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Veterans, Traumatic Brain Injury, Negative Psychiatric Outcomes, & Intervention Strategies

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Table 1. Classification of TBI Severity [3]

(If a patient meets criteria in more than one category of severity, the higher severity level is assigned)			
Criteria	**Mild**	**Moderate**	**Severe**
Structural imaging	Normal	Normal or abnormal	Normal or abnormal
Loss of Consciousness (LOC)	0-30 min	>30 min and <24 hours	>24 hours
Alteration of consciousness/ mental state (AOC)*	up to 24 hours	>24 hours; severity based on other criteria	
Posttraumatic amnesia (PTA)	0-1 day	>1 and <7 days	>7 days
Glasgow Coma Scale (GCS) (best available score in first 24 hours)**	13-15	9-12	<9

*Alteration of mental status must be immediately related to the trauma to the head. Typical symptoms would be looking and feeling dazed and uncertain of what is happening, confusion, and difficulty thinking clearly or responding appropriately to mental status questions, and being unable to describe events immediately before or after the trauma event.

**In April 2015, the DoD released a memorandum recommending against the use of GCS scores to diagnose TBI. See the memorandum for additional information.[3]

Military versus Civilian

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Objective

Describe lifetime history of TBI in Army Active Duty Soldiers returning from deployment to Afghanistan and/or Iraq

Rehabilitation Psychology

Characterization of Lifetime TBIs in a Cohort of Recently Deployed Soldiers: The Warrior Strong Study

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Objective: To describe and characterize the lifetime history of traumatic brain injury (TBI) among active duty soldiers returning from deployment to Afghanistan or Iraq. ***Method:*** Data were extracted from a larger parent study that was conducted at two large United States Army bases between 2009 and 2014 during Post-Deployment Health Assessment. The sample included 1,060 soldiers who sustained at least one TBI during their lifetime. ***Results:*** The Ohio State University TBI-Identification Method interview was administered to characterize individuals' total lifetime history of TBI. Soldiers reported sustaining a median of 2 lifetime TBIs. Slightly more than half of the sample without a most recent deployment-related TBI still reported a history of a lifetime TBI (some of which occurred during previous deployments). Most lifetime injuries reported were of mild severity; however, 6% of individuals reported a history of moderate/severe TBI. Blast was the most frequent mechanism associated with recent deployment related mild TBIs. ***Conclusion:*** Findings suggest that soldiers who screened positive, as well as those who screened negative, for a history of TBI during their recent deployment still endorsed a lifetime history of TBI. Future research is needed to explore the functional impact of multiple TBIs over one's lifetime to help inform screening, assessment, and treatment among military personnel.

Impact and Implications: Although soldiers in this sample mostly reported mild traumatic brain injuries (TBIs), 6% of individuals reported lifetime moderate to severe TBIs. Moreover, a number of soldiers reported a history of nondeployment TBIs. A history of such injuries may contribute to persistent post-TBI symptoms, as well as premilitary functional challenges. Additional research to investigate the timing, severity, and history of multiple TBIs on short- and long-term outcomes is indicated.

Keywords: traumatic brain injury, lifetime history, deployment, soldiers, OEF/OIF

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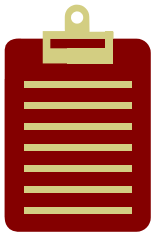
Methods & Materials

- Soldiers recruited from 2 U.S. Army bases between 2009 and 2014
- Warrior Strong TBI screen determined positive/negative TBI screen (Brief Traumatic Brain Injury Screen; BTBIS +/-)
  - TBI positive screen Soldiers preferentially invited to participate
- Following enrollment, Soldiers were interviewed using the Ohio State Traumatic Brain Injury Identification Method (OSU TBI-ID)



Brief Traumatic Brain Injury Screen (BTBIS)

S3. Did you have any injury(ies) during your deployment from any of the following? (check all that apply)

1. Fragment
2. Bullet
3. Vehicular (any type of vehicle, including airplane)
4. Fall
5. Explosion (IED, RPG, land mine, grenade, etc)
6. Other specify:_____

S4. Did any injury you received while deployed result in any of the following? (check all that apply)

1. Being dazed, confused, or "seeing stars"
2. Not remembering the injury
3. Losing consciousness (knocked out) for less than a minute
4. Losing consciousness for 1-20 minutes
5. Losing consciousness for longer than 20 minutes
6. Having any symptoms of concussion afterward (such as headache, dizziness, irritability, etc)
7. Head injury
8. None of the above

S5. Are you currently experiencing any of the following problems that you think might be related to a possible head injury or concussion? (check all that apply)

1. Headaches
2. Dizziness
3. Memory problems
4. Balance problems
5. Ringing in the ears
6. Irritability
7. Sleep problems
8. Other specify: _____

* These are selected items from the instrument identified in the paper as the BTBIS. The screen was designed generally without reference to head injury or traumatic brain injury in order to encourage as wide a report of possible TBI as possible. Items not shown here are questions regarding personal identifying information, helmet type, and deployment history. The entire form fits on a one-page scannable form.

Figure 1. Brief Traumatic Brain Injury Screen (BTBIS).*

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Screening for Traumatic Brain Injury in Troops Returning From Deployment in Afghanistan and Iraq: Initial Investigation of the Usefulness of a Short Screening Tool for Traumatic Brain Injury

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Participant Characteristics

Table 1. Demographics Characteristics

Characteristic	Total Sample with History of TBI (n=1,060)	BTBIS +/OSU + (Person n=505)	BTBIS -/OSU + (Person n=555)
Age at Assessment	26.9 (6.0)	26.8 (6.1)	27.0 (5.8)
Site			
Fort Carson	564 (53%)	308 (61%)	256 (46%)
Fort Bragg	496 (47%)	197 (39%)	299 (54%)
Sex			
Male	1001 (94%)	475 (94%)	526 (95%)
Female	59 (6%)	30 (6%)	29 (5%)
Race/Ethnicity			
Caucasian	736 (69%)	365 (72%)	371 (67%)
African American	94 (9%)	34 (7%)	60 (11%)
Hispanic	131 (12%)	57 (11%)	74 (13%)
Multiple/Other	99 (9%)	49 (10%)	50 (9%)
Number of Deployments			
Mean (SD)	1.9 (1.0)	1.9 (1.0)	1.9 (1.0)
Median (Range)	2 (1-4)	2 (1-4)	2 (1-4)

Participant Level Data

	Total Sample	BTBIS +/OSU +	BTBIS -/OSU +
Characteristic	n (%)		
Number of Reported TBIs			
1	432 (41%)	161 (32%)	271 (49%)
2	252 (24%)	112 (22%)	140 (25%)
3	169 (16%)	100 (20%)	69 (12%)
4	100 (9%)	58 (11%)	42 (8%)
5	51 (5%)	35 (7%)	16 (3%)
6+	56 (5%)	39 (8%)	17 (3%)

Many who screened negative for TBI had a positive lifetime history of TBI

Lifetime TBI's

BTBIS +/OSU + (Person n=505) 2.7 (mean)

BTBIS -/OSU + (Person n=555) 2.0 (mean)

Total Sample (Person n = 1060) Median for both groups was 2

Participant Level Data

	Total Sample	BTBIS +/OSU +	BTBIS -/OSU +
Characteristic	**Median (Range) or n (%)**		
Age at First TBI	17 (1-45)	19 (1-45)	16 (3-43)
Years since First TBI	8 (0-43)	6 (0-42)	9 (0-43)
Age at Last TBI	23 (3-51)	24 (8-51)	21 (3-45)
Years Since Last TBI	1 (0-43)	0 (0-40)	4 (0-43)
Had a Deployment-related TBI	624 (59%)	448 (89%)	176 (32%)
Most Severe Injury was Moderate or Severe	59 (6%)	26 (5%)	33 (6%)
Average Age at Time of Moderate/Severe TBI	16 (3-42)	17.5 (6-42)	14 (3-25)

Deployment TBIs

Injury Level Data

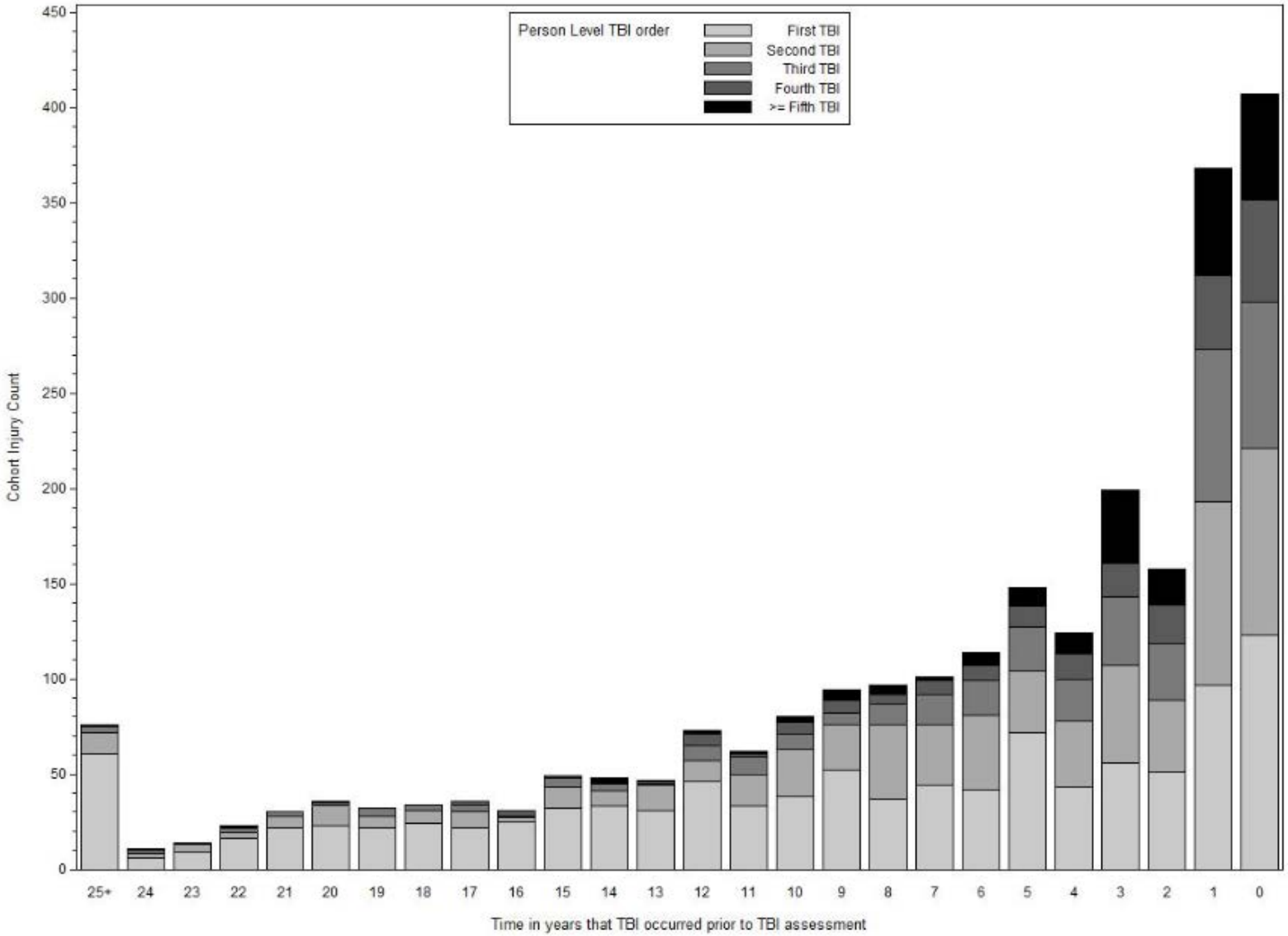
	Total Sample	BTBIS +/OSU+ (Injury n=718)	BTBIS -/OSU + (Injury n=252)
Characteristic	**Count (Percent)**		
Moderate or Severe Severity	4 (Less than 1%)	3 (Less than 1%)	1 (Less thank 1%)
Mechanism of Injury			
Blast	684 (71%)	495 (69%)	189 (75%)
Fall	84 (9%)	64 (9%)	20 (8%)
Assault	16 (2%)	14 (2%)	2 (1%)
Self-inflicted violence	0 (0%)	0 (0%)	0 (0%)
Sports	19 (2%)	14 (2%)	5 (2%)
Transportation	40 (4%)	29 (4%)	11 (4%)
Other	127 (13%)	102 (14%)	25 (10%)
Missing	0 (0%)	0 (0%)	0 (0%)
Medical Attention			
Hospitalized	52 (5%)	40 (6%)	12 (5%)
ER or Combat Medic	127 (13%)	106 (15%)	21 (8%)
Doctor's office, clinic or battalion aid	123 (13%)	99 (14%)	24 (10%)
Other healthcare provider	330 (34%)	255 (36%)	75 (30%)
None	328 (34%)	214 (30%)	114 (45%)
Missing	10 (1%)	0 (0%)	6 (2%)

Non-Deployment TBIs

Injury Level Data

	Total Sample	BTBIS + / OSU + (Injury n=650)	BTBIS - / OSU+ (Injury n=872)
Characteristic	**Count (Percent)**		
Moderate or Severe Severity	58 (4%)	24 (4%)	34 (4%)
Mechanism of Injury			
Blast	10 (1%)	5 (1%)	5 (1%)
Fall	333 (22%)	132 (20%)	201 (23%)
Assault	174 (11%)	81 (12%)	0 (0%)
Self-inflicted violence	2 (0%)	2 (0%)	93 (11%)
Sports	579 (38%)	237 (36%)	342 (39%)
Transportation	280 (18%)	126 (19%)	154 (18%)
Other	141 (9%)	66 (10%)	75 (1%)
Missing	3 (0%)	1 (0%)	2 (0%)
Medical Attention			
Hospitalized	142 (9%)	65 (10%)	77 (9%)
ER or Combat Medic	384 (25%)	164 (25%)	220 (25%)
Doctor's office, clinic or battalion aid	96 (6%)	36 (6%)	60 (7%)
Other healthcare provider	256 (17%)	116 (18%)	140 (16%)
None	627 (41%)	263 (40%)	364 (42%)
Missing	17 (1%)	6 (1%)	11 (1%)

Lifetime TBIs


Person Level TBI order
First TBI
Second TBI
Third TBI
Fourth TBI
>= Fifth TBI
Cohort Injury Count
0
50
100
150
200
250
300
350
400
450
25+
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Time in years that TBI occurred prior to TBI assessment

Conclusions

- Data suggests that Service Members often have a history of TBI prior to entering military service
- Screening negative for history of TBI (deployment-related) does not mean that you have a negative TBI history (lifetime)
- Those who report a recent TBI are likely to have a poorly documented history of prior TBIs - which may impact thinking about recovery time

Epidemiology and prognosis of mild traumatic brain injury in returning soldiers

A cohort study

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ABSTRACT

Objective: Mild traumatic brain injury (mTBI; concussion) is common in returning service members yet limited definitive evidence exists on its prognosis.

Methods: Almost 25,000 non-medically evacuated soldiers returning from Afghanistan or Iraq to 2 military bases between 2009 and 2014 were screened for mTBI. We invited a random sample to participate in the present study, oversampling those screening positive, resulting in 557 mTBI cases and 1,010 controls, of whom 366 cases and 599 controls completed 3-month follow-up evaluations. The criterion measure of screened mTBI was the Ohio State University Traumatic Brain Injury Identification Method. Postconcussive symptoms (PCS) were measured at follow-up with the Neurobehavioral Symptom Inventory. Symptoms reported at a severe or very severe level were considered clinically relevant.

Results: About half (47%) of soldiers who had sustained an mTBI during this latest deployment reported PCS at 3-month follow-up vs 25% of controls: adjusted odds ratio 2.4 (1.8–3.2). The most commonly reported symptoms (cases vs controls) were sleep problems (30% vs 14%), forgetfulness (21% vs 9%), irritability (17% vs 8%), and headaches (15% vs 5%). mTBI cases were about twice as likely as controls to report receiving rehabilitative services and fair or poor health. Other predictors of PCS included posttraumatic stress, combat exposure, and noncephalic pain. A majority of both cases and controls reported traumatic brain injuries predating this latest deployment.

Conclusions: In this nonclinical population of recently deployed soldiers, a substantial proportion of those who had sustained an mTBI were symptomatic 3 months postdeployment. Future studies need to include longer follow-up to measure symptom resolution.

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GLOSSARY

DoD/DVA = Department of Defense/Department of Veterans Affairs; **DSM-IV** = *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition; **LOC** = loss of consciousness; **MOS** = military occupational specialties; **mTBI** = mild traumatic brain injuries; **NSI** = Neurobehavioral Symptom Inventory; **OSU TBI-ID** = Ohio State University Traumatic Brain Injury Identification Method; **PCL-C** = Post-Traumatic Stress Disorder Checklist–Civilian Version; **PCS** = postconcussive symptoms; **PTS** = posttraumatic stress; **TBI** = traumatic brain injury.

Table 3 Three-month outcomes by traumatic brain injury (TBI) status at screening interview

	TBI status at baseline screening interview							
	A: TBI-negative controls (n = 599)		TBI-positive cases (stratified by baseline PTS screening status)					
			B: TBI + PTS (n = 54)		C: TBI − PTS (n = 289)		D: All TBI cases (n = 366)	
	%	AOR[a]	%	AOR[a]	%	AOR[a]	%	AOR[a]
% with 1 + severe/very severe symptom	25	1.0 (ref)	71	6.3 (3.3–12.1)	41	1.8 (1.3–2.5)[b]	47	2.4 (1.8–3.2)
Received rehabilitation services	10	1.0 (ref)	27	3.6 (1.7–7.3)	18	2.0 (1.3–3.1)	20	2.3 (1.5–3.4)
Self-reported fair/poor health	15	1.0 (ref)	38	3.4 (1.8–6.4)	27	2.1 (1.4–3.0)	30	2.4 (1.7–3.4)
Work problems (worse off)	14	1.0 (ref)	28	2.0 (1.01–3.8)	18	1.1 (0.8–1.7)[c]	21	1.4 (0.96–2.0)

[a] Adjusted odds ratio (AOR), adjusted for age (age, age^2), sex, military occupational specialties (MOS) (combat, noncombat), race (white, black, Hispanic, other/multiple), rank (E1–E4, E5–E6, E7–E9, chief warrant/officer), educational level, study site (Fort Carson, Fort Bragg).
[b] AORs different in TBI cases with and without posttraumatic stress (PTS) ($p = 0.003$).
[c] Significant interaction by study site although odds ratio not significant for either site.
Symptoms from neurobehavioral symptom inventory are scaled from 0 to 4, with severe and very severe symptoms rated as 3 or higher; limited to participants who completed both the baseline and 3-month interviews (n = 23 missing/refused PTS screen among TBI cases; number of missing cases for each variable of interest: total symptoms, 37; rehabilitation, 40; health, 16; work problems, 14; received rehabilitation services since last deployment ["Since your last deployment, have you received any rehabilitation (rehab) for health or medical problems resulting from your service in the military?"; "In general, would you say your health is … excellent/very good/good/fair/poor"; outcome is "fair or poor"; "Are you better off, about the same, or worse off now than before your first deployment to theater (work including employment/school/home management)"; outcome is "worse off"]).

Table 2 Prevalence of neurobehavioral symptoms at 3 months by traumatic brain injury (TBI) status at screening interview

	TBI status at screening interview	
Severe/very severe symptom at 3 months	TBI-positive cases (n = 358), %	TBI-negative controls (n = 596), %
Sleep	30	14
Forgetful	21	9
Irritation	17	8
Headaches	15	5
Fatigue	12	4
Concentration	12	6
Hearing	11	4
Anxiety	11	3
Frustration	10	4
Thinking	8	3
Light	7	2
Noise	7	2
Decisions	6	2
Appetite	5	2
Depression	4	2
Nausea	3	1
Numbness	3	2
Coordination	2	1
Vision	2	1
Dizzy	1	<1
Balance	1	<1
Taste	1	<1
% with 1 + severe/very severe symptom	47	25

Symptoms from neurobehavioral symptom inventory are scaled from 0 to 4, with severe and very severe symptoms rated as 3 or higher, defined as follows: 3: "Severe—Frequently present and disrupts activities; I can only do things that are fairly simple or take little effort; I feel like I need help"; 4: "Very Severe—Almost always present and I have been unable to perform at work, school, or home due to this problem; I probably cannot function without help." Limited to participants who completed both the baseline and 3-month interviews, excluding 11 participants with possible symptom exaggeration (see Methods). Participant classification based on postdeployment screening (see Methods): no TBI (controls); TBI screen positive (cases).

Increased Rates of Mental Health Conditions in those with mTBI

Article

The Psychiatric Sequelae of Traumatic Injury

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Objective: Traumatic injury affects millions of people each year. There is little understanding of the extent of psychiatric illness that develops after traumatic injury or of the impact of mild traumatic brain injury (TBI) on psychiatric illness. The authors sought to determine the range of new psychiatric disorders occurring after traumatic injury and the influence of mild TBI on psychiatric status.

Method: In this prospective cohort study, patients were drawn from recent admissions to four major trauma hospitals across Australia. A total of 1,084 traumatically injured patients were initially assessed during hospital admission and followed up 3 months (N=932, 86%) and 12 months (N=817, 75%) after injury. Lifetime psychiatric diagnoses were assessed in hospital. The prevalence of psychiatric disorders, levels of quality of life, and mental health service use were assessed at the follow-ups. The main outcome measures were 3- and 12-month prevalence of axis I psychiatric disorders, levels of quality of life, and mental health service use and lifetime axis I psychiatric disorders.

Results: Twelve months after injury, 31% of patients reported a psychiatric disorder, and 22% developed a psychiatric disorder that they had never experienced before. The most common new psychiatric disorders were depression (9%), generalized anxiety disorder (9%), posttraumatic stress disorder (6%), and agoraphobia (6%). Patients were more likely to develop posttraumatic stress disorder (odds ratio=1.92, 95% CI=1.08–3.40), panic disorder (odds ratio=2.01, 95% CI=1.03–4.14), social phobia (odds ratio=2.07, 95% CI=1.03–4.16), and agoraphobia (odds ratio=1.94, 95% CI=1.11–3.39) if they had sustained a mild TBI. Functional impairment, rather than mild TBI, was associated with psychiatric illness.

Conclusions: A significant range of psychiatric disorders occur after traumatic injury. The identification and treatment of a range of psychiatric disorders are important for optimal adaptation after traumatic injury.

(Am J Psychiatry 2010; 167:312–320)

Traumatic injury is a common occurrence, with over 2 million people hospitalized in the United States each year following nonfatal injuries (1). Traumatic injury has been shown to be the leading cause of trauma-related psychiatric disorders and hence represents a major public health issue (2, 3). Most attention has focused on the incidence of posttraumatic stress disorder (PTSD) and depression after traumatic injury. Studies indicate that 10%–20% of traumatic injury survivors develop PTSD (4, 5) and 9%–15% develop major depressive disorder (4, 6). Our understanding of the psychiatric impact of traumatic injury has been limited by several factors, however. The focus on PTSD and depression has resulted in a relative neglect of the broad range of psychiatric disorders that can arise after traumatic injury. Some small studies suggest increased rates of anxiety and substance use disorders after traumatic injury (4, 7, 8), but most studies indicate that psychiatric disorders after trauma are typically comorbid with PTSD (9). There remains an outstanding need to evaluate the full range of psychiatric sequelae to traumatic injury.

Another critical issue in the study of traumatic injury has to do with the potential role of mild traumatic brain injury (TBI), which involves transient diminished consciousness following an insult to the brain. Mild TBI represents a major public health issue; the incidence of hospitalized adult patients with mild TBI ranges from 100 to 300/100,000 per year (10). The role of TBI in posttraumatic psychiatric illness has been controversial. Although there is some evidence of comparable rates of PTSD in mild TBI and non-TBI samples (11), some commentators have suggested that impaired consciousness after TBI limits awareness of the traumatic nature of the injury and thus is protective against subsequent PTSD (12). Consistent with this proposal, there is evidence that poorer memory of the traumatic injury after mild TBI is protective against PTSD (13, 14). Several large-scale studies of psychiatric illness associated with TBI have been reported (15–17). For example, based on a large-scale study of 939 health plan members, Fann and colleagues (15) reported that patients with mild TBI were 2.8 times more likely to develop a psychiatric disorder than patients with no TBI. These studies

This article is featured in this month's AJP Audio and is the subject of a CME course (p. 359).

