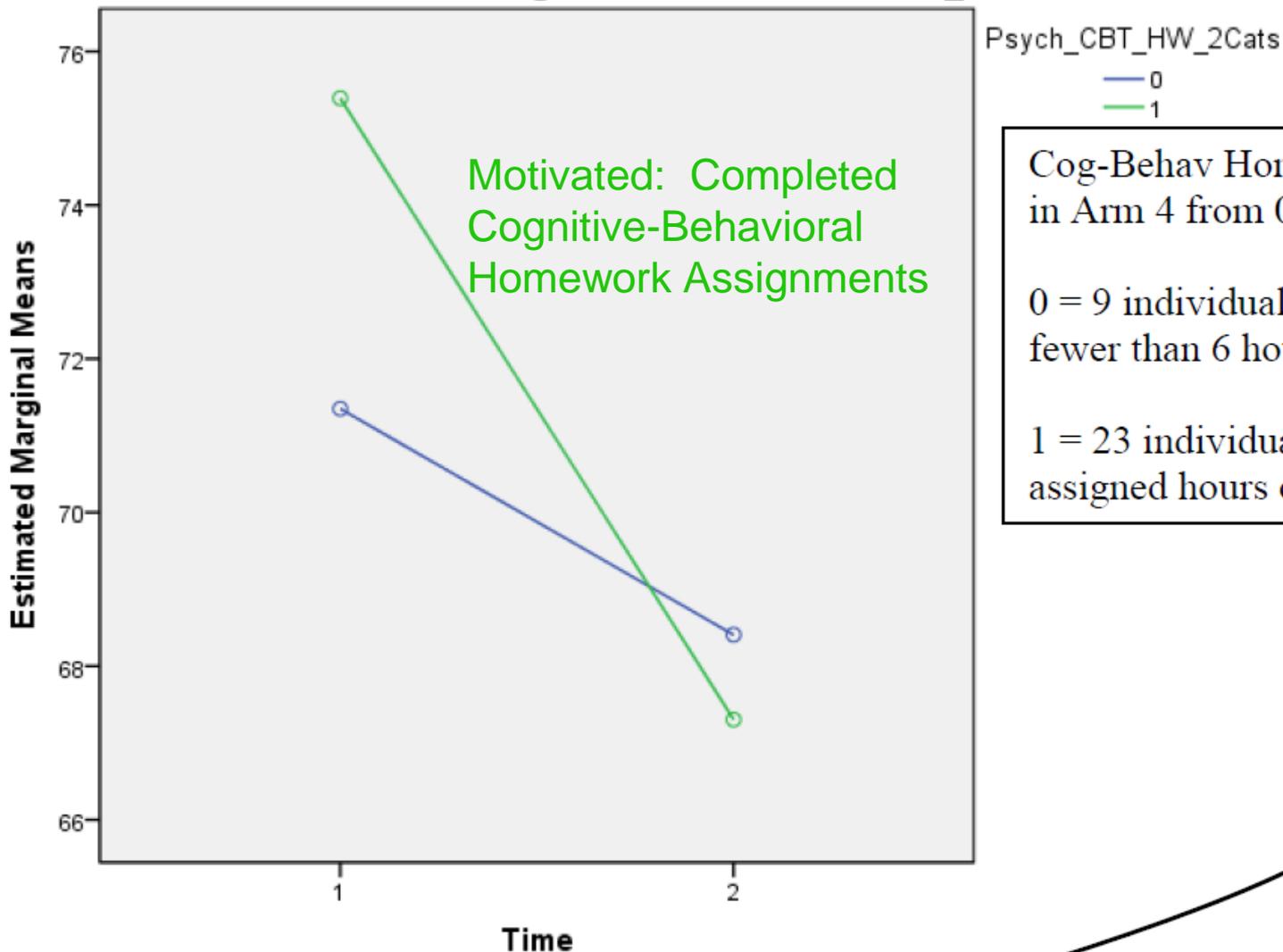
Entire Sample: N = 126

**GSI 90% CI RCI: Logistic Regression Nagelkerke R-Square**

Variable(s)	Nagelkerke R-Square	Cumulative Nagelkerke R-Square
Block 1 (Patient Motivation)	.044*	
Psych CBT HW Hrs	.044*	
Model after Block 1		.044*
Block 2 (Non-specific Tx Effects)	.039 (p = .17)	
Team	.016 (p = .54)	
Clinic	.020 (p = .24)	
(Shared variance)	(.003)	
Model after Block 2		.083 (p = .06)

Note. \*p < .05.

### Estimated Marginal Means of MEASURE\_1



Cog-Behav Homework hours ranged in Arm 4 from 0 to 6.

0 = 9 individuals who completed fewer than 6 hours of homework.

1 = 23 individuals completed all 6 assigned hours of homework.

(Arm 4: 6 hrs CB HW n = 23. < 6 hrs CB HW n = 9.)

All arms: 6 hrs CB HW n = 23. < 6 hrs CB HW n = 103. Figure above reflects All Arms.

CBT HW hrs by Time Interaction: Wilks' Lambda = .942;  $F(1,124) = 7.586$ ;  $p < .007$ .

What if we just provided  
mental health treatment?