1 year post injury:

- 31% reported psychiatric disorder
- 22% developed new psychiatric disorder

Most common new psychiatric disorders:

- Depression (9%)
- Generalized anxiety disorder (9%)
- Posttraumatic stress disorder (6%)
- Agoraphobia (6%)

TBI and Depression

ORIGINAL CONTRIBUTION

Rates of Major Depressive Disorder and Clinical Outcomes Following Traumatic Brain Injury

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Nancy R. Temkin, PhD
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Jason Barber, MS
Sureyya S. Dikmen, PhD

Context Uncertainties exist about the rates, predictors, and outcomes of major depressive disorder (MDD) among individuals with traumatic brain injury (TBI).

Objective To describe MDD-related rates, predictors, outcomes, and treatment during the first year after TBI.

Design Cohort from June 2001 through March 2005 followed up by structured telephone interviews at months 1 through 6, 8, 10, and 12 (data collection ending February 2006).

Setting Harborview Medical Center, a level I trauma center in Seattle, Washington.

Participants Five hundred fifty-nine consecutively hospitalized adults with complicated mild to severe TBI.

Main Outcome Measures The Patient Health Questionnaire (PHQ) depression and anxiety modules were administered at each assessment and the European Quality of Life measure was given at 12 months.

Results Two hundred ninety-seven of 559 patients (53.1%) met criteria for MDD at least once in the follow-up period. Point prevalences ranged between 31% at 1 month and 21% at 6 months. In a multivariate model, risk of MDD after TBI was associated with MDD at the time of injury (risk ratio [RR], 1.62; 95% confidence interval [CI], 1.37-1.91), history of MDD prior to injury (but not at the time of injury) (RR, 1.54; 95% CI, 1.31-1.82), age (RR, 0.61; 95% CI, 0.44-0.83 for ≥60 years vs 18-29 years), and lifetime alcohol dependence (RR, 1.34; 95% CI, 1.14-1.57). Those with MDD were more likely to report comorbid anxiety disorders after TBI than those without MDD (60% vs 7%; RR, 8.77; 95% CI, 5.56-13.83). Only 44% of those with MDD received antidepressants or counseling. After adjusting for predictors of MDD, persons with MDD reported lower quality of life at 1 year compared with the nondepressed group.

Conclusions Among a cohort of patients hospitalized for TBI, 53.1% met criteria for MDD during the first year after TBI. Major depressive disorder was associated with history of MDD and was an independent predictor of poorer health-related quality of life.

JAMA. 2010;303(19):1938-1945 www.jama.com

TRAUMATIC BRAIN INJURY (TBI) is a major cause of disability in the United States[1] and a signature injury among wounded soldiers.[2] Assessment and treatment of TBI typically focus on physical and cognitive impairments, yet psychological impairments represent significant causes of disability.[3] Major depressive disorder (MDD) may be the most common and disabling psychiatric condition in individuals with TBI.[4] Poorer cognitive functioning,[5] aggression and anxiety,[6,7] greater functional disability,[6,8] poorer recovery,[9] higher rates of suicide attempts,[10] and greater health care costs[11] are thought to be associated with MDD after TBI.

Despite considerable research, the rates, predictors, and outcomes of MDD after TBI remain uncertain. Depression prevalence rates have ranged from 10% to 77%.[12] Small sample size, selection bias, retrospective reporting, use of measures without diagnostic validity, and failure to exclude patients who were depressed at the time of injury have limited studies of rates and correlates of TBI-related MDD.[13] More definitive studies could galvanize efforts to improve recognition and treatment of this important secondary condition. Therefore, we sought to describe the rate of MDD during the first year after TBI, multivariate predictors of MDD, MDD-related comorbidities, and the relationship of MDD to 1-year quality-of-life outcomes in a large prospectively studied sample of consecutive patients hospitalized for complicated mild to severe TBI.

METHODS

This study was the recruitment phase of a clinical trial investigating the efficacy of sertraline for MDD after TBI. The trial is completed and the outcome analysis is in progress. Eligibility criteria for the cohort study were admission to Harborview Medical Center (a level I trauma center in Seattle, Washington) with TBI and radiological evidence of acute, traumatically induced brain abnormality or Glasgow Coma Scale (GCS) score lower than 13 (based on the lowest score within 24 hours after admission or the first af-

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During the first year after TBI, 297 of 559 patients (53.1%) met criteria for MDD at least once. The point prevalence of MDD was highest the first month after TBI.

From: **Rates of Major Depressive Disorder and Clinical Outcomes Following Traumatic Brain Injury**

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The JAMA Network

During the first year after TBI, 297 of 559 patients (53.1%) met criteria for MDD at least once. The point prevalence of MDD was highest the first month after TBI.

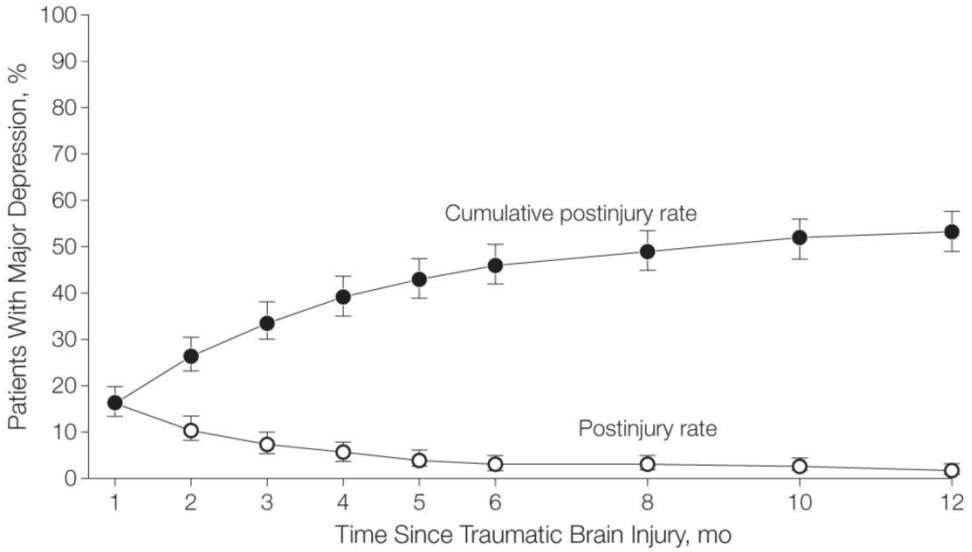

Figure Legend:

Postinjury rate is the proportion of cases ascertained with major depressive disorder for the first time after traumatic brain injury at each assessment. The values underestimate the true rates because not all participants were assessed at each time. Error bars indicate 95% confidence intervals.

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ORIGINAL ARTICLE

Major and Minor Depression After Traumatic Brain Injury

Tessa Hart, PhD, Lisa Brenner, PhD, Allison N. Clark, PhD, Jennifer A. Bogner, PhD, Thomas A. Novack, PhD, Inna Chervoneva, PhD, Risa Nakase-Richardson, PhD, Juan Carlos Arango-Lasprilla, PhD

ABSTRACT. Hart T, Brenner L, Clark AN, Bogner JA, Novack TA, Chervoneva I, Nakase-Richardson R, Arango-Lasprilla JC. Major and minor depression after traumatic brain injury. Arch Phys Med Rehabil 2011;92:1211-9.

Objective: To examine minor as well as major depression at 1 year posttraumatic brain injury (TBI), with particular attention to the contribution of depression severity to levels of societal participation.

Design: Observational prospective study with a 2-wave longitudinal component.

Setting: Inpatient rehabilitation centers, with 1-year follow up conducted primarily by telephone.

Participants: Persons with TBI (N=1570) enrolled in the TBI Model System database and followed up at 1-year postinjury.

Interventions: Not applicable.

Main Outcome Measures: FIM, Patient Health Questionnaire-9, Participation Assessment with Recombined Tools-Objective, Glasgow Outcome Scale-Extended, and the Satisfaction With Life Scale.

Results: Twenty-two percent of the sample reported minor depression, and 26% reported major depression at 1-year post-TBI. Both levels of depression were associated with sex (women), age (younger), preinjury mental health treatment and substance abuse, and cause of injury (intentional). There was a monotonic dose-response relationship between severity of depression and all 1-year outcomes studied, including level of cognitive and physical disability, global outcome, and satisfaction with life. With other predictors controlled, depression severity remained significantly associated with the level of societal participation at 1-year post-TBI.

Conclusions: Minor depression may be as common as major depression after TBI and should be taken seriously for its association to negative outcomes related to participation and quality of life. Findings suggest that, as in other populations, minor and major depression are not separate entities, but exist on a continuum. Further research should determine whether people with TBI traverse between the 2 diagnoses as in other patient groups.

From the Moss Rehabilitation Research Institute, Elkins Park, PA (Hart); VISN 19 Mental Illness, University of Colorado School of Medicine and Craig Hospital, Denver, CO (Brenner); Baylor College of Medicine and TIRR Memorial Hermann, Houston, TX (Clark); Ohio State University, Columbus, OH (Bogner); University of Alabama at Birmingham, Birmingham, AL (Novack); Thomas Jefferson University, Philadelphia, PA (Chervoneva); James A. Haley Veterans Hospital, Tampa, FL (Nakase-Richardson), and University of South Florida, Tampa, FL (Nakase-Richardson); and Virginia Commonwealth University, Richmond, VA (Arango-Lasprilla).

Supported by the National Institute on Disability and Rehabilitation Research (grant nos. H133A070040, H133A070039, H133A070022, H133A070029, H133A070036, and H133A070043).

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doi:10.1016/j.apmr.2011.03.005

Key Words: Brain injuries; Depression; Rehabilitation.

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TRAUMATIC BRAIN INJURY (TBI) can cause major changes in cognitive, physical, and emotional functioning.[1] Depression, characterized by symptoms including depressed mood, diminished capacity for pleasure, and fatigue, is the most frequently diagnosed psychiatric disorder after TBI.[2] Although estimates vary, the point prevalence rate of major depression after TBI may be greater than 25%[3-5] with a reported period prevalence of 42% to 52% within the first year postinjury.[4,6] A recent study estimated the rate of new depression (ie, excluding those who were depressed at the time of injury) to be 49% in the first year.[7] Although studies differ as to sample size and composition, measures of depression, and measurement interval postinjury, demographic factors generally associated with greater risk of depression after TBI include age, with younger adults at greater risk than older adults,[7,8] and lower levels of education.[7,9] Findings for sex have been mixed: while in some studies women report more depression,[10] as in the general population,[11] in others the pattern is reversed.[9] The presence of premorbid psychiatric problems[10] and premorbid substance abuse[9] have also been cited as predictors. However, severity of injury, as judged by depth or duration of impaired consciousness, does not appear to be related to depression post-TBI.[7,9,12]

Depression after TBI is associated with unfavorable outcomes in many domains of societal participation. Depression has been linked to decreased social activity, community integration, employment, and participation in daily activities after TBI.[1,13] Individuals with TBI and major depression lasting more than 6 months exhibit deterioration in social functioning and performance of activities of daily living.[14] Chronic depression after TBI is also associated with decline in quality of life.[7,15] In a recent study of 100 people followed up to 5-years post-TBI, depression was strongly associated with worse occupational function.[16] Symptoms of depression or anxiety at the time of follow-up predicted interpersonal functioning and independent living status over and above the effects of demographic variables, preinjury psychiatric illness, and injury severity. In this study, similar results were found for both self-reported and proxy-reported outcomes, suggesting that the association was not simply due to self-reported outcomes being

List of Abbreviations

GCS	Glasgow Coma Scale
GOS-E	Glasgow Outcome Scale–Extended
PART-O	Participation Assessment With Recombined Tools–Objective
PHQ-9	Patient Health Questionnaire-9
PTA	posttraumatic amnesia
TBI	traumatic brain injury
TBIMS	Traumatic Brain Injury Model System

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"For clinicians involved in TBI rehabilitation, the incidence of minor as well as major depression observed in this study highlights the importance of assessing, treating, and (ideally) preventing depression."

Minor depression is diagnosis when 2-4 symptoms of depression persist for at least 2 weeks

ORIGINAL ARTICLE

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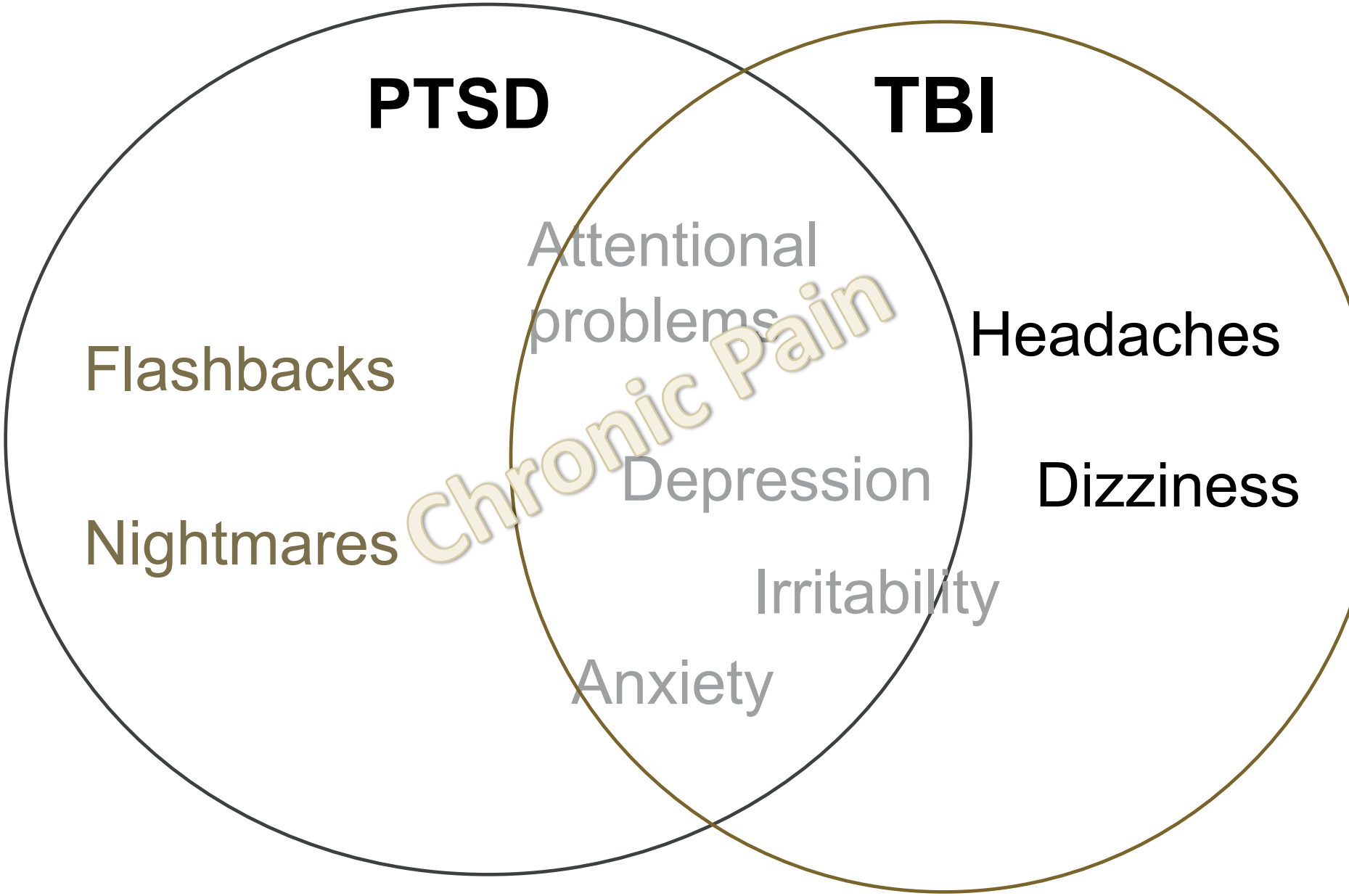
doi:10.1016/j.apmr.2011.03.005

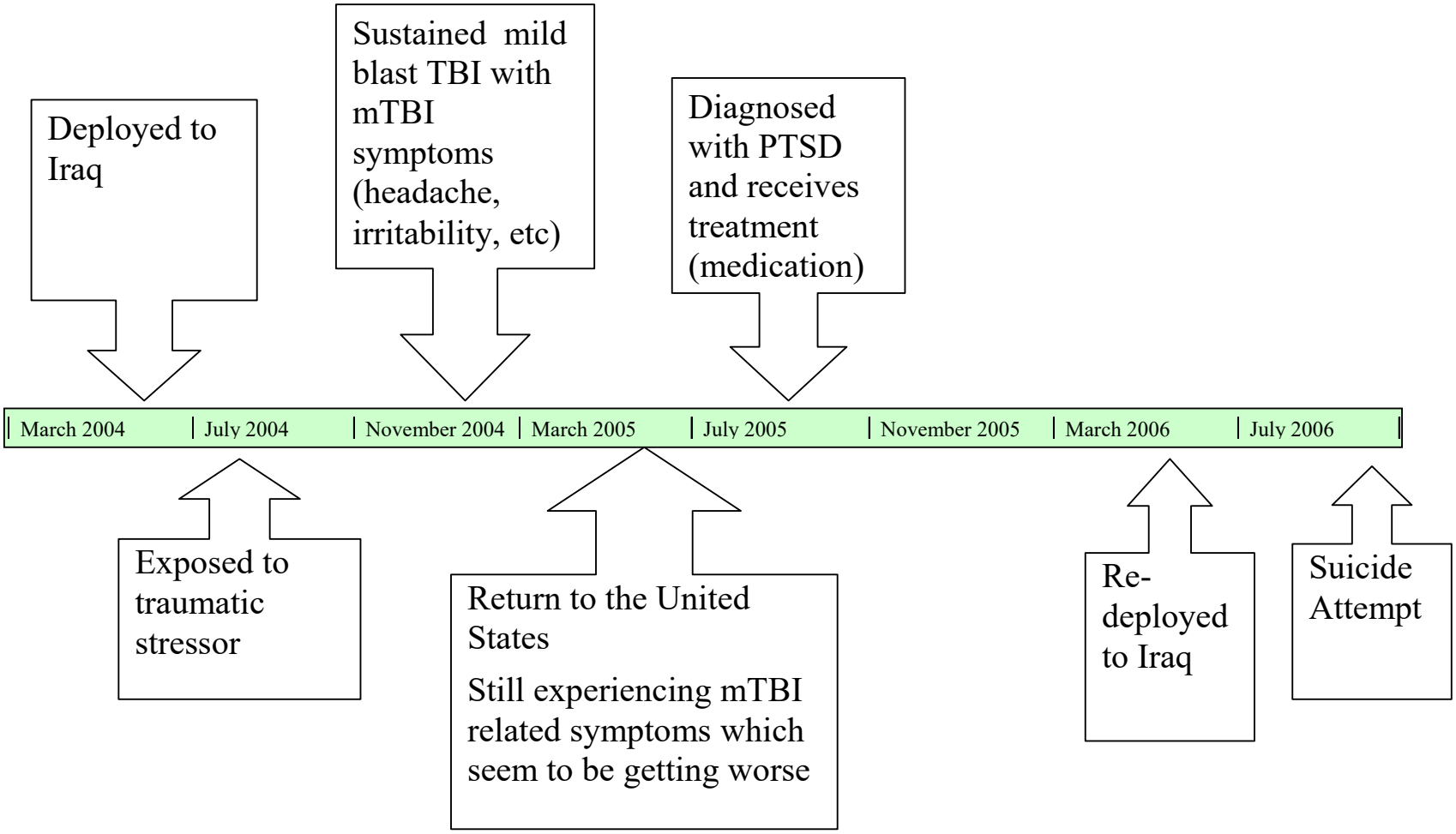
"3/4 of those with MDD at year 1 experienced clinically significant symptoms at year 2"

"…for those with depression at year 1 worsening at year 2 was associated with poor social support…pre-injury mental health issues including SA"

TBI and PTSD


PTSD
TBI
Attentional problems
Flashbacks
Chronic Pain
Headaches
Depression
Dizziness
Nightmares
Irritability
Anxiety

Case Example: mTBI and PTSD



Increased Rates of PTSD in those with Mild TBI

Article

The Psychiatric Sequelae of Traumatic Injury

Richard A. Bryant, Ph.D.
Meaghan L. O'Donnell, Ph.D.
Mark Creamer, Ph.D.
Alexander C. McFarlane, M.D.
C. Richard Clark, Ph.D.
Derrick Silove, M.D.

Objective: Traumatic injury affects millions of people each year. There is little understanding of the extent of psychiatric illness that develops after traumatic injury or of the impact of mild traumatic brain injury (TBI) on psychiatric illness. The authors sought to determine the range of new psychiatric disorders occurring after traumatic injury and the influence of mild TBI on psychiatric status.

Method: In this prospective cohort study, patients were drawn from recent admissions to four major trauma hospitals across Australia. A total of 1,084 traumatically injured patients were initially assessed during hospital admission and followed up 3 months (N=932, 86%) and 12 months (N=817, 75%) after injury. Lifetime psychiatric diagnoses were assessed in hospital. The prevalence of psychiatric disorders, levels of quality of life, and mental health service use were assessed at the follow-ups. The main outcome measures were 3- and 12-month prevalence of axis I psychiatric disorders, levels of quality of life, and mental health service use and lifetime axis I psychiatric disorders.

Results: Twelve months after injury, 31% of patients reported a psychiatric disorder, and 22% developed a psychiatric disorder that they had never experienced before. The most common new psychiatric disorders were depression (9%), generalized anxiety disorder (9%), posttraumatic stress disorder (6%), and agoraphobia (6%). Patients were more likely to develop posttraumatic stress disorder (odds ratio=1.92, 95% CI=1.08–3.40), panic disorder (odds ratio=2.01, 95% CI=1.03–4.14), social phobia (odds ratio=2.07, 95% CI=1.03–4.16), and agoraphobia (odds ratio=1.94, 95% CI=1.11–3.39) if they had sustained a mild TBI. Functional impairment, rather than mild TBI, was associated with psychiatric illness.

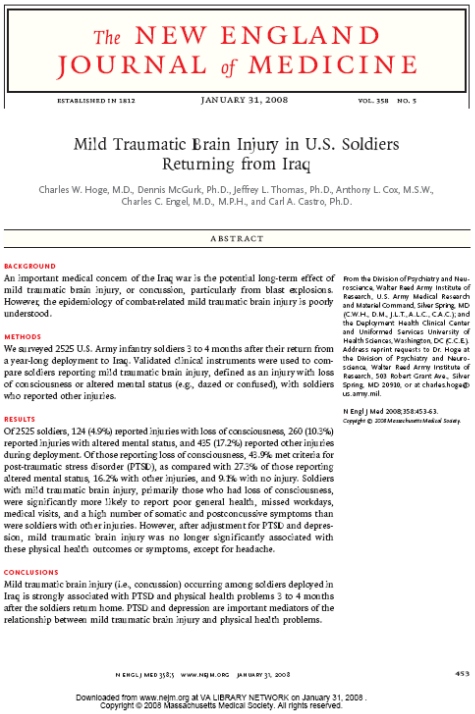
Conclusions: A significant range of psychiatric disorders occur after traumatic injury. The identification and treatment of a range of psychiatric disorders are important for optimal adaptation after traumatic injury.

(Am J Psychiatry 2010; 167:312–320)

Traumatic injury is a common occurrence, with over 2 million people hospitalized in the United States each year following nonfatal injuries (1). Traumatic injury has been shown to be the leading cause of trauma-related psychiatric disorders and hence represents a major public health issue (2, 3). Most attention has focused on the incidence of posttraumatic stress disorder (PTSD) and depression after traumatic injury. Studies indicate that 10%–20% of traumatic injury survivors develop PTSD (4, 5) and 9%–15% develop major depressive disorder (4, 6). Our understanding of the psychiatric impact of traumatic injury has been limited by several factors, however. The focus on PTSD and depression has resulted in a relative neglect of the broad range of psychiatric disorders that can arise after traumatic injury. Some small studies suggest increased rates of anxiety and substance use disorders after traumatic injury (4, 7, 8), but most studies indicate that psychiatric disorders after trauma are typically comorbid with PTSD (9). There remains an outstanding need to evaluate the full range of psychiatric sequelae to traumatic injury.

Another critical issue in the study of traumatic injury has to do with the potential role of mild traumatic brain injury (TBI), which involves transient diminished consciousness following an insult to the brain. Mild TBI represents a major public health issue; the incidence of hospitalized adult patients with mild TBI ranges from 100 to 300/100,000 per year (10). The role of TBI in posttraumatic psychiatric illness has been controversial. Although there is some evidence of comparable rates of PTSD in mild TBI and non-TBI samples (11), some commentators have suggested that impaired consciousness after TBI limits awareness of the traumatic nature of the injury and thus is protective against subsequent PTSD (12). Consistent with this proposal, there is evidence that poorer memory of the traumatic injury after mild TBI is protective against PTSD (13, 14). Several large-scale studies of psychiatric illness associated with TBI have been reported (15–17). For example, based on a large-scale study of 939 health plan members, Fann and colleagues (15) reported that patients with mild TBI were 2.8 times more likely to develop a psychiatric disorder than patients with no TBI. These studies

This article is featured in this month's AJP Audio and is the subject of a CME course (p. 359).



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 31, 2008 VOL. 358 NO. 5

Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq

Charles W. Hoge, M.D., Dennis McGurk, Ph.D., Jeffrey L. Thomas, Ph.D., Anthony L. Cox, M.S.W., Charles C. Engel, M.D., M.P.H., and Carl A. Castro, Ph.D.

ABSTRACT

BACKGROUND
An important medical concern of the Iraq war is the potential long-term effect of mild traumatic brain injury, or concussion, particularly from blast explosions. However, the epidemiology of combat-related mild traumatic brain injury is poorly understood.

METHODS
We surveyed 2525 U.S. Army infantry soldiers 3 to 4 months after their return from a year-long deployment to Iraq. Validated clinical instruments were used to compare soldiers reporting mild traumatic brain injury, defined as an injury with loss of consciousness or altered mental status (e.g., dazed or confused), with soldiers who reported other injuries.

RESULTS
Of 2525 soldiers, 124 (4.9%) reported injuries with loss of consciousness, 260 (10.3%) reported injuries with altered mental status, and 435 (17.2%) reported other injuries during deployment. Of those reporting loss of consciousness, 43.9% met criteria for post-traumatic stress disorder (PTSD), as compared with 27.3% of those reporting altered mental status, 16.2% with other injuries, and 9.1% with no injury. Soldiers with mild traumatic brain injury, primarily those who had loss of consciousness, were significantly more likely to report poor general health, missed workdays, medical visits, and a high number of somatic and postconcussive symptoms than were soldiers with other injuries. However, after adjustment for PTSD and depression, mild traumatic brain injury was no longer significantly associated with these physical health outcomes or symptoms, except for headache.

CONCLUSIONS
Mild traumatic brain injury (i.e., concussion) occurring among soldiers deployed in Iraq is strongly associated with PTSD and physical health problems 3 to 4 months after the soldiers return home. PTSD and depression are important mediators of the relationship between mild traumatic brain injury and physical health problems.

From the Division of Psychiatry and Neuroscience, Walter Reed Army Institute of Research, U.S. Army Medical Research and Material Command, Silver Spring, MD (C.W.H., D.M., J.L.T., A.L.C., C.A.C.); and the Deployment Health Clinical Center and Uniformed Services University of Health Sciences, Washington, DC (C.C.E.). Address reprint requests to Dr. Hoge at the Division of Psychiatry and Neuroscience, Walter Reed Army Institute of Research, 503 Robert Grant Ave., Silver Spring, MD 20910, or at charles.hoge@us.army.mil.

N Engl J Med 2008;358:453-63.
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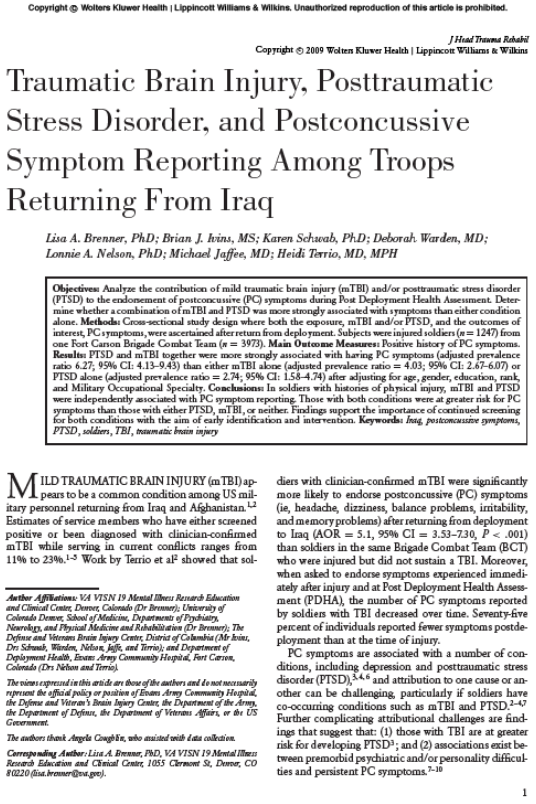
"Patients with mild TBI were twice as likely to develop PTSD [or other anxiety disorders]…"

"Mild traumatic brain injury (i.e., concussion) occurring among soldiers deployed in Iraq is strongly associated with PTSD…"

Increased Symptoms with TBI + PTSD

"In Soldiers with histories of physical injury, mTBI and PTSD were independently associated with PC symptom reporting. Those with both conditions were at greater risk for PC symptoms than those with either PTSD, mTBI, or neither."



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J Head Trauma Rehabil
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Traumatic Brain Injury, Posttraumatic Stress Disorder, and Postconcussive Symptom Reporting Among Troops Returning From Iraq

Lisa A. Brenner, PhD; Brian J. Ivins, MS; Karen Schwab, PhD; Deborah Warden, MD; Lonnie A. Nelson, PhD; Michael Jaffee, MD; Heidi Terrio, MD, MPH

Objectives: Analyze the contribution of mild traumatic brain injury (mTBI) and/or posttraumatic stress disorder (PTSD) to the endorsement of postconcussive (PC) symptoms during Post Deployment Health Assessment. Determine whether a combination of mTBI and PTSD was more strongly associated with symptoms than either condition alone. **Methods:** Cross-sectional study design where both the exposure, mTBI and/or PTSD, and the outcomes of interest, PC symptoms, were ascertained after return from deployment. Subjects were injured soldiers ($n = 1247$) from one Fort Carson Brigade Combat Team ($n = 3973$). **Main Outcome Measures:** Positive history of PC symptoms. **Results:** PTSD and mTBI together were more strongly associated with having PC symptoms (adjusted prevalence ratio 6.27; 95% CI: 4.13–9.43) than either mTBI alone (adjusted prevalence ratio = 4.03; 95% CI: 2.67–6.07) or PTSD alone (adjusted prevalence ratio = 2.74; 95% CI: 1.58–4.74) after adjusting for age, gender, education, rank, and Military Occupational Specialty. **Conclusions:** In soldiers with histories of physical injury, mTBI and PTSD were independently associated with PC symptom reporting. Those with both conditions were at greater risk for PC symptoms than those with either PTSD, mTBI, or neither. Findings support the importance of continued screening for both conditions with the aim of early identification and intervention. **Keywords:** *Iraq, postconcussive symptoms, PTSD, soldiers, TBI, traumatic brain injury*

MILD TRAUMATIC BRAIN INJURY (mTBI) appears to be a common condition among US military personnel returning from Iraq and Afghanistan.[1,2] Estimates of service members who have either screened positive or been diagnosed with clinician-confirmed mTBI while serving in current conflicts ranges from 11% to 23%.[1-5] Work by Terrio et al[2] showed that soldiers with clinician-confirmed mTBI were significantly more likely to endorse postconcussive (PC) symptoms (ie, headache, dizziness, balance problems, irritability, and memory problems) after returning from deployment to Iraq (AOR = 5.1, 95% CI = 3.53–7.30, $P < .001$) than soldiers in the same Brigade Combat Team (BCT) who were injured but did not sustain a TBI. Moreover, when asked to endorse symptoms experienced immediately after injury and at Post Deployment Health Assessment (PDHA), the number of PC symptoms reported by soldiers with TBI decreased over time. Seventy-five percent of individuals reported fewer symptoms postdeployment than at the time of injury.

PC symptoms are associated with a number of conditions, including depression and posttraumatic stress disorder (PTSD),[3,4,6] and attribution to one cause or another can be challenging, particularly if soldiers have co-occurring conditions such as mTBI and PTSD.[2,4,7] Further complicating attributional challenges are findings that suggest that: (1) those with TBI are at greater risk for developing PTSD[3]; and (2) associations exist between premorbid psychiatric and/or personality difficulties and persistent PC symptoms.[7-10]

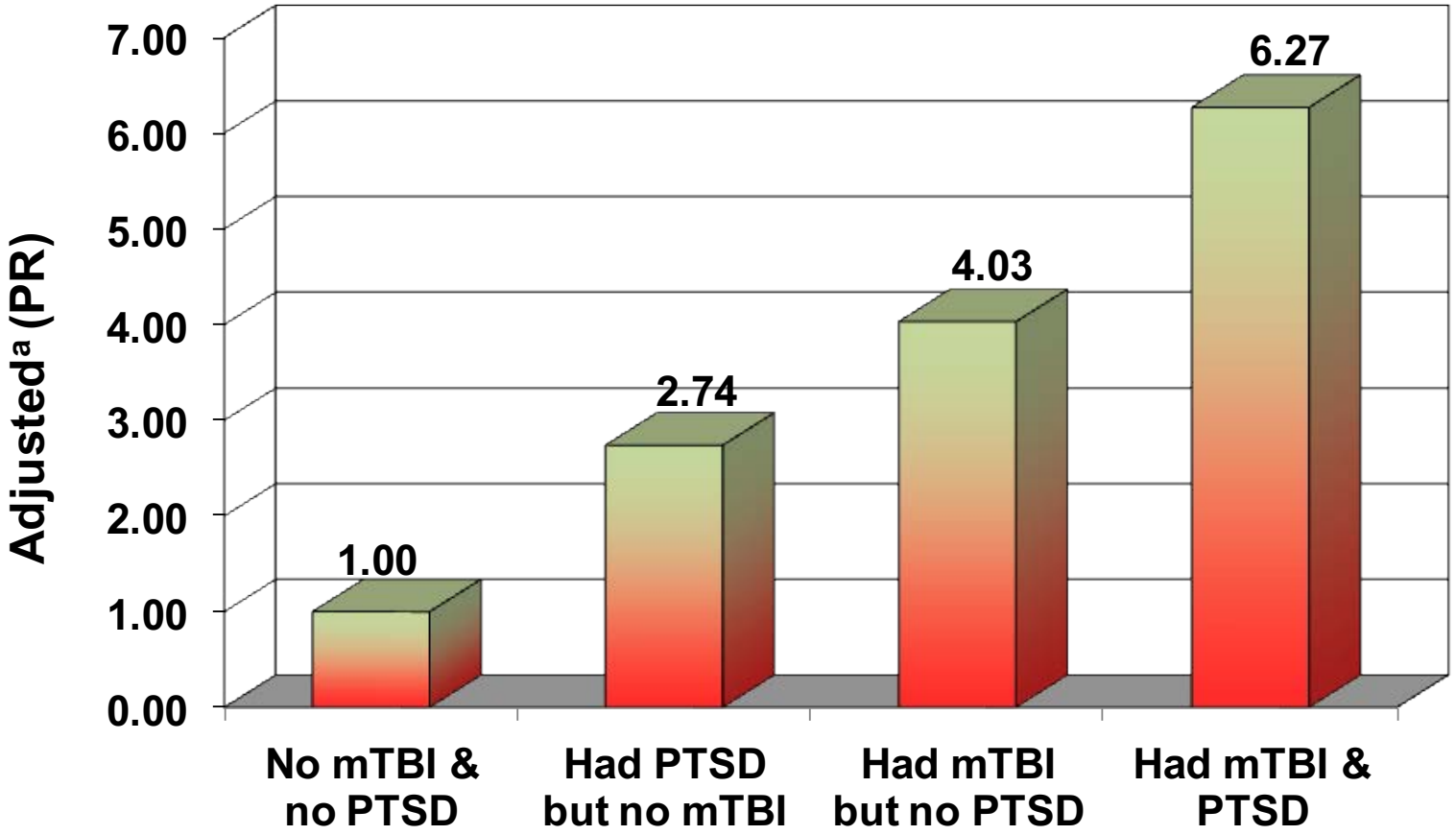
Author Affiliations: VA VISN 19 Mental Illness Research Education and Clinical Center, Denver, Colorado (Dr Brenner); University of Colorado Denver, School of Medicine, Departments of Psychiatry, Neurology, and Physical Medicine and Rehabilitation (Dr Brenner); The Defense and Veterans Brain Injury Center, District of Columbia (Mr Ivins, Drs Schwab, Warden, Nelson, Jaffe, and Terrio); and Department of Deployment Health, Evans Army Community Hospital, Fort Carson, Colorado (Drs Nelson and Terrio).

The views expressed in this article are those of the authors and do not necessarily represent the official policy or position of Evans Army Community Hospital, the Defense and Veteran's Brain Injury Center, the Department of the Army, the Department of Defense, the Department of Veterans Affairs, or the US Government.

The authors thank Angela Coughlin, who assisted with data collection.

Corresponding Author: Lisa A. Brenner, PhD, VA VISN 19 Mental Illness Research Education and Clinical Center, 1055 Clermont St, Denver, CO 80220 (lisa.brenner@va.gov).

Symptom-Exposure: Any Symptoms (n = 389)

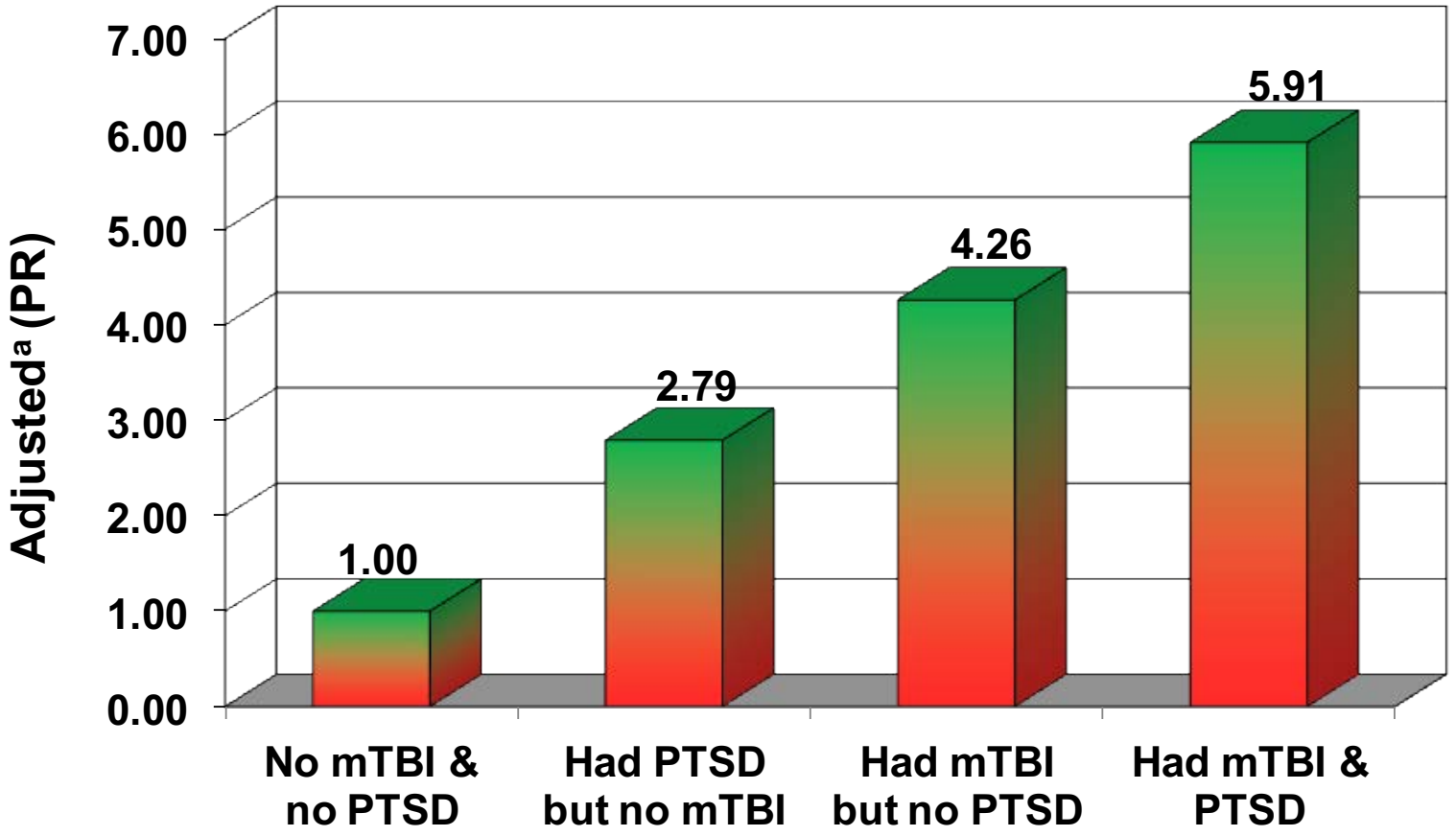


[a]Adjusted for age, gender, education, rank, and MOS

Brenner et al., 2009

Total number of Soldiers (N = 1247)

Symptom-Exposure: Headache (n = 204)

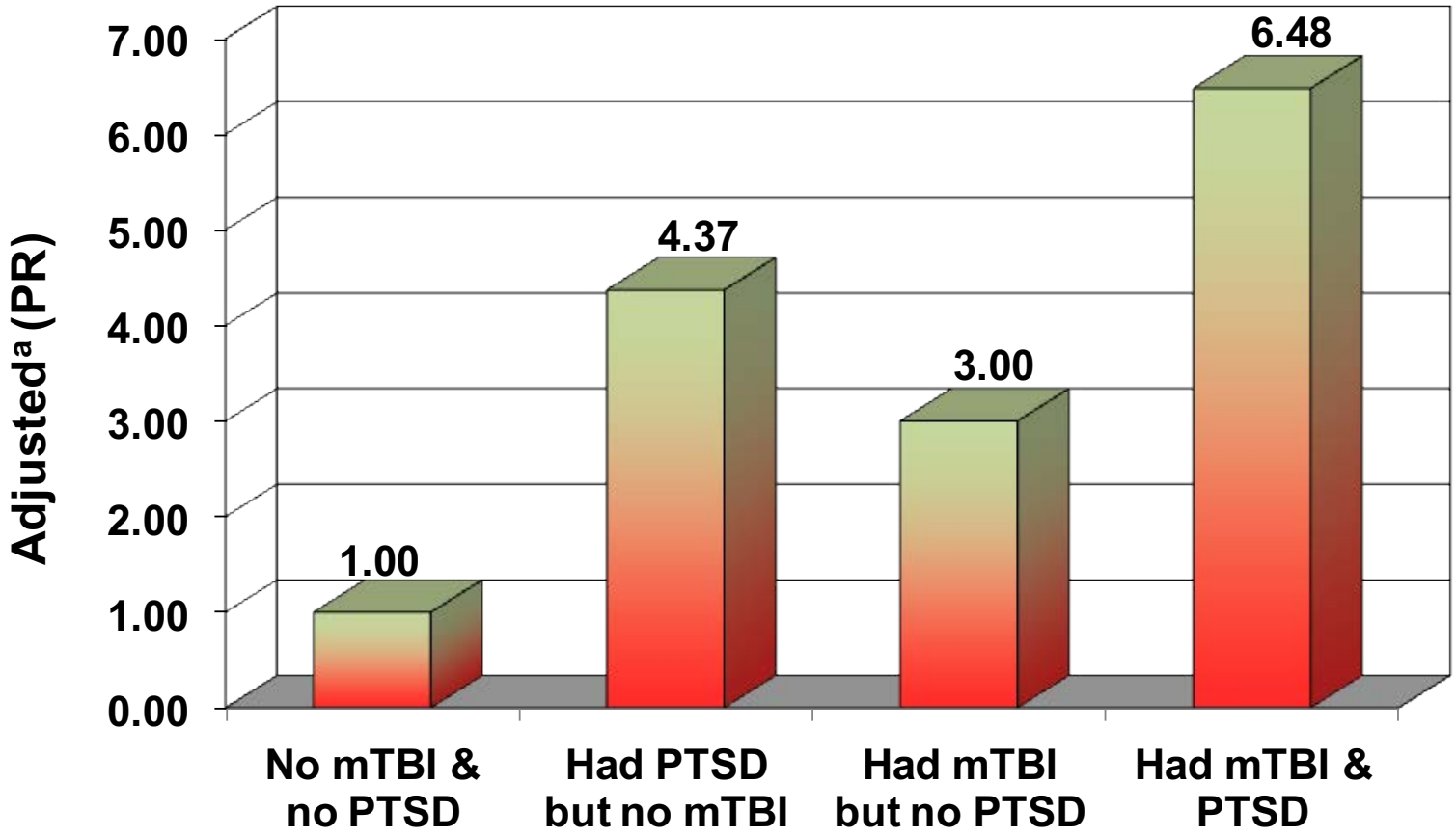


[a]Adjusted for age, gender, education, rank, and MOS

Brenner et al., 2009

Total number of soldiers (n = 1247)

Symptom-Exposure: Dizziness (n = 51)

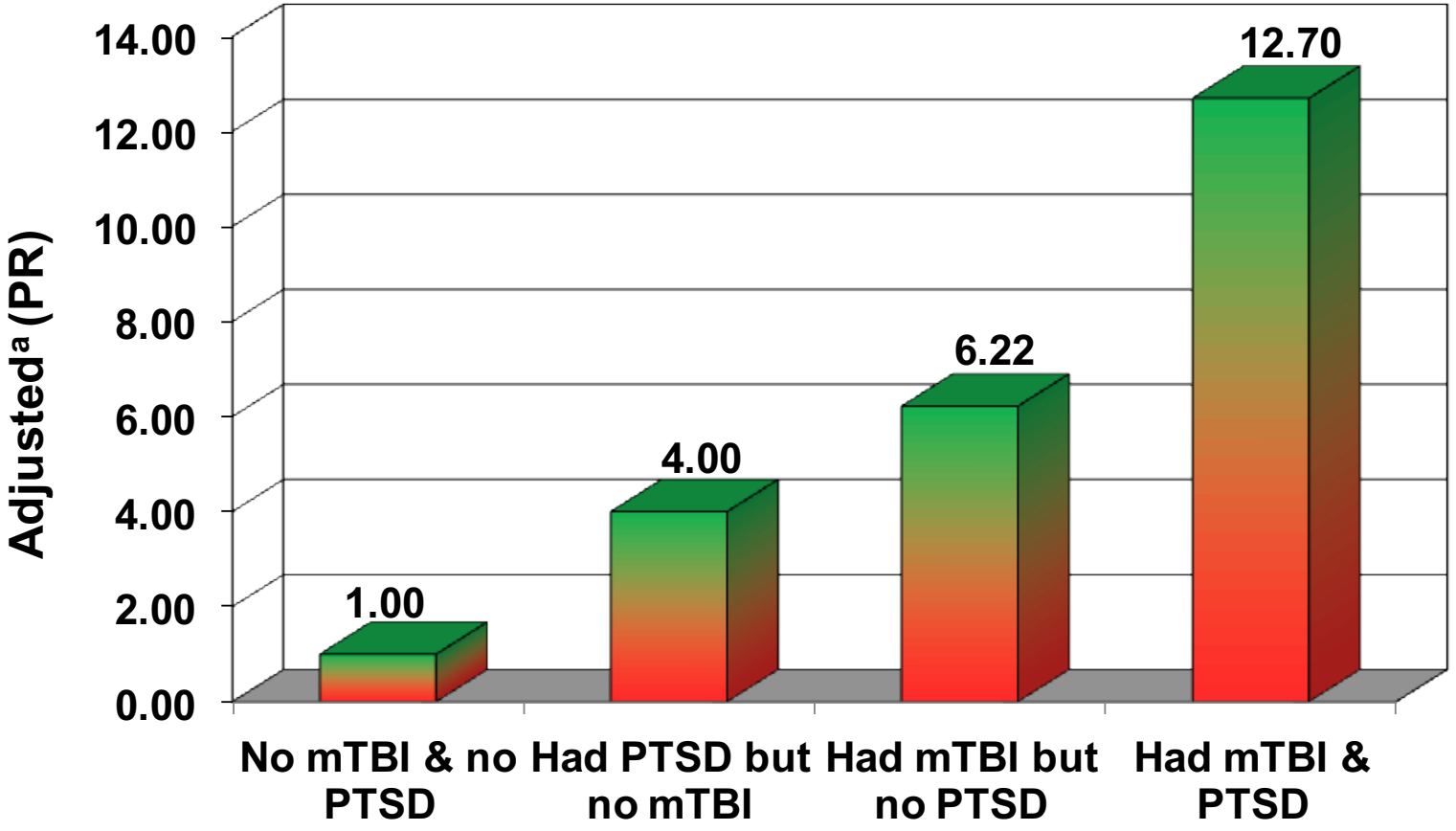


[a]Adjusted for age, gender, education, rank, and MOS

Brenner et al., 2009

Total number of Soldiers (N = 1247)