# Prolonged Exposure Therapy for Veterans Diagnosed with PTSD & TBI



# VA/DOD PTSD/mTBI/Pain Consensus Panel Recommendations

- Active discussion between providers
  - Veteran-centered care that prioritizes and incorporates patient's goals and preferences
  - Need to follow current guidelines regarding PTSD, mTBI and pain since current research suggests they are effective and appropriate
  - **Current guidelines for PTSD recommend**
    - Prolonged Exposure Therapy
    - Cognitive Processing Therapy
- and Pharmacotherapy:  
SSRIs and the SNRI venlafaxine

# Prolonged Exposure Therapy with Veterans Diagnosed with TBI & PTSD

*Journal of Traumatic Stress*  
October 2015, 28, 1–9



## **Prolonged Exposure Therapy With Veterans and Active Duty Personnel Diagnosed With PTSD and Traumatic Brain Injury**

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Thad Q. Strom, Ph.D.  
Afsoon Eftekhari, Ph.D.  
Megan Klenk, Ph.D.  
Laura Hayward, Ph.D.



# Prolonged Exposure Therapy

- Individual evidence-based treatment for PTSD
  - 8-12 sessions
  - 90 min appointments
- Four main components:
  - **Psychoeducation**
  - **Relaxation Training (Breathing)**
  - **Imaginal Exposure:** Talking about the trauma memory over and over to gain control of one's thoughts and feelings
  - **In-vivo Exposure:** Exposure practice with “safe, but avoided” real-world situations

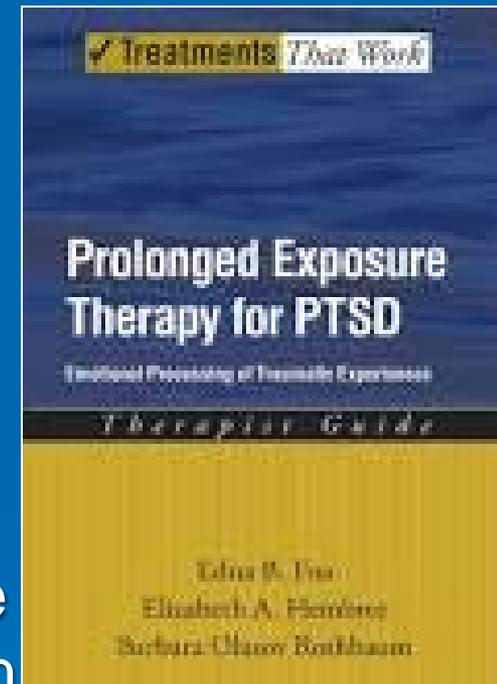


Table 1. Demographic and Clinical Characteristics of Participants

Demographic Variables	Intent to Treat (n = 69)
Age, in years ( <i>M, SD</i> )	34.01 (8.04)
Gender = male ( <i>n, %</i> )	65 (94.2%)
Education, in years ( <i>M, SD</i> )	13.26 (1.61)
Ethnicity ( <i>n, %</i> )	
Caucasian	46 (66.7%)
African-American	13 (18.8%)
Hispanic	8 (11.6%)
Other	2 (2.9%)
Marital Status ( <i>n, %</i> )	
Single	27 (39.1%)
Married	34 (49.3%)
Divorced/Separated	8 (11.6%)
Military Status ( <i>n, %</i> )*	
Active Duty	18 (26.1%)
Veteran	51 (73.9%)
C & P Claim Pending ( <i>n, %</i> )	24 (34.8%)
Service Connected ( <i>n, %</i> )*	40 (58.0%)

2 Sites: Durham and Tampa  
VA Medical Centers

Veterans were in either  
- outpatient mental health or  
- residential/inpatient TBI  
rehabilitation programs

44 Treatment Completers  
(8+ sessions completed)

25 Non-Completers  
(< 8 sessions completed)

# Clinical Characteristics

Clinical Variables	Intent to Treat (n = 69)
TBI Severity (n, %)	
Mild	52 (75.4%)
Moderate/Severe	17 (24.6%)
Years since TBI (M, SD)	4.68 (2.91)
Number of TBIs (M, SD)	2.84 (1.63)
TBI Etiology (n, %)	
Blast	35 (50.7%)
Nonblast	34 (49.3%)
Comorbid Conditions (n, %)	
Depression	57 (82.6%)
Other Anxiety	17 (24.6%)
Substance Abuse	20 (29.0%)
History of Suicide (n, %)	16 (23.2%)
Medications (n, %)	59 (85.5%)
Number of PE Sessions (M, SD)*	9.48 (5.34)

44 Treatment Completers  
(8+ sessions completed)

25 Non-Completers  
(< 8 sessions completed)

# PE Outcomes for PTSD in those with TBI

- Examine pre- and post-treatment changes in an Intent to Treat (ITT) sample ( $n = 69$ ) (No controls)
  - PTSD (PCL):  $F(1,68) = 127.37, p < .0001, \eta p^2 = .65$   
**Cohen's  $d = 1.46$**
  - Depression (BDI-II):  $F(1,66) = 68.77, p < .0001, \eta p^2 = .51$   
**Cohen's  $d = 1.04$**
  - ❖ Neurobehavioral symptoms (NSI): NSI:  $F(1,43) = 52.47, p < .0001, \eta p^2 = .55$ . **Cohen's  $d = 1.22$**
  - ❖ Day-to-day functional cognitive problems (KBCI) associated with TBI  
**Cohen's  $d$  ranging from 0.70 to 1.46**
  - ❖ Self-efficacy ( $F(1,28) = 104.27, p < .0001, \eta p^2 = .79$ )  
**Cohen's  $d = 2.03$**  ←