Symptom-Exposure: Memory Problems (n = 154)

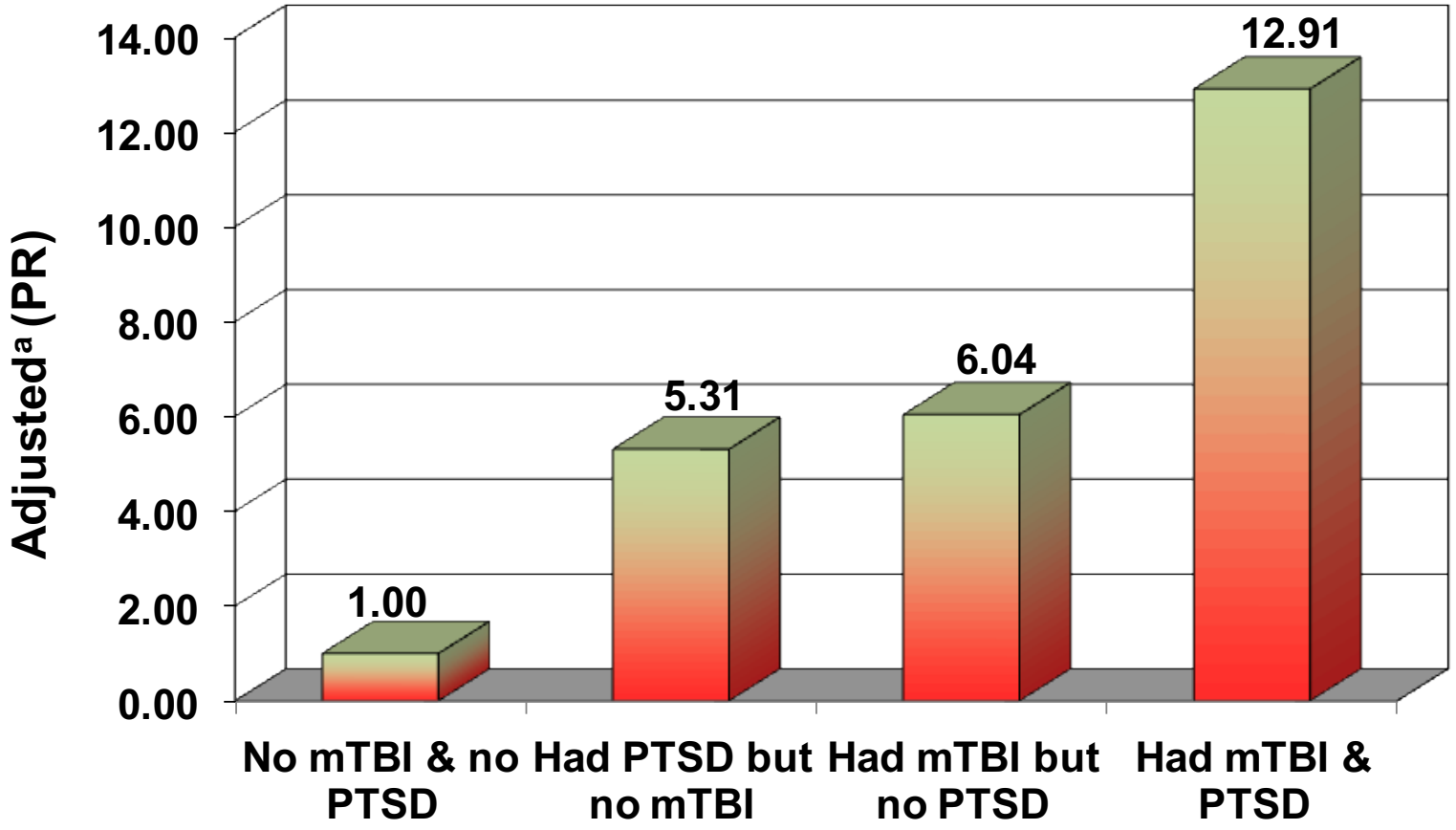


[a]Adjusted for age, gender, education, rank, and MOS

Brenner et al., 2009

Total Number of Soldiers (N = 1247)

Symptom-Exposure: Balance Problems (n = 62)

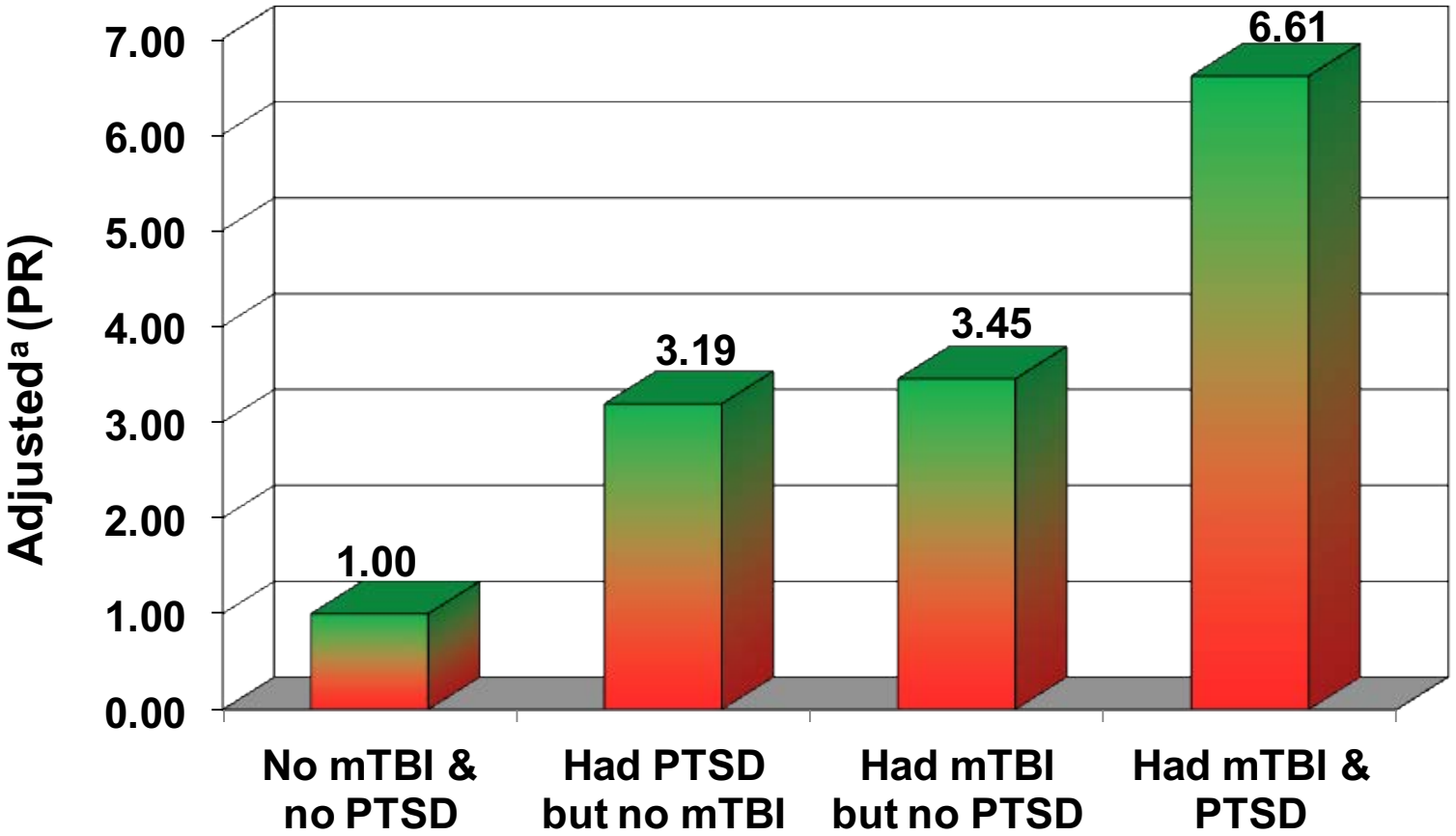


[a]Adjusted for age, gender, education, rank, and MOS

Total no. of soldiers (N = 1247)

Brenner et al., 2009

Symptom-Exposure: Irritability (n = 215)



[a]Adjusted for age, gender, education, rank, and MOS

Total no. of oldiers (N = 1247)

Brenner et al., 2009

TBI and Suicide

VA | U.S. Department of Veterans Affairs

Veteran Suicide Statistics for 2010-2014

Decrease in average number of Veteran suicides per day

22 (2010) ↓ 20 (2014)

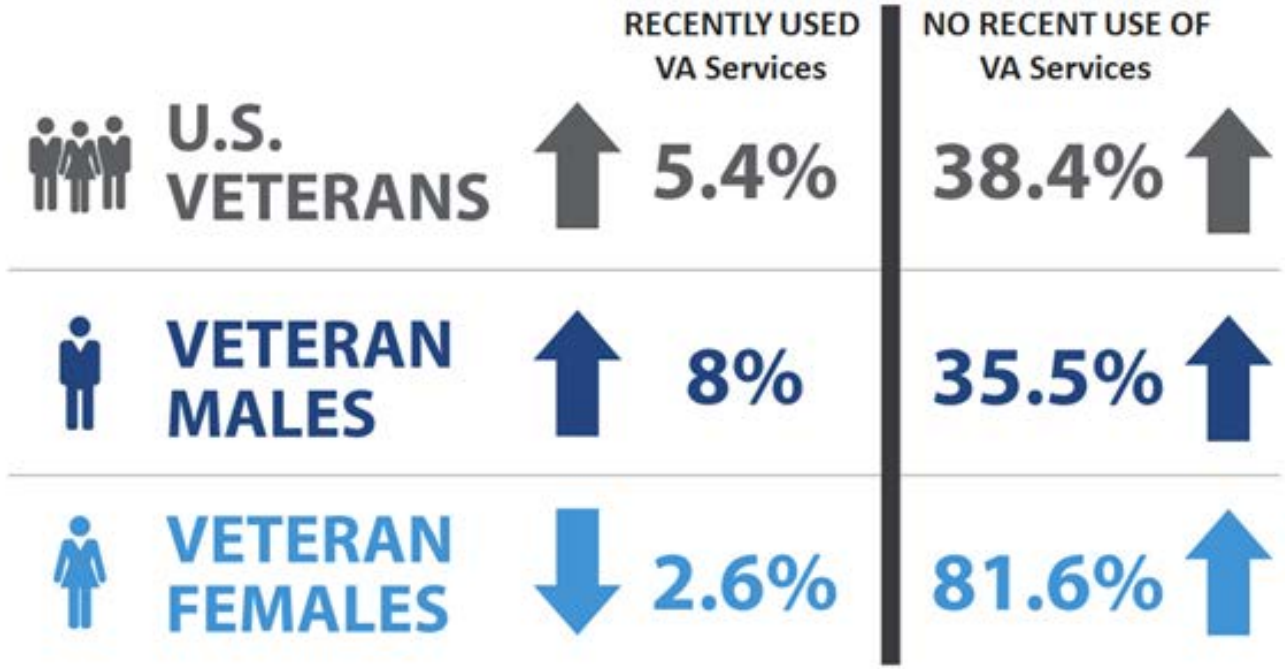
Decrease in number of Veteran suicides as a percentage of all suicides among U.S. adults

20.1% (2010) ↓ 18% (2014)

ROCKY MOUNTAIN MIRECC

Veteran suicide rate increases were lower among those who used Veterans Health Administration care.

Percentage changes in age-adjusted rates of suicide in Veterans from 2001-2014:



Veteran Suicide Statistics for 2014

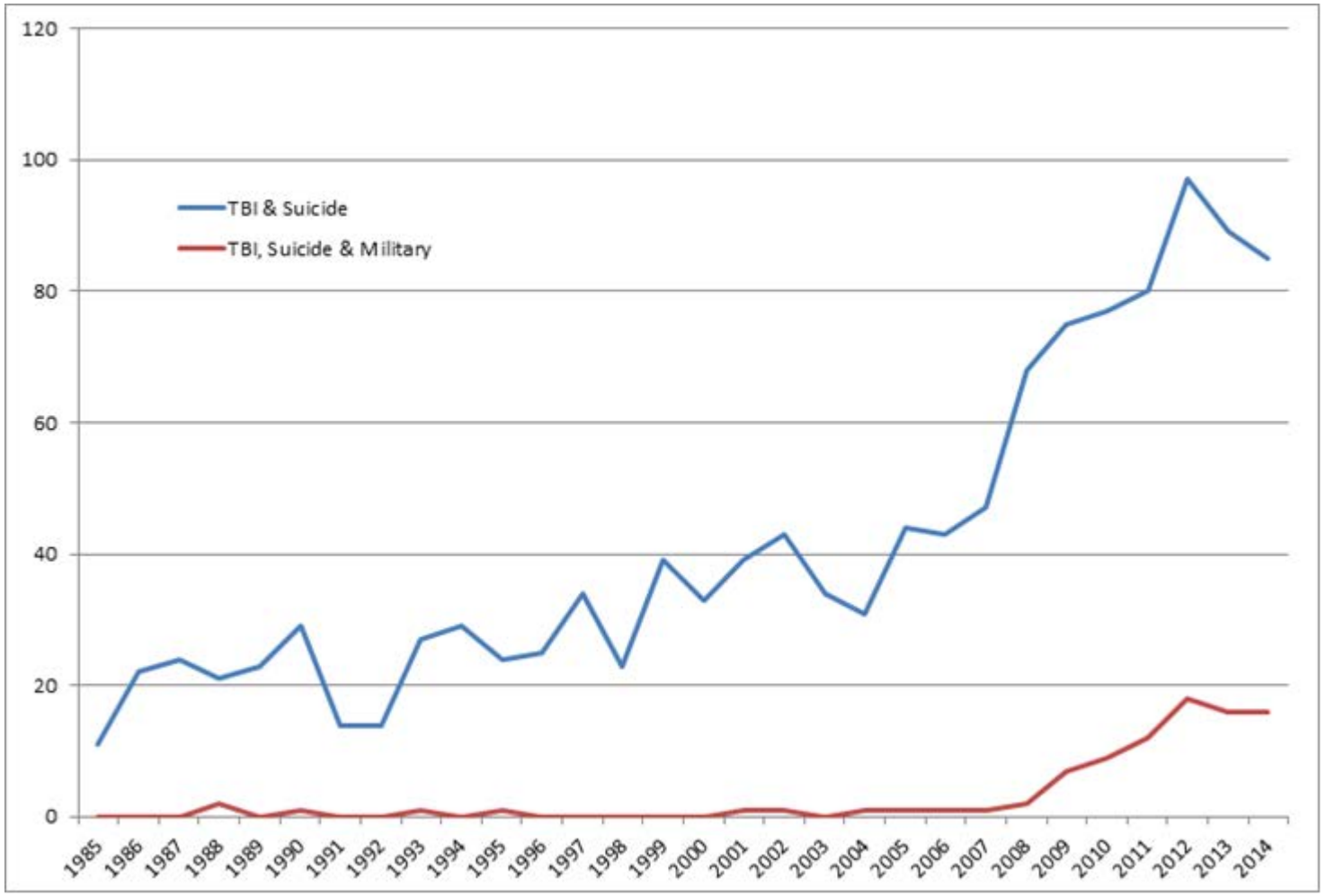
65%

of Veteran suicides are among people age 50 or older

67%

of Veteran suicides are a result of firearm injury

TBI and Suicide - Articles in Medline (1985 to 2014)



Self-Directed Violence Classification System

J Clin Psychol Med Settings (2011) 18:116–128
DOI 10.1007/s10880-011-9240-9

Implementation of a Suicide Nomenclature within Two VA Healthcare Settings

Lisa A. Brenner · Ryan E. Breshears · Lisa M. Betthauser · Katherine K. Bellon · Elizabeth Holman · Jeri E. F. Harwood · Morton M. Silverman · Joe Huggins · Herbert T. Nagamoto

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Abstract Suicide and suicide attempts are significant issues for military, Veterans Affairs (VA), and civilian healthcare systems. The lack of uniform terms related to self-directed violence (SDV) has inhibited epidemiological surveillance efforts, limited the generalizability of empirical studies of suicide and non-lethal forms of SDV, and complicated the implementation of evidence-based assessment and treatment strategies for individuals with suicidal thoughts and/or behaviors. The Department of Veterans Affairs recently adopted the Centers for Disease Control and Prevention's (CDC) SDV Classification System (SDVCS). This paper describes an implementation study of the SDVCS in two VA Medical Centers. The Veterans Integrated Service Network (VISN) 19 Mental Illness Research, Education and Clinical Center (MIRECC) training program for the SDVCS, including the SDVCS Clinical Tool (CT), will be discussed. Although preliminary data suggest that the CT and SDVCS are generally perceived as being acceptable and useful, further work will likely be required to facilitate widespread adoption. Potential next steps in this process are presented.

Keywords Suicide · Self-harm · Self-directed violence · Nomenclature · Veterans

The views in this paper are those of the authors and do not necessarily represent the official policy or position of the Department of Veterans Affairs or the United States Government.

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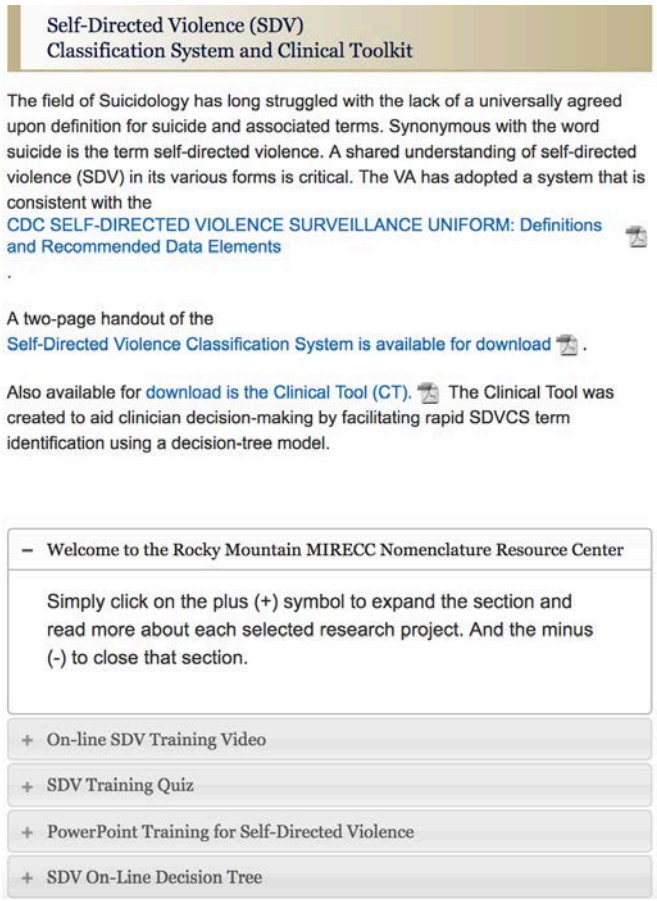

Self-Directed Violence (SDV)
Classification System and Clinical Toolkit

The field of Suicidology has long struggled with the lack of a universally agreed upon definition for suicide and associated terms. Synonymous with the word suicide is the term self-directed violence. A shared understanding of self-directed violence (SDV) in its various forms is critical. The VA has adopted a system that is consistent with the
CDC SELF-DIRECTED VIOLENCE SURVEILLANCE UNIFORM: Definitions and Recommended Data Elements
.

A two-page handout of the
Self-Directed Violence Classification System is available for download .

Also available for download is the Clinical Tool (CT). The Clinical Tool was created to aid clinician decision-making by facilitating rapid SDVCS term identification using a decision-tree model.

– Welcome to the Rocky Mountain MIRECC Nomenclature Resource Center

Simply click on the plus (+) symbol to expand the section and read more about each selected research project. And the minus (-) to close that section.

+ On-line SDV Training Video
+ SDV Training Quiz
+ PowerPoint Training for Self-Directed Violence
+ SDV On-Line Decision Tree

Google: Rocky Mountain MIRECC and SDVCS

Type	Sub-Type	Definition	Modifiers	Terms
Thoughts	Non-Suicidal Self-Directed Violence Ideation	Self-reported thoughts regarding a person's desire to engage in self-inflicted potentially injurious behavior. There is no evidence of suicidal intent. For example, persons engage in Non-Suicidal Self-Directed Violence Ideation in order to attain some other end (e.g., to seek help, regulate negative mood, punish others, to receive attention).	N/A	•Non-Suicidal Self-Directed Violence Ideation
	Suicidal Ideation	Thoughts of engaging in suicide-related behavior. For example, intrusive thoughts of suicide without the wish to die would be classified as Suicidal Ideation, Without Intent.	•Suicidal Intent -Without -Undetermined -With	•Suicidal Ideation, Without Suicidal Intent •Suicidal Ideation, With Undetermined Suicidal Intent •Suicidal Ideation, With Suicidal Intent
Behaviors	Preparatory	Acts or preparation towards engaging in Self-Directed Violence, but before potential for injury has begun. This can include anything beyond a verbalization or thought, such as assembling a method (e.g., buying a gun, collecting pills) or preparing for one's death by suicide (e.g., writing a suicide note, giving things away). For example, hoarding medication for the purpose of overdosing would be classified as Suicidal Self-Directed Violence, Preparatory.	• Suicidal Intent -Without -Undetermined -With	•Non-Suicidal Self-Directed Violence, Preparatory •Undetermined Self-Directed Violence, Preparatory •Suicidal Self-Directed Violence, Preparatory
	Non-Suicidal Self-Directed Violence	Behavior that is self-directed and deliberately results in injury or the potential for injury to oneself. There is no evidence, whether implicit or explicit, of suicidal intent. For example, persons engage in Non-Suicidal Self-Directed Violence in order to attain some other end (e.g., to seek help, regulate negative mood, punish others, to receive attention).	• Injury -Without -With -Fatal • Interrupted by Self or Other	•Non-Suicidal Self-Directed Violence, Without Injury •Non-Suicidal Self-Directed Violence, Without Injury, Interrupted by Self or Other •Non-Suicidal Self-Directed Violence, With Injury •Non-Suicidal Self-Directed Violence, With Injury, Interrupted by Self or Other •Non-Suicidal Self-Directed Violence, Fatal
	Undetermined Self-Directed Violence	Behavior that is self-directed and deliberately results in injury or the potential for injury to oneself. Suicidal intent is unclear based upon the available evidence. For example, the person is unable to admit positively to the intent to die (e.g., unconsciousness, incapacitation, intoxication, acute psychosis, disorientation, or death); **OR** the person is reluctant to admit positively to the intent to die for other or unknown reasons.	• Injury -Without -With -Fatal • Interrupted by Self or Other	•Undetermined Self-Directed Violence, Without Injury •Undetermined Self-Directed Violence, Without Injury, Interrupted by Self or Other •Undetermined Self-Directed Violence, With Injury •Undetermined Self-Directed Violence, With Injury, Interrupted by Self or Other •Undetermined Self-Directed Violence, Fatal
	Suicidal Self-Directed Violence	Behavior that is self-directed and deliberately results in injury or the potential for injury to oneself. There is evidence, whether implicit or explicit, of suicidal intent. For example, a person with a wish to die cutting her wrist s with a knife would be classified as Suicide Attempt, With Injury.	• Injury -Without -With -Fatal • Interrupted by Self or Other	•Suicide Attempt, Without Injury •Suicide Attempt, Without Injury, Interrupted by Self or Other •Suicide Attempt, With Injury •Suicide Attempt, With Injury, Interrupted by Self or Other •Suicide

Seminal Article - Teasdale and Engberg 2001

436 J Neurol Neurosurg Psychiatry 2001;71:436–440

Suicide after traumatic brain injury: a population study

T W Teasdale, A W Engberg

Abstract

Objectives—To determine the rates of suicide among patients who have had a traumatic brain injury.

Methods—From a Danish population register of admissions to hospital covering the years 1979-93 patients were selected who had had either a concussion (n=126 114), a cranial fracture (n=7560), or a cerebral contusion or traumatic intracranial haemorrhage (n=11 766). All cases of deaths by the end of the study period were identified.

Results—In the three diagnostic groups there had been 750 (0.59%), 46 (0.61%), and 99 (0.84%) cases of suicide respectively. Standardised mortality ratios, stratified by sex and age, showed that the incidence of suicide among the three diagnostic groups was increased relative to the general population (3.0, 2.7, and 4.1 respectively). In all diagnostic groups the ratios were higher for females than for males, and lower for patients injured before the age of 21 or after the age of 60. The presence of a codiagnosis relating to substance misuse was associated with increased suicide rates in all diagnostic groups. There was a tendency, among patients with cerebral contusions or traumatic intracranial haemorrhages, for suicide risk to increase with duration of stay in hospital. Cox regression analyses for proportional hazards confirmed that there was a significantly greater risk of suicide among patients with cerebral contusions or traumatic intracranial haemorrhages than among patients with concussion or cranial fractures (hazard ratios=1.42 and 1.50 respectively). There was, however, no evidence of a specific risk period for suicide after injury.

Conclusion—The increased risk of suicide among patients who had a mild traumatic brain injury may result from concomitant risk factors such as psychiatric conditions and psychosocial disadvantage. The greater risk among the more serious cases implicates additionally the physical, psychological, and social consequences of the injuries as directly contributing to the suicides.

(J Neurol Neurosurg Psychiatry 2001;71:436–440)

Keywords: traumatic brain injury; concussion; suicide

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A person with a traumatic brain injury can often experience devastating and enduring changes in all aspects of life, including employment, and family and social relationships. Profound emotional responses of anxiety and in particular major depression are not uncommon[1–3] and suicidal ideation and suicide attempts after traumatic brain injury have also been reported.[4–6]

Owing to its comparative rarity, however, there have been only few studies which have examined the occurrence of completed suicide after traumatic brain injury. In a recent review, Harris and Barraclough[7] listed six studies, all pre-1980, which together suggested increased rates of suicides among populations with brain injury. In by far the largest of these studies, Achté *et al*[8] found 85 suicide cases among 6498 war veterans with brain injury. In another early study, Roberts[9] found three cases of suicide in an up to 25 year follow up of 479 patients with traumatic brain injury. In more recent long term follow up studies, Wilson[10] reported three suicides among 55 patients with traumatic brain injury, Klonoff and Lage[11] found two suicides among a group of 111 patients from a rehabilitation programme and Tate *et al*[12] reported eight suicides from among 896 patients.

Excepting that of Achté *et al*, the above studies comprise only 24 cases of suicide after traumatic brain injury. These small numbers make it difficult to assess the extent to which the rate of suicide after traumatic brain injury may be increased above the rate of the general population. The situation is further complicated by the fact that some risk factors for suicide in the general population are also risk factors for traumatic brain injury—for example, young adults, males, involvement of substance misuse, especially alcohol,[13–15] and a range of other factors relating to psychosocial disadvantage. This means that any statistical association between traumatic brain injury and subsequent suicide could arise simply because of the association of both with such risk factors.

In the present study we have examined suicide rates among a large population derived sample of patients who had survived a traumatic cerebral lesion and who were followed up for a period of up to 15 years. To control for possible risk factors among these patients we have compared them with samples of patients, derived from the same population, who had either a concussion or a cranial fracture. These groups typically have fewer and much less severe sequelae to their injuries but are generally similar in demographic and psychological characteristics.[16 17] Therefore, the extent to which suicide is found to be more

- Individuals with concussions (n=126,114)
- Individuals with cranial fracture (n=7,560)
- Individuals with cerebral contusion or intracranial hemorrhage (n=11,766)

- "Standardized mortality rates, stratified by sex and age, showed that the incidence of suicide among the three groups was increased relative to the general population (3.0, 2.7, 4.1 respectively)."

"The risk of suicide is constant, continuing for at least the maximum of 15 years follow-up."

Systematic Review on Suicide Post-TBI

TABLE 2
Prevalence and Risk of Suicide After TBI

Source	Design[a]	Population/ sample	Study admission	TBI		Reference population	Prevalence of suicides	SMR or OR (95% CI)	Risk of bias (category of bias)[b]
Brenner et al., 2011c Veteran, United States	Retrospective cohort	$N = 49,626$ All VHA users with TBI	2001–2006, 6 years	Concussion Contusion/ TIH	12,159 39,623	5% random sample of VHA users without TBI $N = 389,583$	105 observed	All* 1.55 (1.24, 1.92) Mild** 1.98 (1.39, 2.82) Mod–Sev† 1.34 (1.09, 1.64)	**Rating: low risk of bias** Outcome assessors not blinded to exposure (DB) Use of ICD-10 less accurate for injuries in which medical attention was not sought (DB)
Harrison-Felix et al., 2009 Civilian, United States	Retrospective cohort	$N = 1678$ Persons with TBI admitted to an adult rehabilitation hospital and survived >1 year	1961–2003, 40 years	Loss of consciousness None 1 day 2–7 days 8–129 days	 129 495 360 568	Federal US mortality rates by age, sex and race	10 observed, 3.39 expected	All[c] 2.95 (1.42, 5.43)	**Rating: moderate risk of bias** External comparison group not selected based on TBI status (SB & CON) Outcome assessors not blinded to exposure (DB) Cause of death unknown or missing for 12 cases (AB) Presence of TBI in reference group (CON)
Himanen et al., 2011 Civilian, Finland	Retrospective cohort	$N = 192$ All referrals for neurological or NP A'x at a university hospital	1950–1971, 24–30 years	Mild Moderate Severe Very severe	65 68 53 5	General population	3/75 deaths, 4.2%	NR	**Rating: moderate risk of bias** External comparison group not selected based on TBI status (SB and CON) Outcome assessors not blinded to exposure (DB) TBI severity not based on standard criteria (DB) Validity and reliability of data source for suicide is unclear (DB) Presence of TBI in reference group (CON)

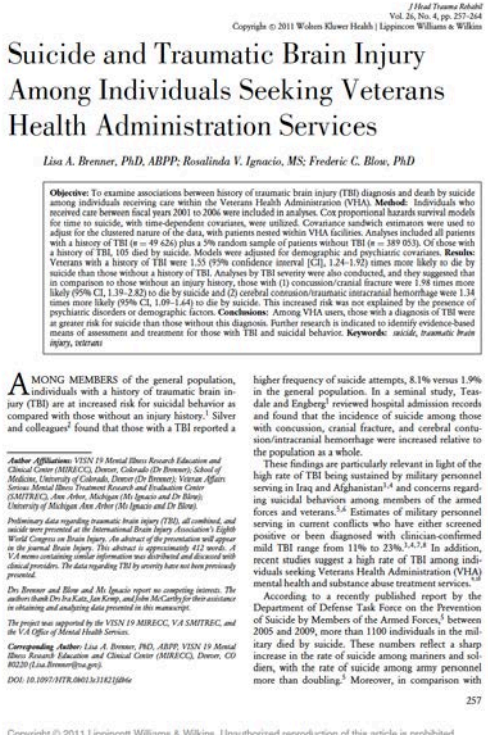
Systematic Review on Suicide Post-TBI

TABLE 2
Continued

Source	Design[a]	Population/ sample	Study admission	TBI		Reference population	Prevalence of suicides	SMR or OR (95% CI)	Risk of bias (category of bias)[b]
Mainio et al., 2007 Civilian, Finland	Cross-sectional	$N = 1877$ All general population suicides in single province	1988–2004, 16 years	Concussion Lesion[d]	83 20	Subset of 1877 suicides with no identified TBI	103/1877 5.5%	NA	**Rating: moderate risk of bias** Assessors of TBI exposure not blinded to suicide (DB) TBI status was based on ICD-9 codes for inpatient treatment or hospitalisation only (DB) mTBIs likely underrepresented or misclassified (CON)
Skopp et al., 2012 Military personnel, United States	Case control	$N = 1764$ All general population suicides in US military active service	2001–2009	Mild Moderate Severe Unclassified	97 25 5 2	Random selection, matched 4:1 ratio to cases by service, gender, race, age, date of entry active service, length of military service	129/1764 7.3%	Mild (OR) 1.1 (0.88, 1.42)	**Rating: moderate risk of bias** Assessors of TBI exposure not blinded to case/ control status (DB) Use of ICD-10 less accurate for injuries in which medical attention was not sought (DB) Risk for moderate to severe TBI not reported due to limited cases; only mTBI analysed and reported (RB and PRE) Differences in length of time from injury to death not addressed (CON)

SMR, Standardized Mortality Ratio; OR, Odds Ratio; CI, Confidence Interval; VHA, Veterans Health Administration; TBI, Traumatic Brain Injury; TIH, Traumatic Intracranial Haemorrhage; Mod, Moderate; Sev, Severe; ICD-10, International Statistical Classification of Diseases-10; NP A'x, Neuropsychological Assessment; NR, Not Reported; NA, Not Applicable.
[a]Determined using the Taxonomy of Study Design Tool (Hartling et al., 2010).
[b]RTI Risk of Bias tool (Viswanathan & Berkman, 2012); potential sources of bias include selection bias (SB), detection bias (DB), performance bias (PB), reporting bias (RB), attrition bias (AB), confounding (CON) and precision (PRE).
[c]SMR reported as statistically significant but p value not provided.
[d]Injuries classified as lesions included cerebral contusion and intracranial haemorrhage.
*p <.0001, adjusted model. **p = .0002, adjusted model. †p = .006, adjusted model.

Suicide and TBI in Veterans



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Suicide and Traumatic Brain Injury Among Individuals Seeking Veterans Health Administration Services

Lisa A. Brenner, PhD, ABPP; Rosalinda V. Ignacio, MS; Frederic C. Blow, PhD

Objective: To examine associations between history of traumatic brain injury (TBI) diagnosis and death by suicide among individuals receiving care within the Veterans Health Administration (VHA). **Method:** Individuals who received care between fiscal years 2001 to 2006 were included in analyses. Cox proportional hazards survival models for time to suicide, with time-dependent covariates, were utilized. Covariance sandwich estimators were used to adjust for the clustered nature of the data, with patients nested within VHA facilities. Analyses included all patients with a history of TBI (n = 49 626) plus a 5% random sample of patients without TBI (n = 389 053). Of those with a history of TBI, 105 died by suicide. Models were adjusted for demographic and psychiatric covariates. **Results:** Veterans with a history of TBI were 1.55 (95% confidence interval [CI], 1.24–1.92) times more likely to die by suicide than those without a history of TBI. Analyses by TBI severity were also conducted, and they suggested that in comparison to those without an injury history, those with (1) concussion/cranial fracture were 1.98 times more likely (95% CI, 1.39–2.82) to die by suicide and (2) cerebral contusion/traumatic intracranial hemorrhage were 1.34 times more likely (95% CI, 1.09–1.64) to die by suicide. This increased risk was not explained by the presence of psychiatric disorders or demographic factors. **Conclusions:** Among VHA users, those with a diagnosis of TBI were at greater risk for suicide than those without this diagnosis. Further research is indicated to identify evidence-based means of assessment and treatment for those with TBI and suicidal behavior. **Keywords:** *suicide, traumatic brain injury, veterans*

AMONG MEMBERS of the general population, individuals with a history of traumatic brain injury (TBI) are at increased risk for suicidal behavior as compared with those without an injury history.[1] Silver and colleagues[2] found that those with a TBI reported a higher frequency of suicide attempts, 8.1% versus 1.9% in the general population. In a seminal study, Teasdale and Engberg[1] reviewed hospital admission records and found that the incidence of suicide among those with concussion, cranial fracture, and cerebral contusion/intracranial hemorrhage were increased relative to the population as a whole.

These findings are particularly relevant in light of the high rate of TBI being sustained by military personnel serving in Iraq and Afghanistan[3,4] and concerns regarding suicidal behaviors among members of the armed forces and veterans.[5,6] Estimates of military personnel serving in current conflicts who have either screened positive or been diagnosed with clinician-confirmed mild TBI range from 11% to 23%.[3,4,7,8] In addition, recent studies suggest a high rate of TBI among individuals seeking Veterans Health Administration (VHA) mental health and substance abuse treatment services.[7,8]

According to a recently published report by the Department of Defense Task Force on the Prevention of Suicide by Members of the Armed Forces,[5] between 2005 and 2009, more than 1100 individuals in the military died by suicide. These numbers reflect a sharp increase in the rate of suicide among mariners and soldiers, with the rate of suicide among army personnel more than doubling.[5] Moreover, in comparison with

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Preliminary data regarding traumatic brain injury (TBI), all combined, and suicide were presented at the International Brain Injury Association's Eighth World Congress on Brain Injury. An abstract of the presentation will appear in the journal Brain Injury. This abstract is approximately 412 words. A VA memo containing similar information was distributed and discussed with clinical providers. The data regarding TBI by severity have not been previously presented.

Drs Brenner and Blow and Ms Ignacio report no competing interests. The authors thank Drs Ira Katz, Jan Kemp, and John McCarthy for their assistance in obtaining and analyzing data presented in this manuscript.

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- Individuals who received care between FY 01 and 06
- Analyses included all patients
- with a history of TBI (n = 49, 626) plus a 5% random sample of patients without TBI (n = 389,053)
- Suicide - National Death Index (NDI) compiles death record data for all US residents from state vital statistics offices
- TBI diagnoses of interest were similar to those used by Teasdale and Engberg

Challenges associated with this type of research and need for collaboration (~8 million records reviewed)

Suicide and TBI in Veterans

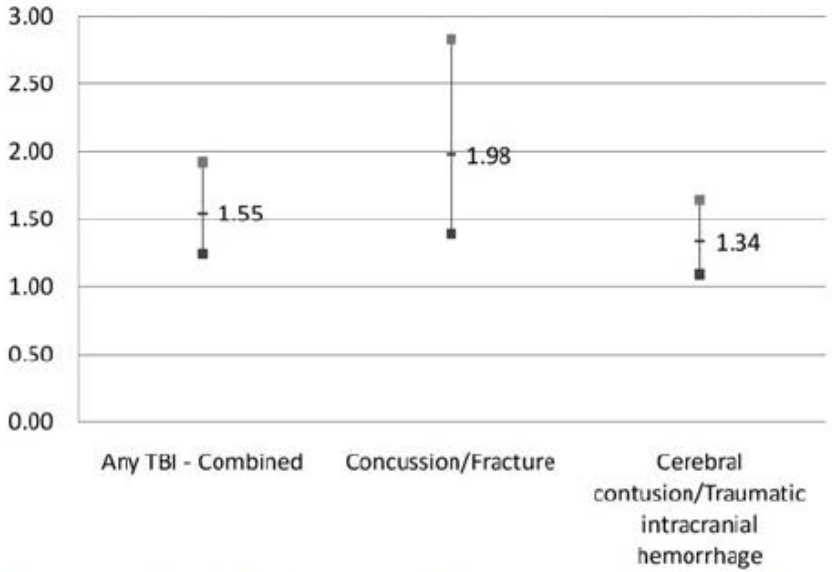

Figure 2. Hazard ratios for suicide by traumatic brain injury severity adjusted for sex, age, and psychiatric conditions.

Cox proportional hazards survival models for time to suicide, with time-dependent covariates, were utilized. Covariance sandwich estimators were used to adjust for the clustered nature of the data, with patients nested within VHA facilities.

ICD-9 codes:

1) concussion (850), cranial fracture—fracture of vault of skull (800), fracture of base of skull (801), and other and unqualified skull fractures (803)

(2) cerebral laceration and contusion (851); subarachnoid, subdural, and extradural hemorrhage after injury (852); other and unspecified intracranial hemorrhage after injury (853); and intracranial injury of other and unspecified nature (854).

Diagnosis	All		Those who died by suicide		Those who did not die by suicide		
	N	Col%	*N*	Col%	*N*	Col%	*P*
VHA users with any TBI (combined)							
All	49 626	100	105	100	49 521	100	
Substance abuse	8368	16.86	32	30.48	8336	16.83	.0002
Bipolar I/II	2265	4.56	10	9.52	2255	4.55	.0292
MDD	4,464	9	24	22.86	4440	8.97	<.0001
Other depression, no MDD	7616	15.35	23	21.9	7593	15.33	.062
Other anxiety	4326	8.72	16	15.24	4310	8.7	.0177
PTSD	4880	9.83	23	21.9	4857	9.81	<.0001
Schizophrenia/schizoaffective disorder	2287	4.61	6	5.71	2281	4.61	.4875
VHA users with concussion/fracture							
All	12 159	100	33	100	12 126	100	
Substance abuse	2087	17.16	9	27.27	2078	17.14	.123
Bipolar I/II	588	4.84	2	6.06	586	4.83	.6731
MDD	1198	9.85	10	30.3	1188	9.8	.00092
Other depression, no MDD	1831	15.06	7	21.21	1824	15.04	.3271
Other anxiety	1148	9.44	7	21.21	1141	9.41	.0316
PTSD	1376	11.32	7	21.21	1369	11.29	.0912
Schizophrenia/schizoaffective disorder	519	4.27	1	3.03	518	4.27	.9999
VHA users with cerebral contusion/traumatic intracranial hemorrhage							
All	39 545	100	78	100	39 467	100	
Substance abuse	6728	17.01	25	32.05	6703	16.98	.0004
Bipolar I/II	1802	4.56	8	10.26	1794	4.55	.0256
MDD	3490	8.83	17	21.79	3473	8.8	<.0001
Other depression, no MDD	6142	15.53	17	21.79	6125	15.52	.1263
Other anxiety	3377	8.54	11	14.1	3366	8.53	.0785
PTSD	3757	9.5	17	21.79	3740	9.48	.0002
Schizophrenia/schizoaffective disorder	1869	4.73	5	6.41	1864	4.72	.4199

Suicide and Traumatic Brain Injury among Individuals Seeking Veterans Health Administration Services between Fiscal Years 2006 to 2015

Trisha A. Hostetter, M.P.H.[1], Claire A. Hoffmire, Ph.D.[1,2], Jeri. E. Forster, Ph.D.[1,2], Rachel Sayko Adams, Ph.D., M.P.H.[1, 3], Kelly A. Stearns-Yoder, M.A.[1,2,4], Lisa A. Brenner, Ph.D.[1,2,4-6]

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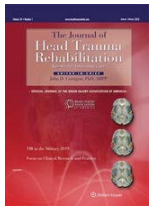


Objectives

- Examine the association between receiving a TBI diagnosis and subsequent risk of death by suicide among individuals who received Veterans Health Administration (VHA) care between fiscal years 2006 to 2015.

- Examine the association between TBI and suicide method (firearm versus other) among Veterans who used VHA services between fiscal years 2006 to 2015.

Study Methods & Design

Setting

- VHA
- Fiscal years 2006-2015

Participants

- Veterans with a TBI diagnosis during/prior to the study window plus a random sample of Veterans without a TBI diagnosis in their VHA medical record

Design

- Retrospective cohort

Data Analysis

- Cox proportional hazard models fit to examine the associations between TBI and suicide
  - Accounting for time-dependent measures, chronic conditions, and demographics for those with TBI compared to those without
  - Additional models were fit to evaluate the impact of TBI severity as well as the cause specific hazard of suicide (suicide by firearms vs no suicide by firearms and suicide by non-firearm vs no suicide by non-firearms)
- For suicide decedents, logistic regression was used to analyze the relationship between TBI and suicide method

Main Outcome Measures

Death by suicide

- Captured with ICD-10 codes using data from the VA-Department of Defense Suicide Data Repository
- Classified by method of suicide
    1. Firearm suicide
    2. Suicide by other means

Variable Definitions

TBI status and TBI severity

- Captured using ICD-9 codes
- TBI severity classified using ICD-9 codes
    1. Mild TBI
    2. Moderate/Severe TBI

Psychiatric conditions

- Captured using ICD-9 codes
- Depression or other mood disorders, bipolar disorder, psychotic disorder, posttraumatic stress disorder (PTSD), anxiety disorder, substance use disorder

Comorbid conditions

- Captured from electronic medical record using yearly calculations of the Charlson/Deyo Index

Other chronic conditions

- Captured from electronic medical record using ICD-9 codes
- Dementias, plegias/paralyses, epilepsy, nerve damage/neuropathies

Sample Demographics by TBI Status

Variable		All (n = 1,403,249)	No TBI (n = 1,187,639)	Any TBI (n = 194, 337)
Age Median (range)		56 (18-100)	58 (18-100)	35 (18-100)
Gender % (n)	Male	92.8% (1,302,777)	92.7% (1,101,465)	93.4% (201,312)
	Female	7.2% (100,472)	7.3% (86,174)	6.6% (14,298)
Race % (n)	Caucasian	69.9% (980,639)	69.2% (821,713)	73.7% (158,926)
	African-American	14.8% (208,153)	14.9% (176,812)	14.5% (31,341)
	Asian or Pacific Islander	1.8% (25,827)	1.7% (20,626)	2.4% (5,201)
	American Indian or Alaska Native	0.7% (10,441)	0.7% (7,779)	1.2% (2,662)
	Multiple	0.8% (10,621)	0.7% (8,102)	1.2% (2,519)
	Missing	11.9% (167,568)	12.9% (152,607)	6.9% (14,961)

Psychiatric and Other Diagnoses by TBI Status

Psychiatric Diagnosis % (n)	All (n = 1,403,249)	No TBI (n = 1,187,639)	Any TBI (n = 194, 337)
Depression and other non-bipolar mood disorder	37.0% (518,681)	31.5% (373,487)	67.3% (145,194)
Bipolar	4.7% (65,690)	3.6% (42,829)	10.6% (22,861)
Psychotic Disorder	4.6% (64,551)	3.7% (43,957)	9.6% (20,594)
PTSD	22.0% (308,764)	15.0% (178,404)	60.5% (130,360)
Anxiety	23.7% (332,375)	19.5% (231,715)	46.7% (100,660)
Substance	37.7% (528,658)	34.2% (405,713)	57.0% (122,945)
Other Diagnosis % (n)			
Nerve Damage/neuropathy	3.1% (44,069)	3.2% (37,486)	3.1% (6,583)
Plegia/paralysis	0.7% (9,224)	0.5% (6,096)	1.5% (3,128)
Dementia	5.6% (77,889)	3.5% (41,549)	16.9% (36,340)
Epilepsy	1.3% (18,475)	0.7% (8,788)	4.5% (9,687)

Sample Demographics by TBI Severity

Variable		All (n = 1,403,249)	No TBI (n = 1,187,639)	Mild TBI (n = 194,337)	Moderate/ Severe TBI (n = 20,888)
Age Median (range)		56 (18-100)	58 (18-100)	33 (18-100)	53 (18-98)
Gender % (n)	Male	92.8% (1,302,777)	92.7% (1,101,465)	93.2% (181,037)	95.4% (19,928)
	Female	7.2% (100,472)	7.3% (86,174)	6.8% (13,300)	4.6% (960)
Race % (n)	Caucasian	69.9% (980,639)	69.2% (821,713)	73.9% (143,562)	72.3% (15,096)
	African-American	14.8% (208,153)	14.9% (176,812)	14.4% (28,047)	15.5% (3,229)
	Asian or Pacific Islander	1.8% (25,827)	1.7% (20,626)	2.5% (4,807)	1.9% (387)
	American Indian or Alaska Native	0.7% (10,441)	0.7% (7,779)	1.3% (2,448)	1.0% (210)
	Multiple	0.8% (10,621)	0.7% (8,102)	1.2% (2,317)	0.9% (190)
	Missing	11.9% (167,568)	12.9% (152,607)	6.8% (13,174)	8.5% (1,785)

Psychiatric and Other Diagnoses by TBI Severity

Psychiatric Diagnosis % (n)	All (n = 1,403,249)	No TBI (n = 1,187,639)	Mild TBI (n = 194,337)	Moderate/ Severe TBI (n = 20,888)
Depression and other non-bipolar mood disorder	37.0% (518,681)	31.5% (373,487)	68.1% (132,242)	60.8% (12,692)
Bipolar	4.7% (65,690)	3.6% (42,829)	10.5% (20,490)	11.0% (2,290)
Psychotic Disorder	4.6% (64,551)	3.7% (43,957)	9.1% (17,734)	13.4% (2,790)
PTSD	22.0% (308,764)	15.0% (178,404)	62.8% (122,035)	39.1% (8,156)
Anxiety	23.7% (332,375)	19.5% (231,715)	47.6% (92,404)	38.7% (8,075)
Substance	37.7% (528,658)	34.2% (405,713)	56.7% (110,124)	60.2% (12,570)
Other Diagnosis % (n)				
Nerve Damage/neuropathy	3.1% (44,069)	3.2% (37,486)	2.7% (5,275)	6.1% (1,279)
Plegia/paralysis	0.7% (9,224)	0.5% (6,096)	1.3% (2,438)	3.3% (681)
Dementia	5.6% (77,889)	3.5% (41,549)	16.4% (31,957)	20.7% (4,333)
Epilepsy	1.3% (18,475)	0.7% (8,788)	4.2% (8,061)	7.7% (1,608)