# What Affects Treatment Outcome?

or

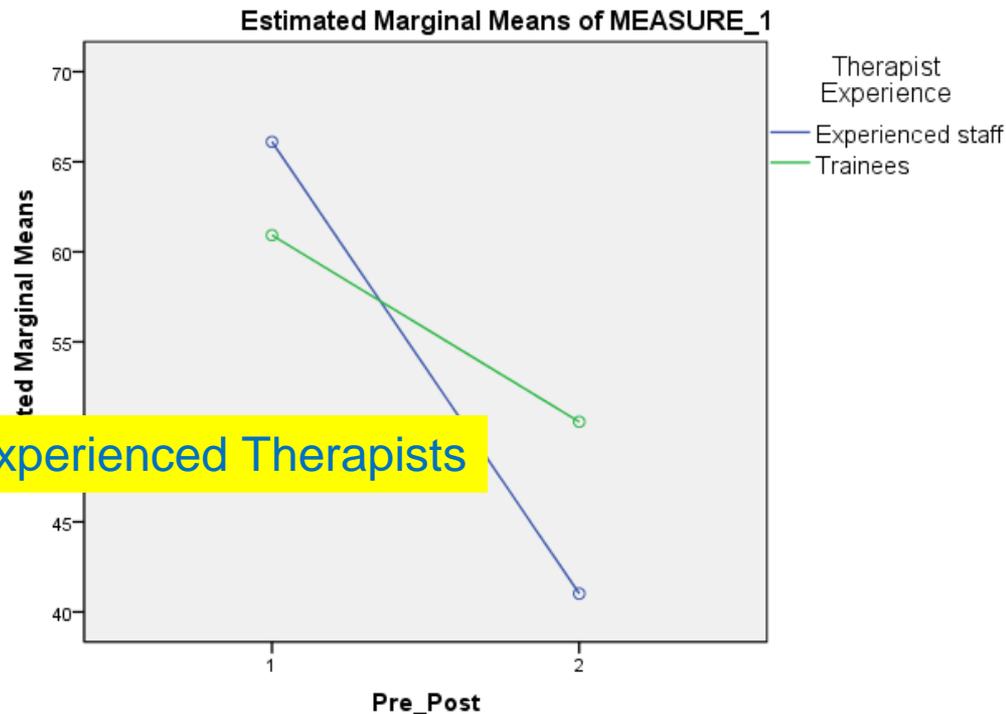
(What are the **Effective Components** of Treatment?)

- Site: Tampa versus Durham
- TBI Severity: Mild versus Moderate/Severe
- Setting: Inpatient TBI Rehabilitation versus Outpatient Mental Health
- **Therapist Experience: Staff versus Postdoc Fellow**
- **PE Treatment Completion (Completers versus Non-Completers)**

# Amount of Unique Variance in PTSD Outcomes Associated with Different Predictor Variables

Predictor Variables	PTSD PCL-C
ITT Effect Sizes	<b>d = 1.46</b>
Tampa v. Durham	1.77%
TBI Severity	0.30%
Inpatient v. Outpatient	0.49%
Staff v. Trainee	<b>4.71%*</b>
Completed PE Tx	<b>15.29%**</b>

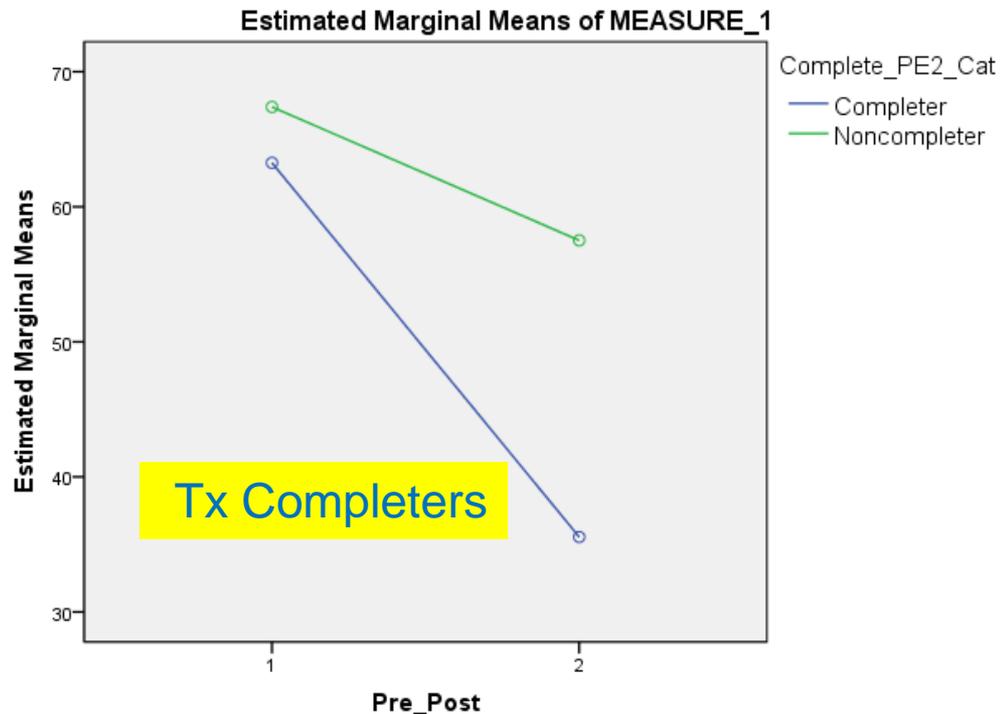
Experienced Therapists



Covariates appearing in the model are evaluated at the following values: Site Location = 1.36, Inpt vs Output = 1.78, TBI\_Sever\_2\_level = 1.25, Complete\_PE2\_Cat = 1.36