Hazard Ratios for Suicide by TBI Status and Severity

TBI Status	Unadjusted Model	Adjusted for Gender and Age	Full Adjusted Model+
	Hazard Ratio (95% CI)		
Any TBI vs No TBI	2.19 (2.02-2.37)*	2.15 (1.97-2.34)*	1.71 (1.56-1.87)*
Mild TBI vs No TBI	2.06 (1.89-2.25)*	2.01 (1.83-2.21)*	1.62 (1.47-1.78)*
Moderate/Severe TBI vs No TBI	3.36 (2.78-4.06)*	3.29 (2.72-3.98)*	2.45 (2.02-2.97)*

+ Adjusted for age, sex, Charlson/Deyo Index, and the following diagnoses: depression, bipolar, psychotic, PTSD, anxiety, substance, nerve damage/neuropathy, plegia/paralysis, dementia, and epilepsy

*p-value <0.0001

Method Specific Hazard Ratios for Suicide by TBI Severity Firearms

TBI Status	Unadjusted Model	Adjusted for Gender and Age	Fully Adjusted Model+
	Odds Ratio (95% CI)		
Any TBI vs No TBI	0.76 (0.64-0.90)**	1.02 (0.85-1.23)	1.10 (0.90-1.34)
Mild TBI vs No TBI	0.68 (0.57-0.81)*	0.93 (0.76-1.12)	0.96 (0.78-1.19)
Moderate/Severe TBI vs No TBI	1.59 (1.00-2.51)**	1.98 (1.24-3.15)**	2.39 (1.48-3.87)**

+ Adjusted for age, sex, Charlson/Deyo Index, and the following diagnoses: depression, bipolar, psychotic, PTSD, anxiety, substance, nerve damage/neuropathy, plegia/paralysis, dementia, and epilepsy

*p-value <0.0001

**p-value<0.05

TBI and Suicide

- Veterans with a history of TBI were 2-4 times more likely to have a psychiatric diagnosis than those without a history of TBI

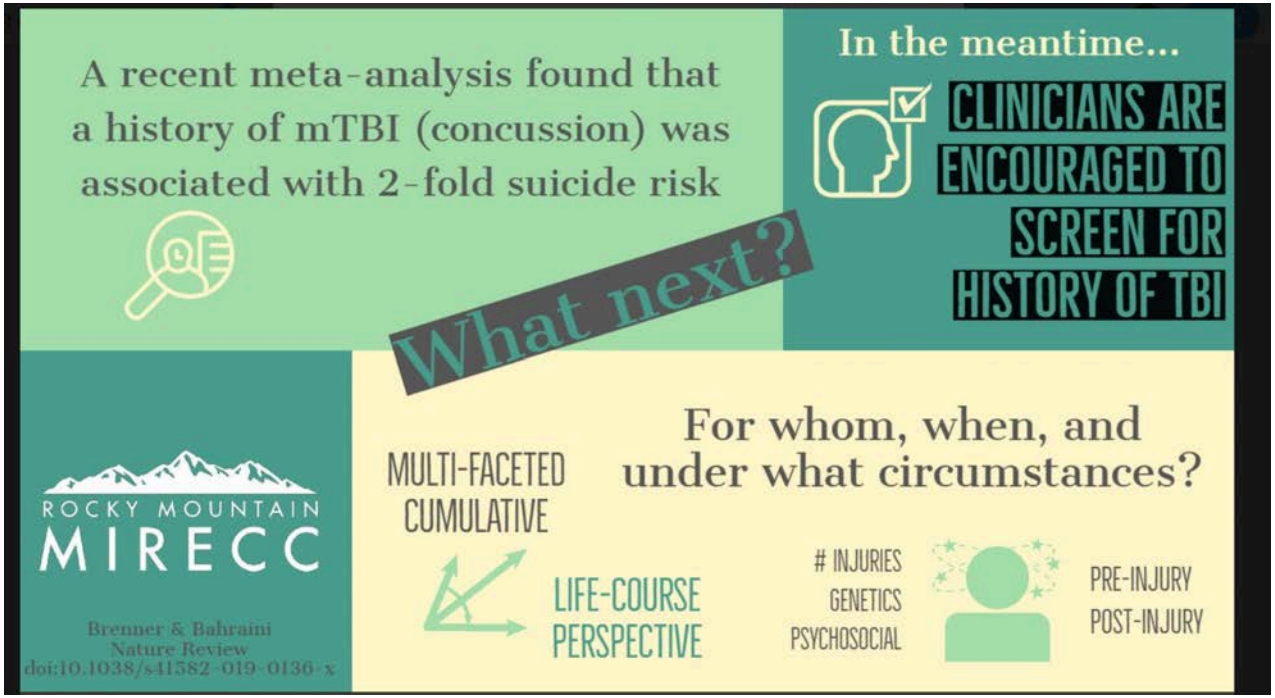
- Veterans with any TBI diagnosis were significantly more likely to die by suicide compared to those without a history of TBI (HR= 1.71; 95% CI=1.56-1.87)

TBI and Suicide Severity

- Those with a moderate to severe TBI had a higher estimate for hazards of suicide than those with mild injuries.
  - The hazard of suicide was 1.62 higher for those with a mild TBI compared to those without a TBI after adjusting for covariates
  - The hazard of suicide was 2.45 higher for those with a moderate/severe TBI compared to those without a TBI after adjusting for covariates.

TBI and Suicide Method

- In suicide decedents, the odds of using firearms as a means of suicide was significantly increased for Veterans with a moderate to severe TBI as compared to those without a history of TBI (OR=2.39 95% CI=1.48-3.87)



nature REVIEWS NEUROLOGY

TRAUMATIC BRAIN INJURY

Concussion and risk of suicide: who, when and under what circumstances?

Lisa A. Brenner & Nazanin H. Bahraini

Nature Reviews Neurology **15**, 132–133 (2019) | Download Citation

A new analysis has found that concussion and mild traumatic brain injury (mTBI) are linked to an increased risk of suicidal behaviours and thoughts. However, a host of risk factors might influence this correlation, and careful investigation is required to establish which individuals with mTBI might be most at risk of suicide.

In the early days of the conflicts in Iraq and Afghanistan, Brenner and colleagues wrote about mTBI, post-traumatic stress disorder, other polytrauma conditions and the burden of adversity hypothesis.

This hypothesis posits that greater cumulative exposure to lifetime adversities and trauma increases the risk of negative mental and physical health outcomes. Applying this framework to mTBI, Brenner et al. proposed that post-mTBI outcomes among military personnel are influenced by an **accumulation of life events and adversities**, including those that are deployment-related as well as those that occur before and after military service.

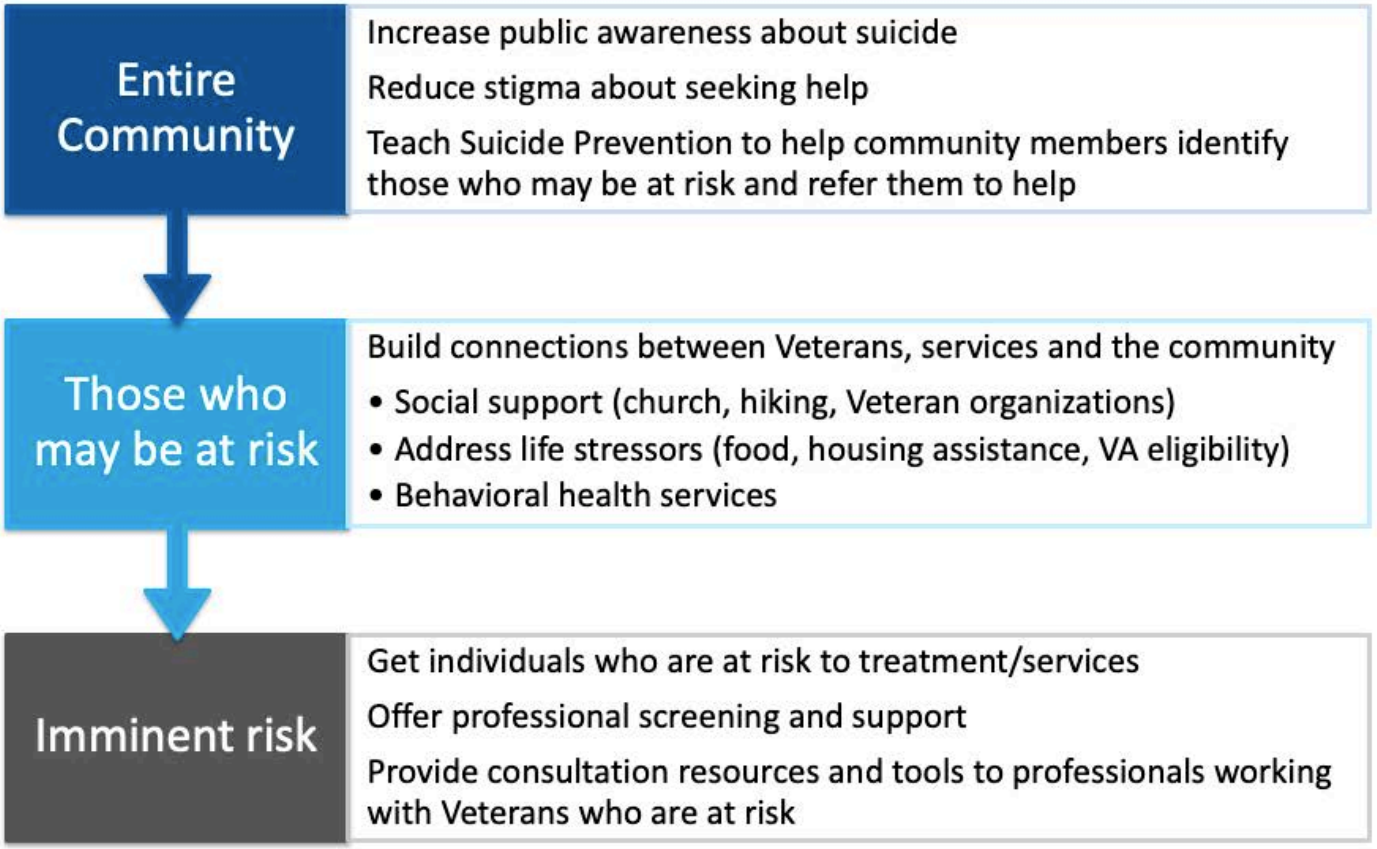
The team concluded that the burden of adversity hypothesis could be used as a framework to potentially explain why some individuals would go on to experience a host of adverse outcomes post-mTBI, while others would recover with minor symptoms or complications.

> "we need to acknowledge the inherent heterogeneity among individuals who sustain concussions"

Strategies for Intervention

National Academy of Medicine (NAM) Classification

Public Health Levels of Prevention



Stratification of Suicide Risk

What's the Risk?

- 29 y/o female
- 18 suicide attempts and chronic SI
  - Currently reports below baseline SI & stable mood
- Numerous psychiatric admissions
- Family history of suicide
- Owns a gun
- Intermittent homelessness
  - Currently reports having stable housing
- Alcohol dependence
  - Has sustained sobriety for 6 months
- Borderline Personality Disorder

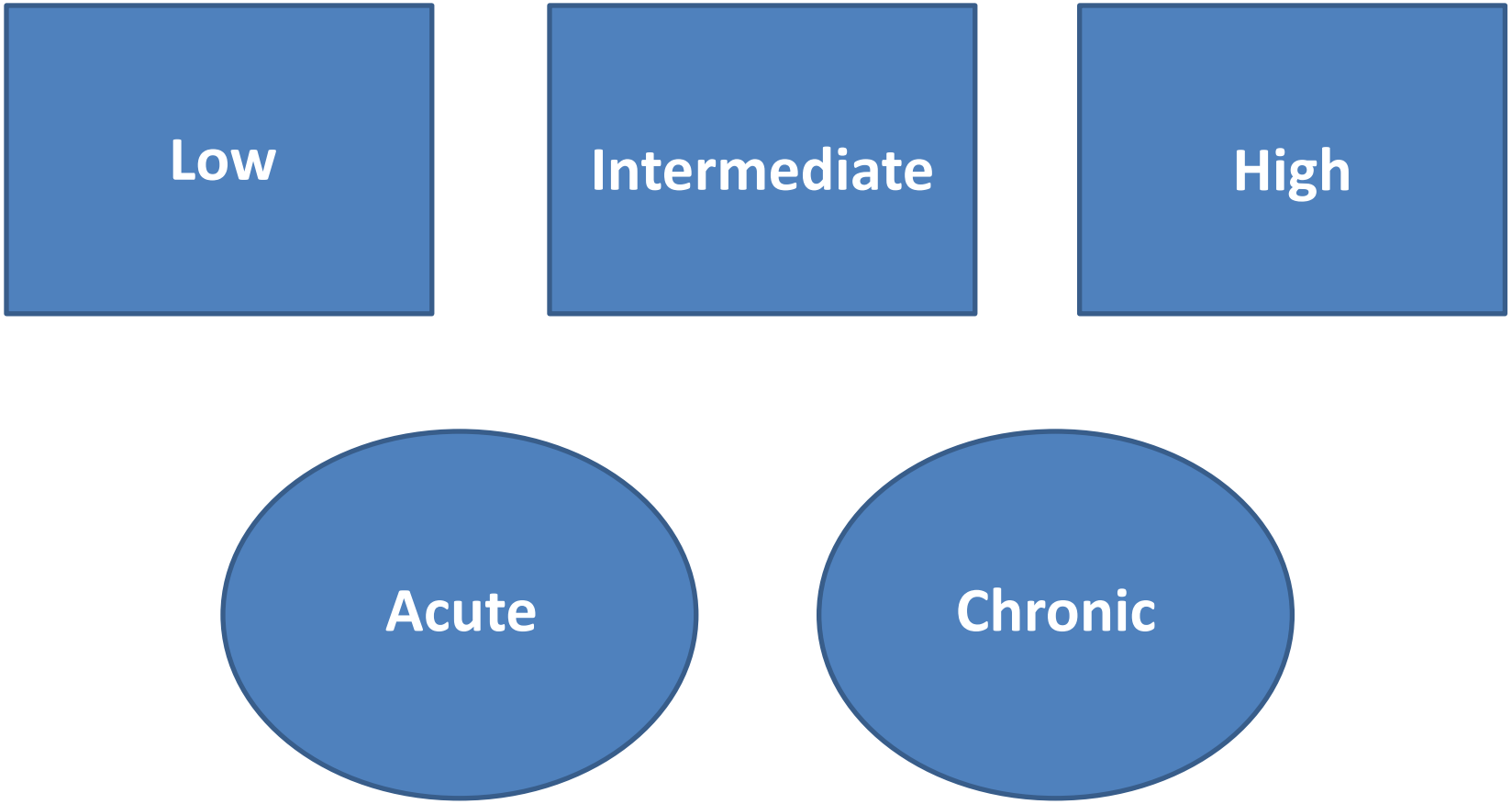
Severity

Low

Intermediate

High

Stratify Risk – Severity & Temporality



High Acute Risk

- **Essential features:**
  - SI with intent to die by suicide AND
  - Inability to maintain safety independent of external support/help
- **Likely to be present:**
  - Plan
  - Access to means
  - Recent/ongoing preparatory behaviors and/or SA
  - Acute Axis I illness (e.g., MDD episode, acute mania, acute psychosis, drug relapse)
  - Exacerbation of Axis II condition
  - Acute psychosocial stressor (e.g., job loss, relationship change)
- **Action:**
  - Psychiatric hospitalization

Intermediate Acute Risk

- **Essential features:**
  - Ability to maintain safety independent of external support/help
- **Likely to be present:**
  - May present similarly to those at high acute risk except for:
    - Lack of intent or preparatory behaviors
    - Reasons for living
    - Ability/desire to abide by Safety Plan
- **Action:**
  - Consider psychiatric hospitalization
  - Intensive outpatient management

Low Acute Risk

- **Essential features:**
  - No current intent AND
  - No suicidal plan AND
  - No preparatory behaviors AND
  - Collective high confidence (e.g., patient, care providers, family members) in the ability of the patient to independently maintain safety
- **Likely to be present:**
  - May have SI but without intent/plan
  - If plan is present, it is likely vague with no preparatory behaviors
  - Capable of using appropriate coping strategies
    - Willing/able to use Safety Plan
- **Action:**
  - Can be managed in primary care
  - Mental health treatment may be indicated

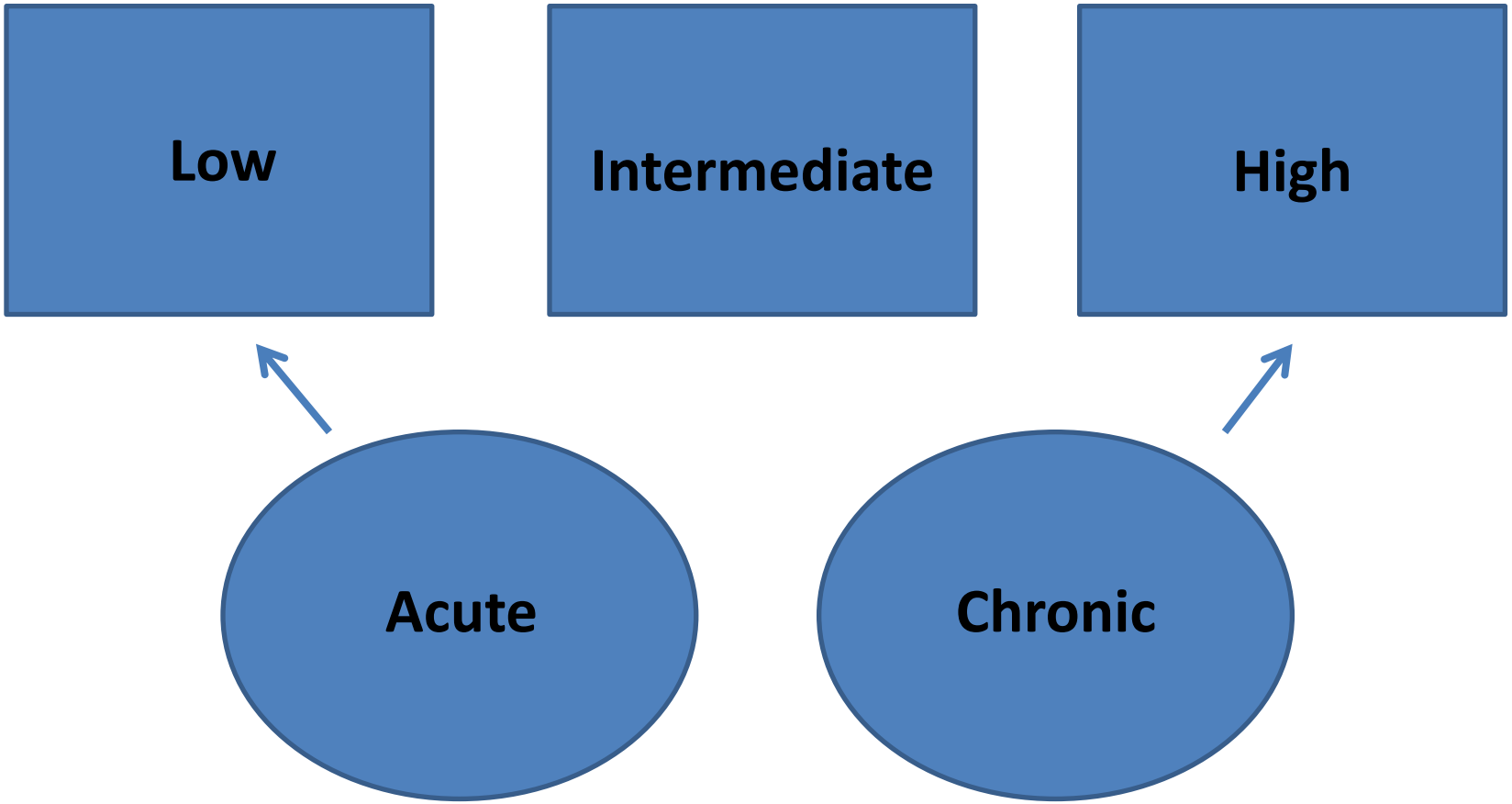
Chronic Risk

- **High**
  - Prior SA, chronic conditions (diagnoses, pain, substance use), limited coping skills, unstable/erratic psychosocial status (housing, rltp), limited reasons for living
  - Can become acutely suicidal, often in the context of unpredictable situational contingencies
  - Routine mental health f/up, safety plan, routine screening, means restriction, intervention work on coping skills/augmenting protective factors
- **Intermediate**
  - BALANCE of protective factors, coping skills, reasons for living, and stability suggests ENHANCED ability to endure crises without resorting to SDV
  - Routine mental health care to monitor conditions and maintain/enhance coping skills/protective factors, safety plan
- **Low**
  - History of managing stressors without resorting to SI
  - Typically absent: history of SDV, chronic SI, tendency toward impulsive/risky behaviors, severe/persistent mental illness, marginal psychosocial functioning

What's the Risk?

- 29 y/o female
- 18 suicide attempts and chronic SI
  - Currently reports below baseline SI & stable mood
- Numerous psychiatric admissions
- Family history of suicide
- Owns a gun
- Intermittent homelessness
  - Currently reports having stable housing
- Alcohol dependence
  - Has sustained sobriety for 6 months
- Borderline Personality Disorder

Stratify Risk – Severity & Temporality



Risk Assessment and Formulation: Documentation

Ideation → Intent → Plan → Access to Means

Although patient carries many static risk factors placing her at *high chronic risk* for engaging in suicidal behaviors, her present mood, stable housing, sustained sobriety, and SI below baseline and no current intent suggest *low acute/imminent risk* for suicidal behavior

ACUTE Therapeutic Risk Management – *Risk Stratification Table*

ROCKY MOUNTAIN MIRECC

HIGH ACUTE RISK

Essential Features

- **Suicidal ideation with intent to die by suicide**
- **Inability to maintain safety independent external support/help**

Common Warning Signs

- A plan for suicide
- Recent attempt and/or ongoing preparatory behaviors
- Acute major mental illness (e.g., MDD episode, acute mania, acute psychosis, recent/current drug relapse)
- Exacerbation of personality disorder (e.g., increased borderline symptomatology)

Common Risk Factors

- Access to means
- Acute psychosocial stressors (e.g., job loss, relationship dissolution, relapse on alcohol)

Action

Typically requires psychiatric hospitalization to maintain safety and aggressively target modifiable factors.

These individuals need to be directly observed until on a secure unit and kept in an environment with limited access to lethal means (e.g. keep away from sharps, cords/tubing, toxic substances).

During hospitalization co-occurring psychiatric symptoms should also be addressed.

INTERMEDIATE ACUTE RISK

Essential Features

- **Suicidal ideation to die by suicide**
- **Ability to maintain safety, independent of external support/help**

These individuals may present similarly to those at high acute risk, sharing many of the features. The only difference may be lack of intent, based upon an identified reason for living (e.g. children), and ability to abide by a safety plan and maintain their own safety. Preparatory behaviors are likely to be absent.

Action

Consider psychiatric hospitalization, if related factors driving risk are responsive to inpatient treatment (e.g. acute psychosis).

Outpatient management of suicidal thoughts and/or behaviors should be intensive and include:

- frequent contact,
- regular re-assessment of risk, and
- a well-articulated safety plan

Mental health treatment should also address co-occurring psychiatric symptoms.

LOW ACUTE RISK

Essential Features

- **No current suicidal intent AND**
- **No specific and current suicidal plan AND**
- **No preparatory behaviors AND**
- **Collective high confidence** (e.g., patient, care provider, family member) in the ability of the patient to independently maintain safety

Individuals may have suicidal ideation, but it will be **with little or no intent or specific current plan**. If a plan is present, the plan is general and/or vague, and without any associated preparatory behaviors (e.g., "I'd shoot myself if things got bad enough, but I don't have a gun"). These patients will be capable of engaging appropriate coping strategies, and willing and able to utilize a safety plan in a crisis situation.

Action

Can be managed in primary care.

Outpatient mental health treatment may also be indicated, particularly if suicidal ideation and psychiatric symptoms are co-occurring.

*Overall level of individual risk may be increased or decreased based upon warning signs, risk factors and **protective factors**

Lethal Means Safety

Lethal Means and Safety and Suicide Prevention

- Lethal means are objects (e.g., medications, firearms, sharp objects) that can be used to engage in Suicidal Self-Directed Violence (S-SDV)*, including suicide attempts.

- Facilitating lethal means safety is an essential component of effective suicide prevention.