# Amount of Unique Variance in PTSD Outcomes Associated with Different Predictor Variables

Predictor Variables	PTSD PCL-C
ITT Effect Sizes	<b>d = 1.46</b>
Tampa v. Durham	1.77%
TBI Severity	0.30%
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Staff v. Trainee	<b>4.71%*</b>
Completed PE Tx	<b>15.29%**</b>

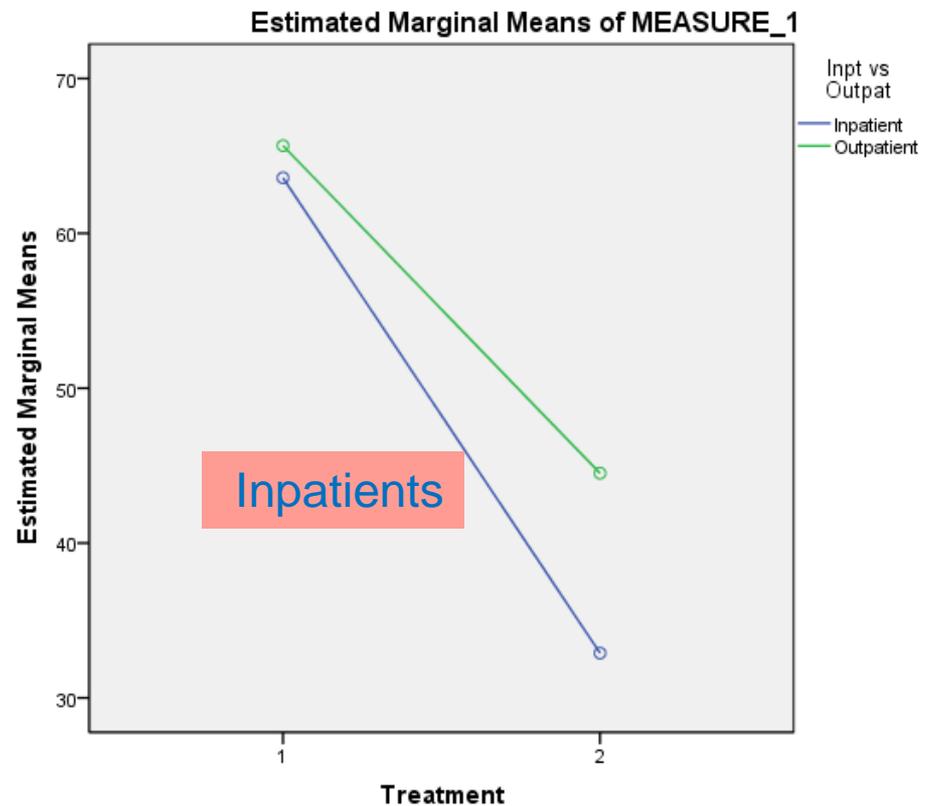


Covariates appearing in the model are evaluated at the following values: Site Location = 1.36, Therapist\_2\_level = 1.2609, Inpt vs Output = 1.78, TBI\_Sever\_2\_level = 1.25

# Amount of Unique Variance in PTSD Outcomes Associated with Different Predictor Variables

Adding TBI-specific interventions has no effect on outcomes

Predictor Variables	PTSD PCL-C
ITT Effect Sizes	<b>d = 1.46</b>
Tampa v. Durham	1.77%
TBI Severity	0.30%
Inpatient v. Outpatient	0.49%
Staff v. Trainee	4.71%*
Completed PE Tx	15.29%**



## PCL-C , NSI and NSI Factors, Scaled to Severity of Symptom Reporting

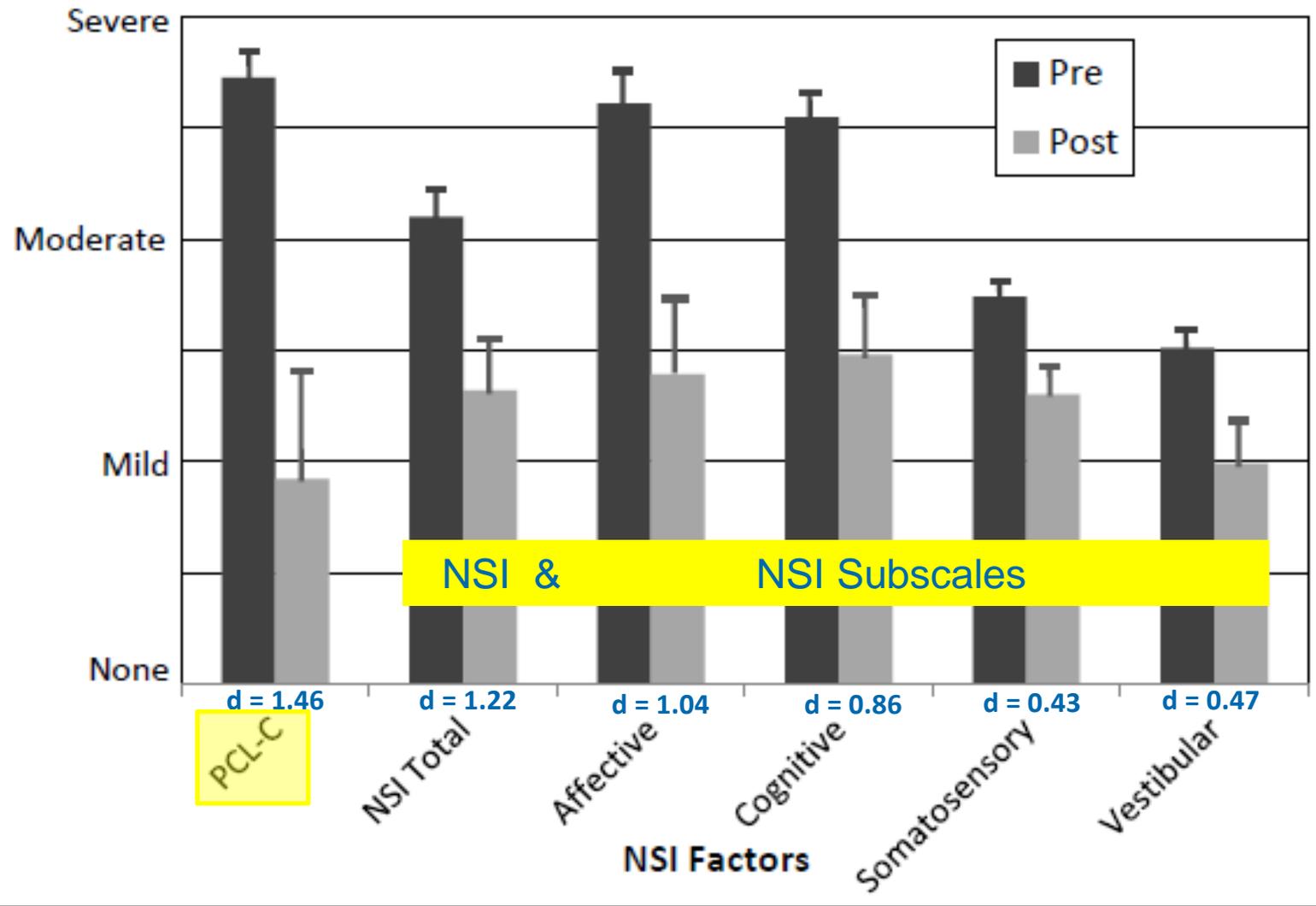


Figure 1 compares the Treatment Completers (solid columns) and the entire Intent to Treat sample (T-bars attached to the columns) on the PCL-C, NSI, and NSI subfactors averaging the level of symptom reporting across items to the common metric of none, mild, moderate, and severe level of symptom reporting.

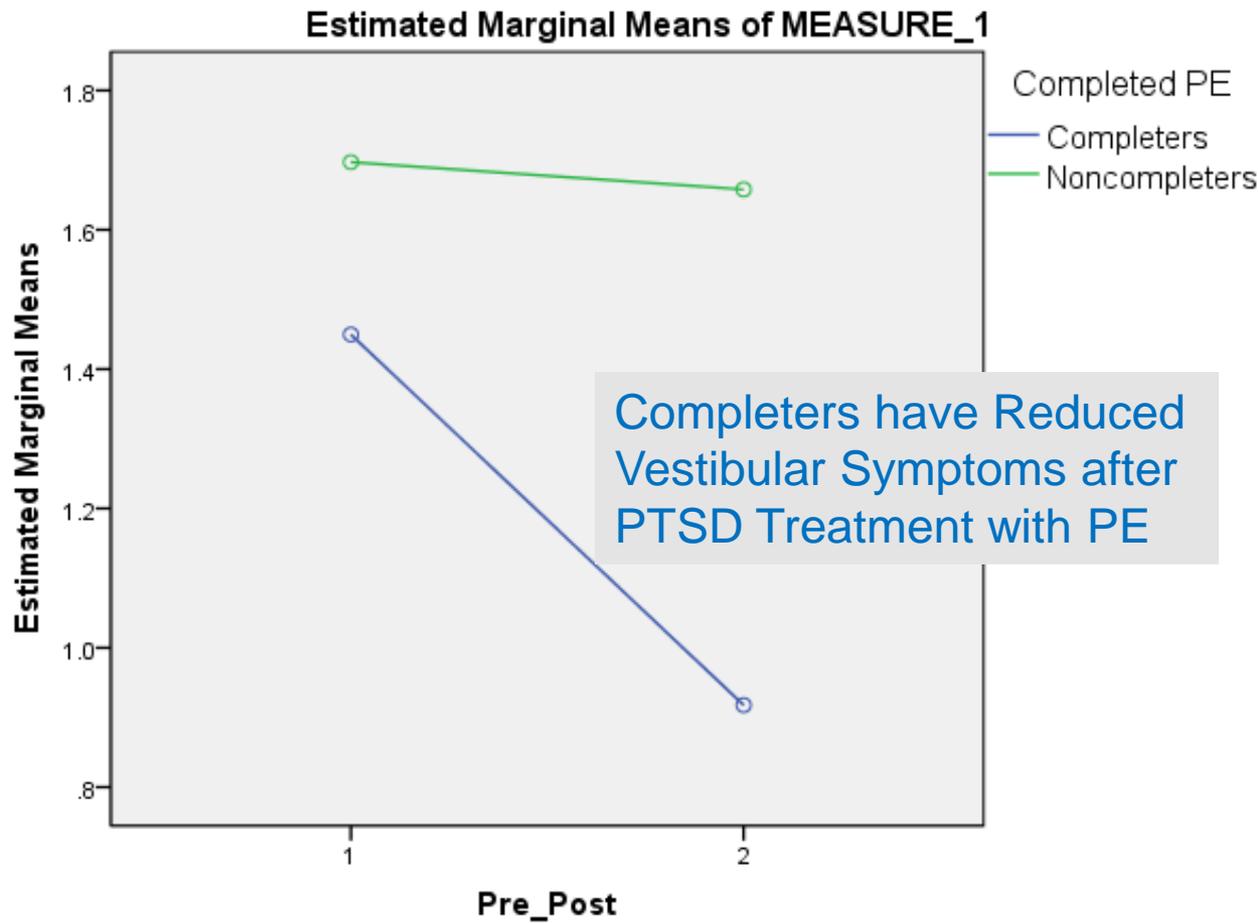
# Amount of Unique Variance in NSI Outcomes Associated with Different Predictor Variables (NSI collected in Tampa site & only later on cases in Durham)