- ***Why?*** Lethal means safety during a critical period can save a Veteran's life

- ***Who?*** Strategies to promote Lethal Means Safety (LMS) should be discussed with all Veterans with High or Intermediate Acute or Chronic suicide risk

- ***What?*** Providing Lethal Means Safety Counseling (LMSC) & information about accessing tangible materials to facilitate lethal means safety (e.g., firearm locking devices, medication disposal kits) will save lives

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VA | U.S. Department of Veterans Affairs

ROCKY MOUNTAIN MIRECC FOR SUICIDE PREVENTION

Suicide Risk Management Consultation Program
for Providers Who Serve Veterans
#NeverWorryAlone

@RMIRECC
@LisaABrenner

Lethal Means Safety Training

Training Description:

This web-based presentation will educate VHA mental health providers on lethal means safety counseling. Participan will learn about the purpose of lethal means safety counseling, including how to work with Veterans and their friends and family to facilitate lethal means safety during high-risk periods. The training emphasizes Veteran autonomy and teaches clinicians to work collaboratively with Veterans towards solutions that align with each Veteran's values and preferences. Following completion of the training, providers will have a better understanding of how to utilize lethal means safety counseling to enhance suicide prevention efforts with the Veterans they serve.

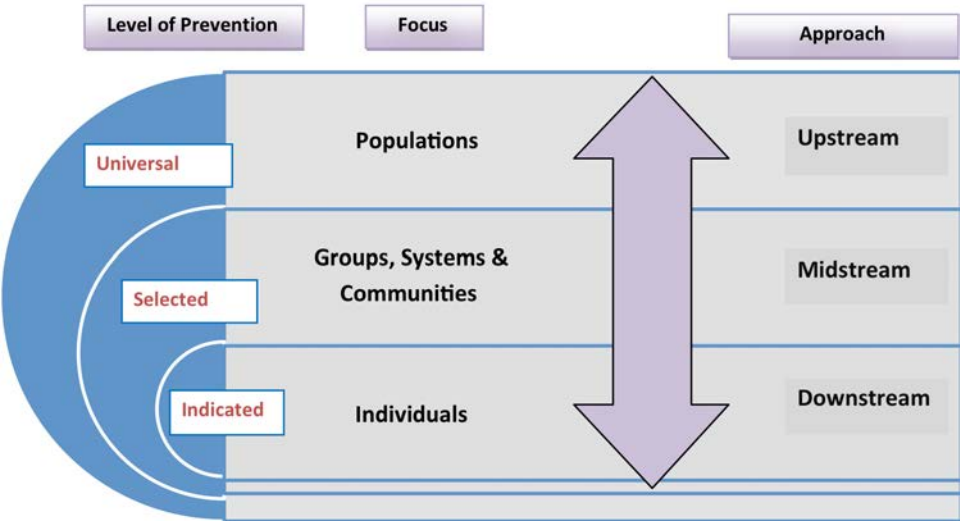
https://www.mirecc.va.gov/lethalmeanssafety/training/

BROADCASTING @rmirecc

www.mirecc.va.gov/visn19

Lisa.Brenner@va.gov

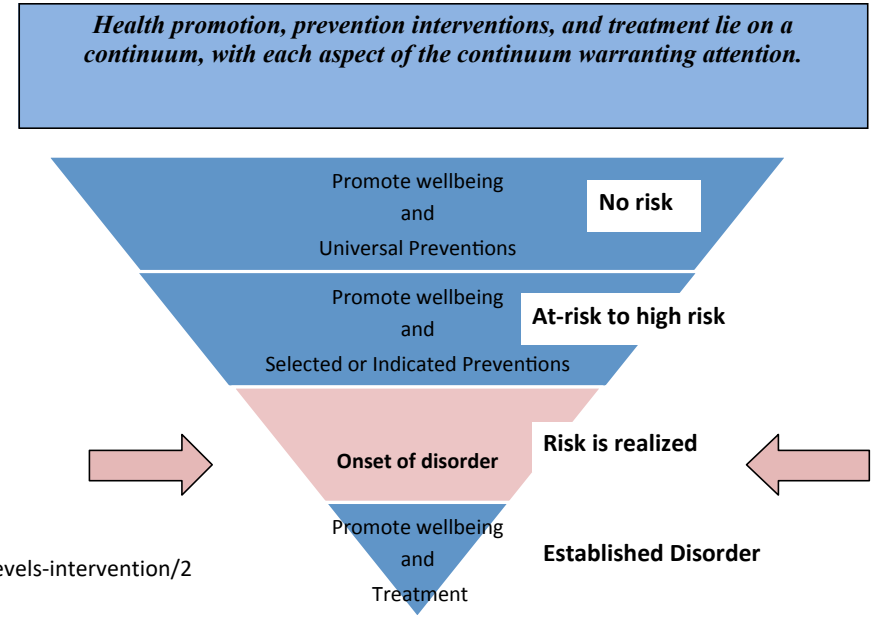
ROCKY MOUNTAIN MIRECC



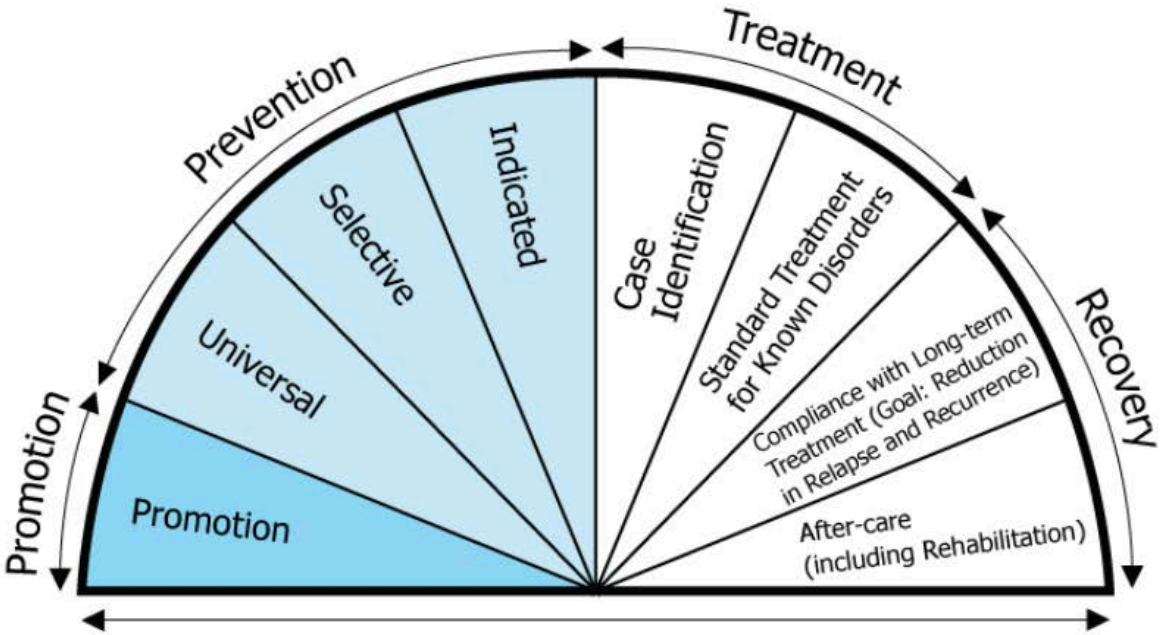
Universal preventive interventions take the broadest approach, targeting "the general public or a whole population that has not been identified on the basis of individual risk" (O'Connell, 2009). Universal prevention interventions might target schools, whole communities, or workplaces.

Selective preventive interventions target "individuals or a population sub-group whose risk of developing mental disorders [or substance abuse disorders] is significantly higher than average", prior to the diagnosis of a disorder (O'Connell, 2009). Selective interventions target biological, psychological, or social risk factors that are more prominent among high-risk groups than among the wider population.

Indicated preventive interventions target "high-risk individuals who are identified as having minimal but detectable signs or symptoms foreshadowing mental, emotional, or behavioral disorder" prior to the diagnosis of a disorder (IOM, 2009). Interventions focus on the immediate risk and protective factors present in the environments surrounding individuals.



http://captus.samhsa.gov/prevention-practice/prevention-and-behavioral-health/levels-risk-levels-intervention/2



https://www.samhsa.gov/prevention

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Archives of Physical Medicine and Rehabilitation
journal homepage: www.archives-pmr.org
Archives of Physical Medicine and Rehabilitation 2013;94:1199-201

SPECIAL COMMUNICATION

Traumatic Brain Injury as a Chronic Health Condition

John D. Corrigan, PhD,[a,*] Flora M. Hammond, MD,[b,*]

From the [a]Department of Physical Medicine and Rehabilitation, Wexner Medical Center at The Ohio State University, Columbus, OH; and [b]Department of Physical Medicine and Rehabilitation, Indiana University School of Medicine, and the Rehabilitation Hospital of Indiana, Indianapolis, IN.

Abstract

Growing evidence indicates that multiple types of brain injury, including traumatic brain injury, are dynamic conditions that continue to change years after onset. For a subset of individuals who incur these injuries, decline occurs over time and is likely due to progressive neurodegenerative processes, comorbid conditions, aging, behavioral choices, and/or psychosocial factors. Deterioration, whether directly or indirectly associated with the original brain injury, necessitates a clinical approach as a chronic health condition, including identification of risk and protective factors, protocols for early identification, evidence-based preventive and ameliorative treatment, and training in self-management. We propose that the acknowledgment of chronic brain injury will facilitate the research necessary to provide a disease management approach.
Archives of Physical Medicine and Rehabilitation 2013;94:1199-201

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JOURNAL OF NEUROTRAUMA 26:2383–2402 (December 2009)
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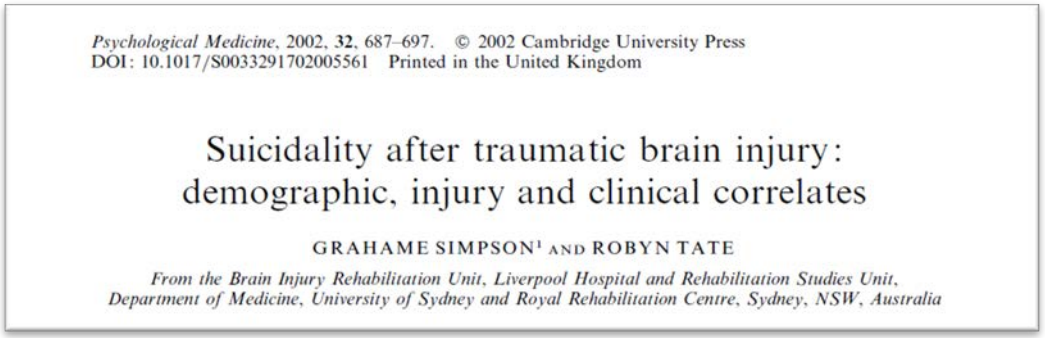
DOI: 10.1089/neu.2009.1091

Treatment for Depression after Traumatic Brain Injury: A Systematic Review

Jesse R. Fann,[1] Tessa Hart,[2] and Katherine G. Schomer[3]

This systematic review differs from prior reviews of interventions for TBI (Alderfer et al., 2005; Warden et al., 2006), in that it systematically examines the evidence for the efficacy of both biological and psychosocial interventions on depression outcomes specifically. Although the data on the treatment of depression following TBI have grown over the past decade, the paucity of adequately powered and controlled studies, including randomized controlled trials, limits the ability to establish evidence-based treatment guidelines. Among the 27 studies meeting criteria for inclusion in this review, there were only two evidence class I studies and four evidence class II studies. Only two of the class I or II studies included depression as an inclusion criterion for study entry (Ashman et al., 2009; Lee et al., 2005). The class I pharmacotherapy study (Ashman et al., 2009) showed trends toward superiority of sertraline over placebo in a demographically heterogeneous sample that was temporally far removed from their TBI, but was underpowered to examine predictors of response. The class I psychosocial study (Powell et al., 2002) demonstrated improvements in general psychological well-being, but not depressive symptoms specifically, following a comprehensive, community based, interdisciplinary team intervention targeted to multiple outcomes. The class II studies spanned modalities from pharmacotherapy (Lee et al., 2005) to psychotherapy (Tiersky et al., 2005) to alternative approaches such as biofeedback (Schoenberger et al., 2001) and meditation (McMillan, 2002). While none of these studies provided sufficient evidence for practice guidelines, taken together they do indicate that well-controlled studies are beginning to be applied to the problem of depression after TBI.

Hopelessness - strong risk factor for suicide among non-brain injured cohorts with greater predictive power than depression



Psychological Medicine, 2002, **32**, 687–697. © 2002 Cambridge University Press
DOI: 10.1017/S0033291702005561 Printed in the United Kingdom

Suicidality after traumatic brain injury: demographic, injury and clinical correlates

GRAHAME SIMPSON[1] AND ROBYN TATE

From the Brain Injury Rehabilitation Unit, Liverpool Hospital and Rehabilitation Studies Unit, Department of Medicine, University of Sydney and Royal Rehabilitation Centre, Sydney, NSW, Australia

35% of those with TBI endorsed moderate to severe hopelessness between 1 and 10 years post-injury

J Head Trauma Rehabil
Vol. 26, No. 4, pp. 290–300
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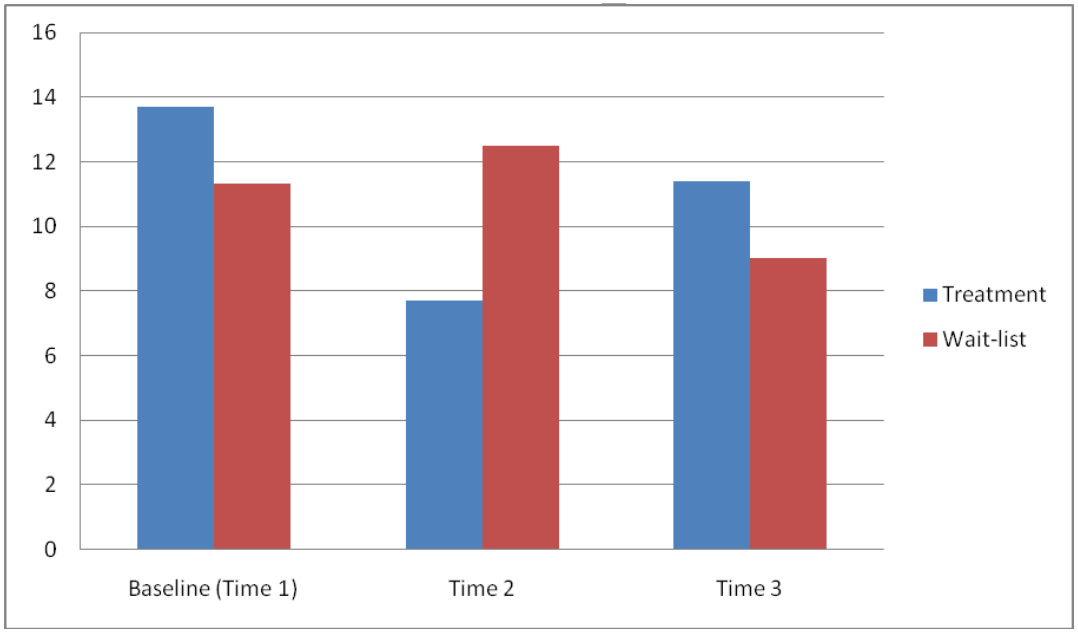
Suicide Prevention After Traumatic Brain Injury: A Randomized Controlled Trial of a Program for the Psychological Treatment of Hopelessness

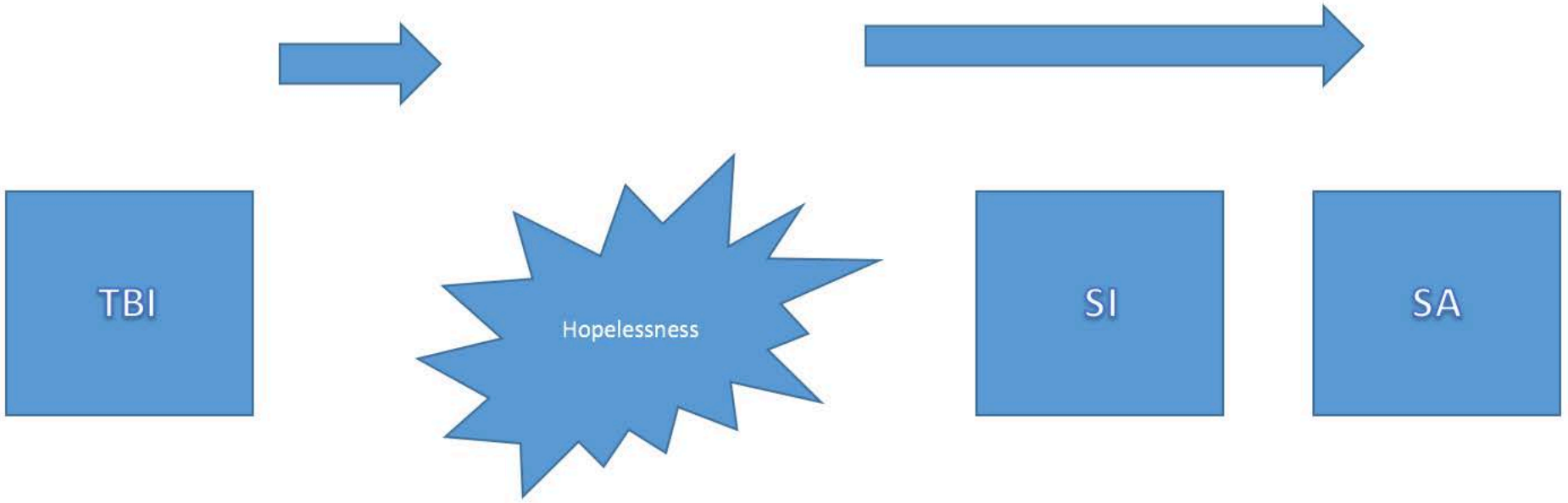
Grahame K. Simpson, PhD; Robyn L. Tate, PhD; Diane L. Whiting MPsychol (Clinical); Rachel E. Cotter, BA (Hons) (Psychol)

10 Session

Small group intervention



Beck Hopelessness Scale (BHS)


TBI
Hopelessness
SI
SA

Session	Therapeutic Principle	Goals
1. Getting started	Group formation	Group participants meet, introduce program theme
2. Living a positive lifestyle	Behavioral activation	Examine relationship between affect and lifestyle factors
3. Thoughts and feelings	Socialization to CBT	Learn about the relationship between thoughts and feelings
4,5. Take another look	Cognitive restructuring	How cognitive restructuring can ameliorate distress
6,7. Problem-solving	Problem-solving	To develop a systematic approach to solving problems
8. Problem-solving and recovery	Compensatory techniques	To develop skills to facilitate adjustment to the extent of post-injury recovery
9. Building hope	Relapse prevention: Post Traumatic Growth	To identify means of building hope after TBI, self-esteem
10. Building hope	Relapse prevention: Post Traumatic Growth	Making meaning of TBI, positive expectancy, and building connections

Aims of the program

The program aims to strengthen hope by:

1. Exploring ways of building and maintaining a sense of hopefulness after a brain injury

2. Addressing negative feelings

   - Learning how some thinking styles can trap people into feeling bad

   - Learning how to break out of this trap

3. Learning ways of dealing with life's problems

4. Looking at ways of rebuilding our lives after a traumatic brain injury.

Positive Lifestyle – EASE

Eating

Activity

Sleep

Exercise

Take Another Look

Cognitive Restructuring

Stop

Drop

Roll

How to be a STAR

Problem Solving

Spot the problem

Think of options

Act on best option

Review how it went

Building Hope

Post Traumatic Growth

Self-esteem/ value

Finding connection

Sense of purpose

Expect good things

Positive Lifestyle - Behavioral Activation

Worksheet 7 Window to Hope Manual

Activity Diary

1. Highlight times when you are already active and when you want to be more active.
2. List activities that you want to try in the boxes below.

	MORNING	AFTERNOON	EVENING
MONDAY			
TUESDAY			
WEDNESDAY			
THURSDAY			
FRIDAY			
SATURDAY			
SUNDAY			

Take Another Look – Cognitive Restructuring

Aim of Session 4

To learn how to increase our positive self-talk by practicing the following skills:

When we realize that we are telling ourselves negative messages, we should:

1. **STOP** ⇨ Say it inside our heads, not aloud
2. **DROP** ⇨ Your stress by taking 4 deep breaths (or more/less)
3. **ROLL** ⇨ On to a positive thought

Notice negative self-talk then:

STOP

⇩

DROP — **Take a Deep breath**

⇩

ROLL — **Use Positive Self-talk**

⇩

Move on

Problem Solving

How to be a **STAR**

or identify the problem

of ways to solve the problem

on the best option

the outcome

Building Hope

Building hope after traumatic brain injury

VA | U.S. Department of Veterans Affairs

J Head Trauma Rehabil
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Window to Hope: A Randomized Controlled Trial of a Psychological Intervention for the Treatment of Hopelessness Among Veterans With Moderate to Severe Traumatic Brain Injury

Lisa A. Brenner, PhD; Jeri E. Forster, PhD; Adam S. Hoffberg, MHS; Bridget B. Matarazzo, PsyD; Trisha A. Hostetter, MPH; Gina Signoracci, PhD; Grahame K. Simpson, PhD

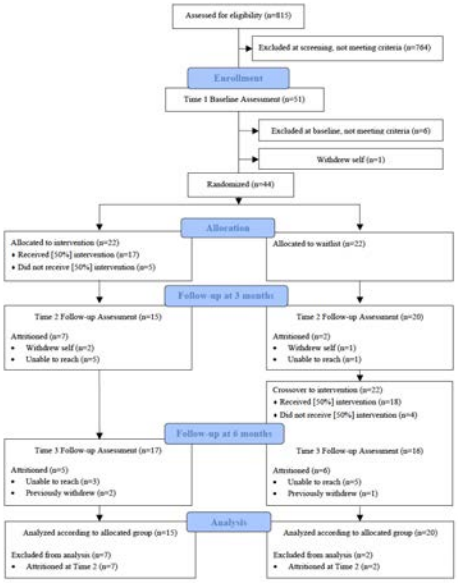
Objective: To evaluate the efficacy of a psychological intervention to reduce moderate to severe hopelessness among Veterans with moderate to severe traumatic brain injury (TBI). **Design:** Two-arm parallel group, controlled, randomized crossover trial, with 3-month follow-up for those initially allocated to treatment. Participants were randomly allocated in blocks of 4 on a 1:1 ratio to treatment ($n = 15$) or waitlist ($n = 20$) groups. **Setting:** A Veterans Affairs Medical Center. **Participants:** Veterans between the ages of 26 and 65 years, with a history of moderate to severe TBI, and moderate to severe hopelessness. **Interventions:** A 20-hour manualized small group cognitive-behavioral intervention. **Main Outcome Measures:** Beck Hopelessness Scale (primary), Beck Depression Inventory, and Beck Scale for Suicide Ideation. **Results:** A significant difference between groups was found for postintervention scores on the Beck Hopelessness Scale ($P = .03$). Significant decreases were maintained at follow-up. For those initially allocated to the waitlist group who completed the intervention, treatment gains were noted in decreased hopelessness ($P = .01$) and depression ($P = .003$). **Conclusions:** Findings from this trial provide additional support for the efficacy of this method of psychological treatment of hopelessness among individuals with moderate to severe TBI. **Key words:** *cognitive behavior therapy, depression, hopelessness, randomized controlled trial, replication, suicide ideation, suicide prevention, traumatic brain injury, Veterans*

MILITARY SUICIDE RESEARCH CONSORTIUM

ROCKY MOUNTAIN MIRECC

VA Window to Hope - Preliminary Findings
Characteristics

All Moderate to Severe TBI
All BHS = 9 or greater



Demographic and Military	Initially allocated to Waitlist (n=20)	Initially allocated to WtoH (n=15)	Fisher's Exact p-value
Age	54.6 (8.8) 56.5 (29, 65)	47.7 (12.1) 49.0 (26, 64	0.06^
Gender			
Male	19 (95%)	13 (87%)	0.71
Female	1 (5%)	1 (7%)	
Transgender	0	1 (7%)	
Race			
Caucasian	10 (53%)	11 (73%)	0.30
Other	9 (47%)	4 (27%)	
Marital Status			
Married	6 (32%)	6 (40%)	0.95
Single	4 (21%)	3 (20%)	
Cohabitating	1 (5%)	1 (7%)	
Divorced/Separated	8 (42%)	5 (33%)	
Education			
9-12th grade/no diploma or HS diploma or equivalent	4 (20%)	2 (13%)	0.007
Some college or associate degree	16 (80%)	7 (47%)	
Bachelor, graduate or professional degree	0 (0%)	6 (40%)	
Employment			
Full-time	1 (6%)	0 (0%)	0.83
Retired or Not Employed	12 (67%)	11 (79%)	
Unemployed	5 (28%)	3 (21%)	
Student	2 (10%)	1 (7%)	>0.99
Branch			
Army	7 (35%)	7 (47%)	0.33
Air Force	5 (25%)	4 (27%)	
Navy	3 (15%)	0 (0%)	
Marines	4 (20%)	1 (7%)	
Multiple	1 (5%)	3 (20%)	
Deployed*	9 (56%)	12 (80%)	0.25
Combat	4 (20%)	9 (60%)	0.03
Months in the Military	88.6 (83.8) 48 (3, 264)	126.1 (104.4) 86 (24, 384)	0.09^
Unique episodes of Homelessness**	0.68 (1.3) 0 (0, 5)	0.36 (0.50) 0 (0, 1)	0.81^

*N=16 Waitlist; ** N=19 Waitlist, N=14 WtoH; ^Wilcoxon Rank-Sum Test

VA Window to Hope – Clinical Characteristics

Clinical variables	Initially allocated to waitlist ($n = 20$)	Initially allocated to WtoH ($n = 15$)	Fisher exact test *P* value
Lifetime mood disorder	19 (95%)	15 (100%)	>.99
Lifetime anxiety disorder	18 (90%)	13 (87%)	>.99
Lifetime alcohol or substance dependence or abuse	4 (20%)	2 (13%)	.68
Lifetime PTSD	7 (35%)	8 (53%)	.32
Lifetime psychotic disorder	2 (10%)	2 (13%)	>.99
History of a suicide attempt	10 (50%)	10 (67%)	.49
BHS	14.0 (3.1) 14 (8.5, 20)	16.2 (3.2) 17 (10.5, 20)	.04[a]
BDI	28.4 (8.4) 28 (14, 45)	37.6 (11.6) 37 (14, 54)	.01[a]
BSS[b]	4.8 (5.5) 2 (0, 18)	5 (5.8) 1.5 (0, 15)	.89[a]
Sessions of WtoH attended	7.8 (2.9) 8.5 (0, 10)	8.7 (1.5) 9 (5, 10)	.53[a]

Abbreviations: BDI, Beck Depression Inventory; BHS, Beck Hopelessness Scale; BSS, Beck Scale for Suicide Ideation; PTSD, posttraumatic stress disorder; WtoH, Window to Hope.
[a]Wilcoxon rank sum test.
[b]$n = 19$ waitlist, $n = 14$ WtoH.