Predictor Variables	NSI Total Score	NSI Affective	NSI Cognitive	NSI Somato-sensory	NSI Vestibular	NSI Balance Problems
ITT Effect Sizes	d = 1.22	d = 1.04	d = 0.86	d = 0.43	d = 0.47	d = 0.40
TBI Severity	0.34%	0.48%	1.02%	3.13%	0.05%	0.03%
Inpatient v. Outpatient	0.18%	0.53%	0.10%	0.02%	0.48%	0.02%
Completed PE Tx	1.08%	1.74%	3.03%	0.48%	6.55%**	4.93%*

Intensive Inpatient TBI-specific interventions have no effect on outcomes

# NSI Outcomes

for Variables  
(Cases in Durham)



Completers have Reduced Vestibular Symptoms after PTSD Treatment with PE

Covariates appearing in the model are evaluated at the following values: Inpt vs Output = 1.66  
TBI\_Sever\_2\_level = 1.34

NSI Vestibular	NSI Balance Problems
<b>d = 0.47</b>	<b>d = 0.40</b>
0.05%	0.03%
0.48%	0.02%
<b>6.55%**</b>	<b>4.93%*</b>

Completed PE Tx

1.08%

1.74%

3.03%

0.48%

**6.55%\*\***

**4.93%\***

## Secondary Treatment Outcomes: Tampa Site Only

		<i>n</i>	Pre		Post		Cohen's <i>d</i>
			<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	
<b>Secondary Outcomes</b>							
<b>KBCI</b>	Inattention	28	76.46	11.35	64.85	12.73	0.85
	Impulsivity	28	65.75	11.02	57.54	8.98	1.14
	Apathy	28	69.81	11.48	58.17	10.00	1.12
	Unawareness	28	61.83	9.54	56.02	8.84	0.78
	Interpersonal Difficulties	28	64.71	8.99	54.86	8.19	1.14
	Communication Problems	28	64.13	11.42	58.60	10.88	0.70
	Emotional Adjustment	28	66.88	9.21	55.99	7.81	1.46
	Somatic Concerns	28	65.51	9.38	56.58	10.29	1.04
<b>Self-Efficacy</b>		29	57.59	17.64	88.36	23.66	2.03

# PE KBCI: Reliable Change & Clinically Significant Change

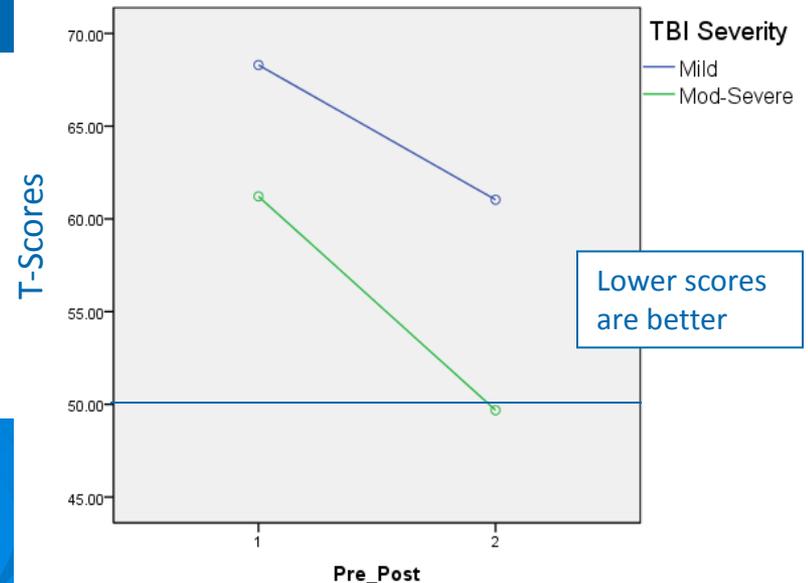
- 90% Confidence Interval for Reliable change (6.8 T-score points):
  - 60.7% had reliable improvement on the KBCI

# Amount of Unique Variance in KBCI Outcomes Associated with Different Predictor Variables

Predictor Variables	Inattention	Impulsivity	Apathy	Awareness Problems	Inter-personal Problems	Communic. Problems	Emotional Adjustmen t	Somatic Concerns
	<b>d = 0.85</b>	<b>d = 1.14</b>	<b>d = 1.12</b>	<b>d = 0.78</b>	<b>d = 1.14</b>	<b>d = 0.70</b>	<b>d = 1.46</b>	<b>d = 1.04</b>
TBI Severity	4.16%	0.49%	1.56%	5.48%	0.49%	5.48%	4.33%	<b>10.82%*</b>
Inpatient v. Out-patient	5.71%	2.10%	2.02%	1.46%	2.56%	0.01%	0.86%	0.26%



Somatic Concerns Outcomes



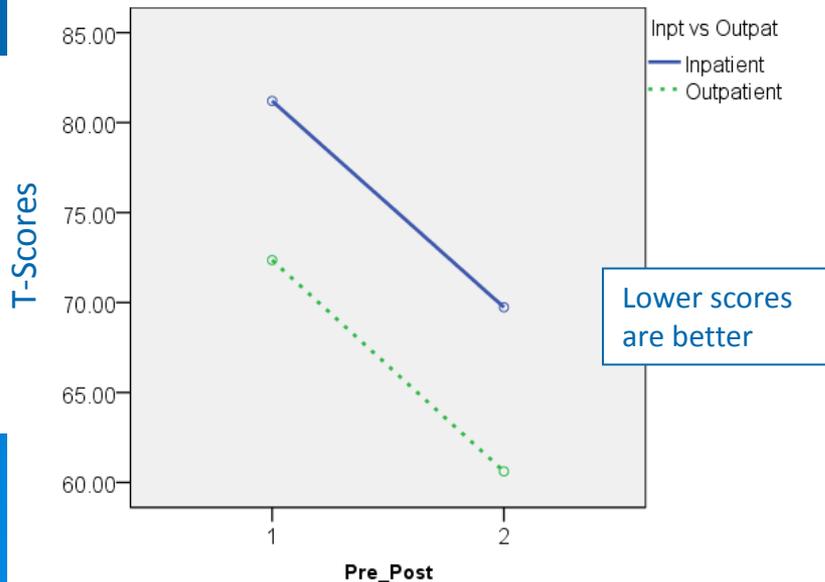
# Amount of Unique Variance in KBCI Outcomes Associated with Different Predictor Variables

Predictor Variables	KBCI Inattention
	<b>d = 0.85</b>
TBI Severity	4.16%
Inpatient v. Out-patient	5.71%

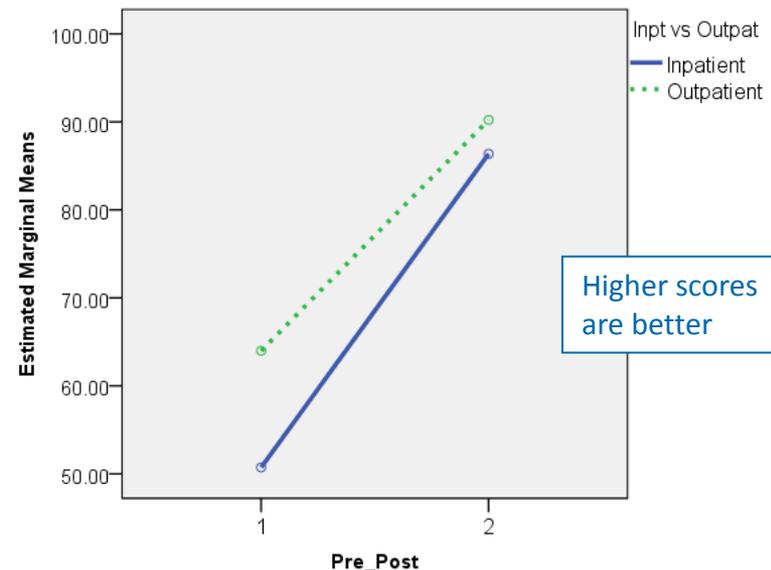
← Not Significant →

Predictor Variables	Self-Efficacy
	<b>d = 2.03</b>
TBI Severity	0.23%
Inpatient v. Out-patient	4.08%

**Inattention Outcomes**



**Self-Efficacy Outcomes**



Compare Treatment  
Effectiveness between

**SCORE/Cog Rehab**

versus

**Prolonged Exposure Therapy**

# Cog Rehab & PE Effect Size Comparison

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Treatment Effect Sizes in the  
SCORE versus Prolonged Exposure Studies:  
Pre- to Post-TX Comparisons:

	SCORE	PE	<u>Cohen's d</u>	<u>Cohen's d</u>
PCL	0.22	1.36		
NSI	0.50	1.09		
KBCI	0.41	1.55		

SCORE Study includes only Arms 3 and 4 (the effective treatment arms)

# Cog Rehab & PE Effect Size Comparison

Treatment Effect Sizes in the  
SCORE versus Prolonged Exposure Studies:  
 Pre- to Post-TX Comparisons:

*J Head Trauma Rehabil*

Clinical  
Tx Program  
 0.34  
 0.72  
 Janak, Cooper  
 et al, (in press)

SCORE	PE	CPT-C
<u>Cohen's d</u>	<u>Cohen's d</u>	<u>Cohen's d</u>
PCL 0.22	1.36	1.21
NSI 0.50	1.09	0.68
KBCI 0.41	1.55	Walter, Kiefer, & Chard (2012)

Rehabilitation Psychology  
 2012, Vol. 57, No. 1, 13-17



SCORE Study includes only Arms 3 and 4 (the effective treatment arms)

# Compare Cog Rehab & PE on **KBCI**: 90% Confidence Interval Reliable Change

- Reliable change (6.9 T-score points):
  - SCORE Study = 21.0%
  - PE Study = 60.7%

# Pre- to Post-treatment Outcomes across Prolonged Exposure and SCORE Studies

## ITT: PE versus SCORE Cognitive Rehab Treatment

	PCL (PTSD)		NSI (Postconcussion)		KBCI (functional measure)	
	PE	SCORE <sup>1</sup>	PE	SCORE <sup>1</sup>	PE	SCORE <sup>1</sup>
<b>Cohen's d</b>	<b>1.36*</b>	<b>0.28</b>	<b>1.09*</b>	<b>0.50*</b>	<b>1.55*</b>	<b>0.51*</b>
<b>Average # Tx hrs in each Tx Approach</b>	<b>9.5</b>	<b>33.8</b>	<b>9.5</b>	<b>33.8</b>	<b>9.5</b>	<b>33.8</b>
<b>d / tx hrs (Effect Size per hour of Tx)</b>	<b>0.143</b>	<b>0.008</b>	<b>0.115</b>	<b>0.015</b>	<b>0.163</b>	<b>0.015</b>
<b>Comparative Tx Effectiveness across the Two Intervention Studies</b>	<b>17.9</b>	<b>1.0</b>	<b>7.7</b>	<b>1.0</b>	<b>10.9</b>	<b>1.0</b>

<sup>1</sup>Includes only SCORE participants with **both PTSD and TBI diagnoses** in **Arms 3 and 4** (the effective treatment arms).

# Summary and Conclusions

- PE is highly effective in treating PTSD, as well in treating comorbid:
  - Depression
  - Postconcussive symptoms (NSI)
  - Day-to-day cognitive performance (KBCI)
- Cognitive Rehabilitation (SCORE) is less effective in treating day-to-day cognitive performance (KBCI), and has minimal effect on:
  - PTSD
  - Depression
  - Day-to-day cognitive performance (KBCI)
- What clinicians do in PE matters
- What patients do in SCORE matters

# Thank-you





PTSD Consultation Program  
FOR PROVIDERS WHO TREAT VETERANS

(866) 948-7880 or [PTSDconsult@va.gov](mailto:PTSDconsult@va.gov)



Please enter your  
questions in the Q&A box  
and be sure to include your  
email address.

*The lines are muted to avoid background noise.*



PTSD Consultation Program  
FOR PROVIDERS WHO TREAT VETERANS

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*Employee Education System*

**VHA TRAIN**

Welcome users of VHA TRAIN!

To obtain continuing education credit  
please return to [www.vha.train.org](http://www.vha.train.org)  
after the lecture.





# PTSD Consultation Program FOR PROVIDERS WHO TREAT VETERANS

(866) 948-7880 or PTSDconsult@va.gov

CEU Process for users of VHA TRAIN (non-VA)

Registration → Attendance → Posttest → Certificate



*Register in  
TRAIN.*



*Listen to the  
lecture and  
download the  
slides from the  
"Files" pod.*



*Return to  
TRAIN for  
posttest and  
evaluation.*



*Follow the  
directions to  
print  
certificate.*



# PTSD Consultation Program FOR PROVIDERS WHO TREAT VETERANS

(866) 948-7880 or PTSDconsult@va.gov

## CEU Process (for VA employees)

Registration → Attendance → Posttest → Certificate



*Follow the link on the right under "Web Links" to register now.*



*Listen to the lecture and download the slides and brochure from the "Files" pod.*



*Return to TMS for posttest and evaluation.*



*Follow the directions in the brochure to print certificate.*



# PTSD Consultation Program

FOR PROVIDERS WHO TREAT VETERANS

(866) 948-7880 or  
PTSDconsult@va.gov



There is no charge for these services.

## Who can contact us?

Any provider treating Veterans with PTSD.

## Who are the consultants?

Experts at the National Center for PTSD including psychologists, social workers, physicians, and pharmacists.

### Ask us about

- Evidence-Based Treatment
- Medications
- Clinical Management
- Resources
- Assessment
- Referrals
- Educational Opportunities
- Improving Care
- Transitioning Veterans to VA Care

WWW.PTSD.VA.GOV



## What can you expect?

- It's easy to make a request
- Responses are quick
- Questions are answered by email or phone
- Calls are scheduled at your convenience



# PTSD Consultation Program

FOR PROVIDERS WHO TREAT VETERANS

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## UPCOMING TOPICS

*SAVE THE DATE: Third Wednesday of the Month from 2-3PM (ET)*

April 20	PTSD and Reintegration Stress	David Riggs, PhD
May 18	Chain Analysis: An Assessment Strategy for Targeting Trauma-Related Therapy	Sara Landes, PhD
June 15	Effective Pharmacotherapy for PTSD	Matthew Jeffreys, MD
July 20	Evidence-Based Couple Therapy for PTSD	Candice Monson, PhD
August 17	Shared Decision-Making for PTSD	Juliette Harik, PhD
October 19	Treating Anger and Aggression in Populations with PTSD	Leslie Morland, PhD