BHS Score (20 items)	Range
0-3	Minimal
4-8	Mild
9-14	Moderate
15-20	Severe

BDI Score (21 items)	Range
0-9	Minimal
10-16	Mild
7-29	Moderate
30-63	Severe

BSS Score (19 item)

All items rated on a 3-point scale scores range from 0-48; non-zero score is notable

Part 1

1 0 I have a moderate to strong wish to live.
1 I have a weak wish to live.
2 I have no wish to live.

2 0 I have no wish to die.
1 I have a weak wish to die.
2 I have a moderate to strong wish to die.

3 0 My reasons for living outweigh my reasons for dying.
1 My reasons for living or dying are about equal.
2 My reasons for dying outweigh my reasons for living.

4 0 I have no desire to kill myself.
1 I have a weak desire to kill myself.
2 I have a moderate to strong desire to kill myself.

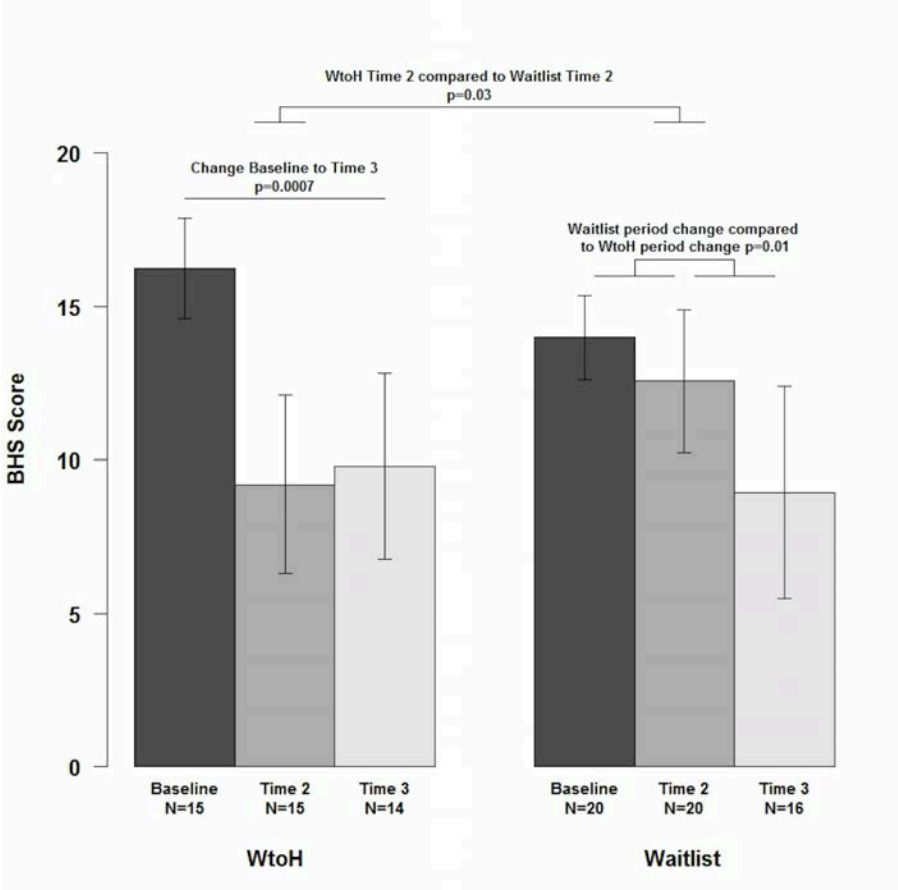
5 0 I would try to save my life if I found myself in a life-threatening situation.
1 I would take a chance on life or death if I found myself in a life-threatening situation.
2 I would not take the steps necessary to avoid death if I found myself in a life-threatening situation.

If you have circled the zero statements in both Groups 4 and 5 above, then skip down to Group 20. If you have marked a 1 or 2 in either Group 4 or 5, then open here and go to Group 6.

Primary Outcome – Hopelessness

Statistically vs. Clinically Significant

Score	Range
0-3	Minimal
4-8	Mild
9-14	Moderate
15-20	Severe



Please describe what the intervention contributed to you. What was its impact after the intervention was completed?

- *Not just one intervention, but a multitude thereof in which I can combine or use separately in my issues pertaining to decision and problem-solving when I have problems pertaining to my thought process and TBI.*

- *...I have found that I have sustained the intervention techniques and now use them without a cognizant thought. With these new techniques, I found that I have more hopefulness in attaining my goals and hopelessness is now filed away and not attainable easily, it is not the first thing I grasp.*

- *I have already noticed some differences in me. The way I respond to simple questions, like "how are you?" A lot of the stuff we were doing I was already practicing like eating better, exercising, sleeping, and positive living. I didn't take it very seriously at first, but it was a good thing.*

- *To be able to breathe with knowing that ending my life is not the answer.*

What change, if any, took place during participation in the intervention? If a change did not take place, please describe what happened during participation in the intervention?

- *I and (other ppt) have the same medical problems and I don't feel like an outcast or a freak anymore. Yea and I have more self-esteem about myself and understanding that I have a physical handicap now and I am better able to deal with it by this class.*

- *I'd say that I became much more aware of my own thought processes, and maybe my own lack of thought process, more just acting on feelings, rather than really thinking about why I am feeling how I am feeling. And I became very aware of some of the things that I am not doing, that I can do, specifically some of the things that only I can do, that no one else can do for me to help me, even though I haven't been doing it. That responsibility falls to me.*

- *I felt a change in me, it gave me more incentive to try to work out the problems I have, instead of just putting them in the back burner all the time. It gave me hope*!

ACRM

Archives of Physical Medicine and Rehabilitation

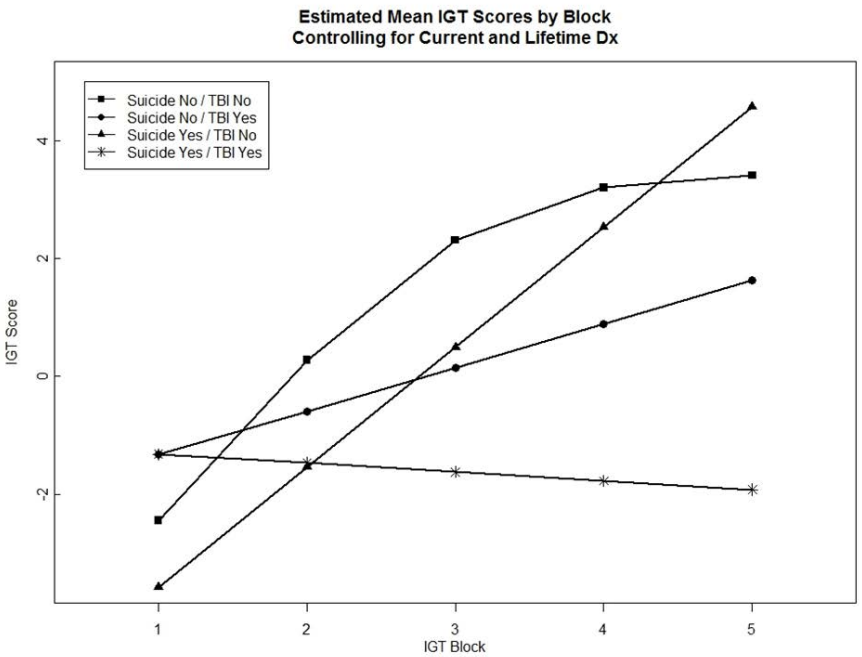
ORIGINAL RESEARCH

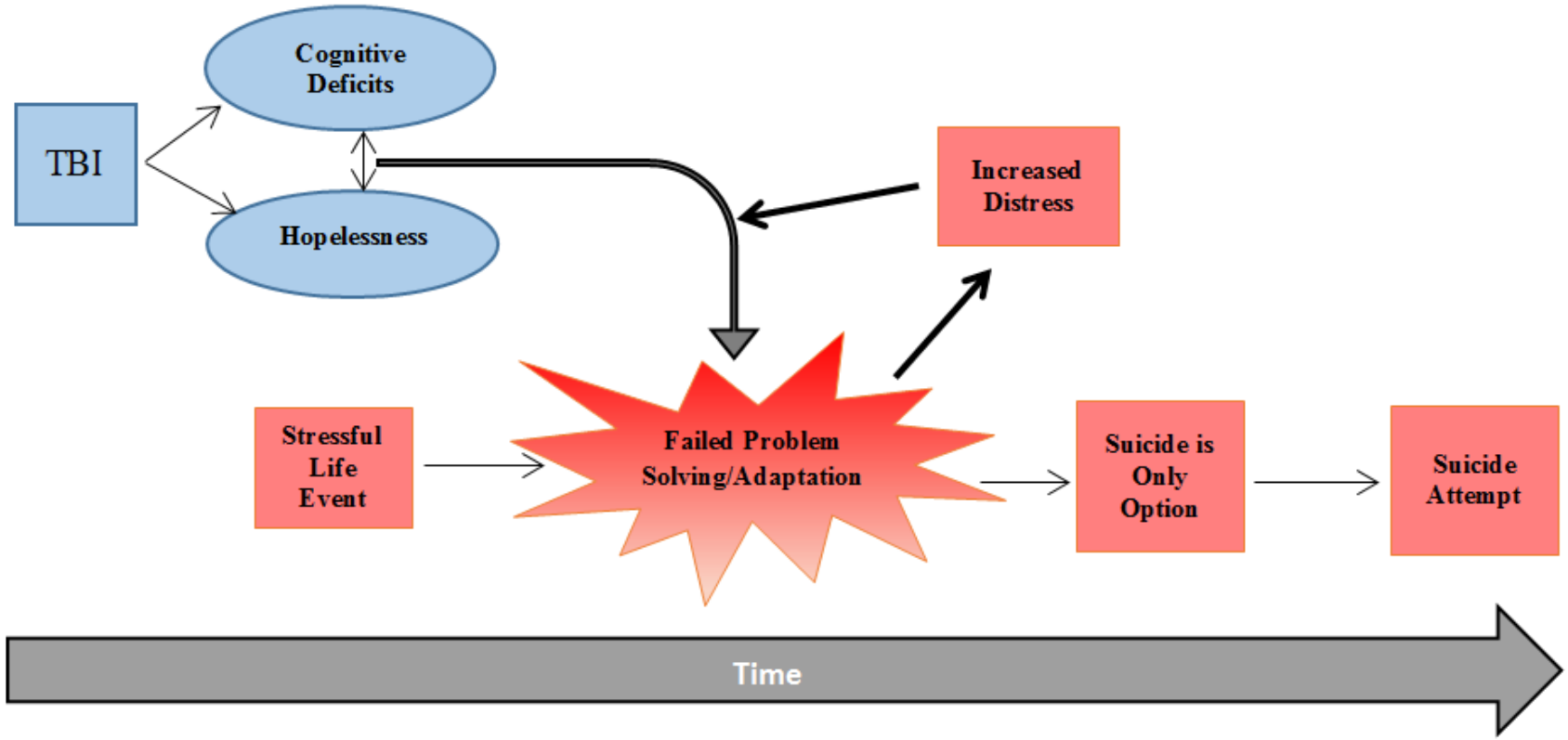
Executive Functioning and Suicidal Behavior Among Veterans With and Without a History of Traumatic Brain Injury

Lisa A. Brenner, PhD, Nazanin Bahraini, PhD, Beeta Y. Homaifar, PhD, Lindsey L. Monteith, PhD, Herbert Nagamoto, MD, Brooke Dorsey-Holliman, PhD, Jeri E. Forster, PhD

- Objective: To examine the relationship between executive dysfunction, as a multidimensional construct (i.e., decision making, impulsivity, aggression, and concept formation) and suicide attempts
- Design: Observational, 2x2 factorial design
- Setting: Veterans Health Administration
- Participants: 133 (No SA No TBI: n=48, No SA Yes TBI: n=51, Yes SA No TBI: n = 12, Yes SA Yes TBI: n = 22).
- Main Outcome Measures: Iowa Gambling Test (IGT), Immediate and Delayed Memory Test (IMT/DMT), State Trait Anger Expression Inventory (STAXI-2), Wisconsin Card Sorting Test (WCST)

Veterans Health Administration RR&D Merit Review Grant Project #D7210R





TBI-related sequela (e.g., cognitive deficits, feelings of hopelessness) may lead to difficulty finding solutions when faced with stressful life events. Resulting distress further impairs problem solving abilities. When successful solutions cannot be found, suicide may appear to be the only option.

Problem Solving:

Creating an Action Plan

Veterans' Version

Lisa Brenner, PhD, ABPP (Rp)

with Beeta Homaifar, PhD

Lindsey Monteith, PhD

Sean Barnes, PhD

Adam Hoffberg, MHS

Georgia Gerard, LCSW

Problem Solving Therapy Strategies (Emotional regulation & planful problem solving skills)

↓

Facilitate Safety Planning (Action Plan)

J Head Trauma Rehabil
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Comorbid Posttraumatic Stress Disorder and Traumatic Brain Injury: Generalization of Prolonged-Exposure PTSD Treatment Outcomes to Postconcussive Symptoms, Cognition, and Self-Efficacy in Veterans and Active Duty Service Members

Gregory K. Wolf, PsyD; Gregory J. Mauntel, PsyD; Tracy Kretzmer, PhD; Eric Crawford, PhD; Christina Thors, PhD; Thad Q. Strom, PhD; Rodney D. Vanderploeg, PhD

Objectives: To examine (*a*) generalization of the effectiveness of prolonged exposure (PE) therapy for posttraumatic stress disorder (PTSD) in improving postconcussive symptoms (PCSs) and other outcomes in military service members and Veterans (VA) with histories of mild to severe traumatic brain injury (TBI), and (*b*) factors associated with PCS reduction. **Setting:** VA polytrauma medical center. **Participants:** Consecutive referrals for PTSD treatment of Active Duty ($n = 17$) or Veterans ($n = 27$) diagnosed with PTSD and TBI ($N = 44$). **Main Outcome Measures:** Neurobehavioral Symptom Inventory, Key Behaviors Change Inventory, Self-Efficacy for Symptom Management, Posttraumatic Stress Disorder Checklist, and Beck Depression Inventory, 2nd edition. **Design:** Post hoc analysis of archival clinical effectiveness program evaluation data. **Interventions:** PE for PTSD. **Results**: There were significant improvements on all outcome measures with large effect sizes (Cohen's *d* ranging from 0.68 to 2.02). Improvement on PCS (Cohen's $d = 1.21$) was associated with lower levels of VA service-connected disability and PE treatment completion. **Conclusion:** PE treatment-related improvements for participants with comorbid PTSD and TBI generalize from PTSD outcomes to PCS and other TBI-related outcomes. Positive outcomes were independent of TBI severity, treatment setting, or Veteran status, but dependent upon PE treatment completion and lower levels of VA service-connected disability. **Key words:** *concussion, postconcussive syndrome, postdeployment, posttraumatic stress disorder, rehabilitation, traumatic brain injury, Veteran*

TABLE 2 *NSI, KBCI, and self-efficacy treatment outcomes*[a]

	n	Pre Mean (SD)	Post Mean (SD)	Cohen's *d*
NSI total score	44	48.32 (12.30)	33.98 (18.60)	1.21[b]
NSI[c] affective	44	16.57 (3.84)	10.34 (5.99)	1.27[b]
Cognitive	44	10.64 (3.27)	6.95 (4.26)	1.02[b]
Somatosensory	44	12.61 (4.47)	10.05 (5.93)	0.68[b]
Vestibular	44	4.73 (2.54)	3.59 (2.43)	0.69[b]
KBCI average T score	28	44.07 (11.80)	27.73 (17.06)	1.57[b]
KBCI inattention	28	76.46 (11.35)	64.85 (12.73)	0.85[b]
Impulsivity	28	65.75 (11.02)	57.54 (8.98)	1.14[b]
Apathy	28	69.81 (11.48)	58.17 (10.00)	1.12[b]
Unawareness	28	61.83 (9.54)	56.02 (8.84)	0.78[b]
Interpersonal difficulties	28	64.71 (8.99)	54.86 (8.19)	1.14[b]
Communication problems	28	64.13 (11.42)	58.60 (10.88)	0.70[b]
Emotional adjustment	28	66.88 (9.21)	55.99 (7.81)	1.46[b]
Somatic concerns	28	65.51 (9.38)	56.58 (10.29)	1.04[b]
Self-efficacy	29	57.59 (17.64)	88.36 (23.66)	2.02[b]

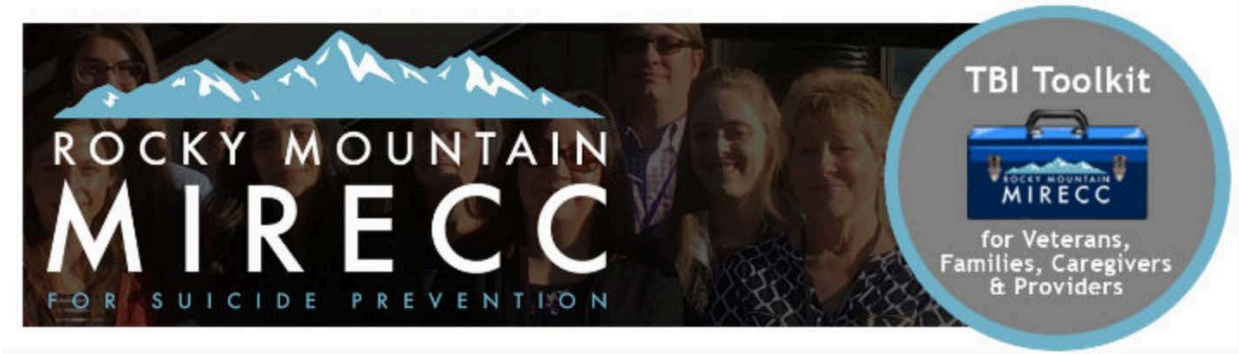
Abbreviations: KBCI, Key Behaviors Change Inventory; NSI, Neurobehavioral Symptom Inventory; SD, standard deviation.
[a]All those who had KBCI and Self-efficacy data completed prolonged exposure treatment. These 2 measures were added after the study began.
[b]$P < .001$.
[c]NSI subscales were based on Vanderploeg et al.[26]

Toolkit for Community Mental Health Providers Treating TBI and Comorbid Mental Health Concerns

Lisa A. Brenner, Ph.D., Jennifer Olson-Madden, Ph.D.,
Gina Signoracci, Ph.D., Bridget Matarazzo, Ph.D., Joe Huggins, MSW

Welcome to the Toolkit!

Rocky Mountain MIRECC TBI Toolkit



Home | TBI 101 | Mental Health/TBI | Justice Involved | Military & Veteran | Resources

Why an On-line Toolkit?

Traumatic Brain Injury (TBI) is a significant public health concern. This toolkit provides necessary information to address the needs of individuals with a history of TBI and co-occurring mental health conditions. The toolkit specifically emphasizes TBI in justice-involved and Military/Veteran populations. Community mental health clinicians', justice-involved professionals', and Military/Veteran experts' input was integral in identifying areas of focus. This toolkit is designed to assist professionals in identifying TBI and associated co-occurring problems and to facilitate determining potential need for further evaluation and/or treatment/case planning modification. In addition, relevant information and resources for families/support systems are available.

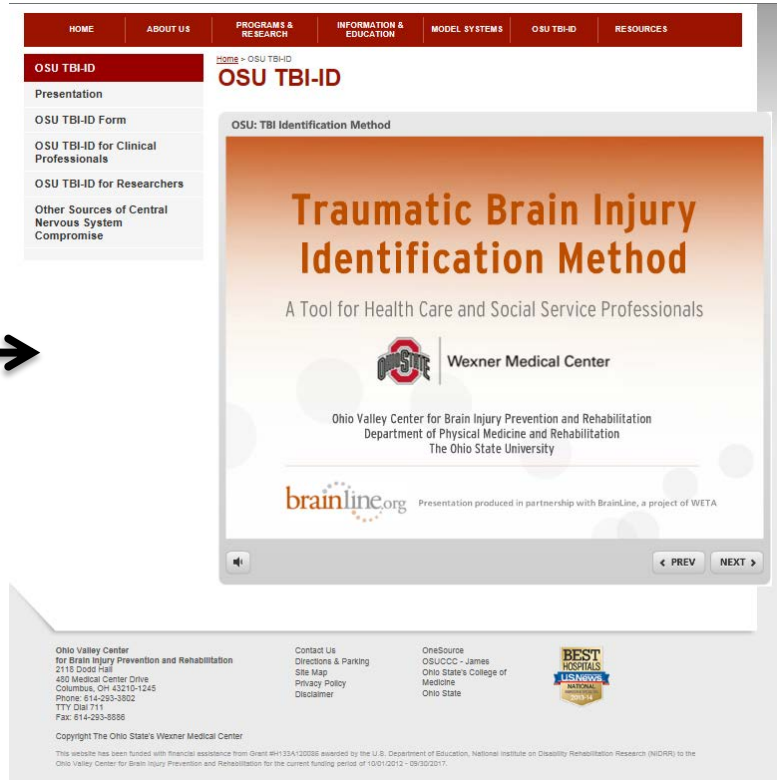
Traumatic Brain Injury: Assessment

– TBI: Assessment

Diagnosis of TBI and its associated comorbid symptoms and disorders present unique challenges to reliably making a diagnosis of TBI. As such, no screening instruments available can reliably make the diagnosis. Instead, full assessment should be implemented when screening results indicate probable TBI. It should be noted that assessment via brain imaging is not useful in detecting history of mTBI. As such, structured clinical interview is considered the gold standard assessment approach for diagnosing TBI. Assessment using a structured clinical interview will help to clarify the nature of the injury, confirm injury events, determine if a TBI was sustained, and if so, the severity of injury. The Ohio Valley Center for Brain Injury Prevention and Rehabilitation offers training regarding assessment of TBI history and related symptoms using the gold-standard Ohio State University TBI Identification Method (OSU TBI-ID). Although structured interview relies on verbal history which may be difficult to obtain, this approach provides a means for clinicians to elicit and obtain as much detailed injury history as possible in order to make a diagnosis.

TBI Assessment Tools

After information regarding TBI history has been gathered and a history of probable injury or injuries has been confirmed to establish diagnosis, it can be helpful to assess if and how symptoms associated with TBI may be impacting the client's life. Several tools are available to facilitate this process.



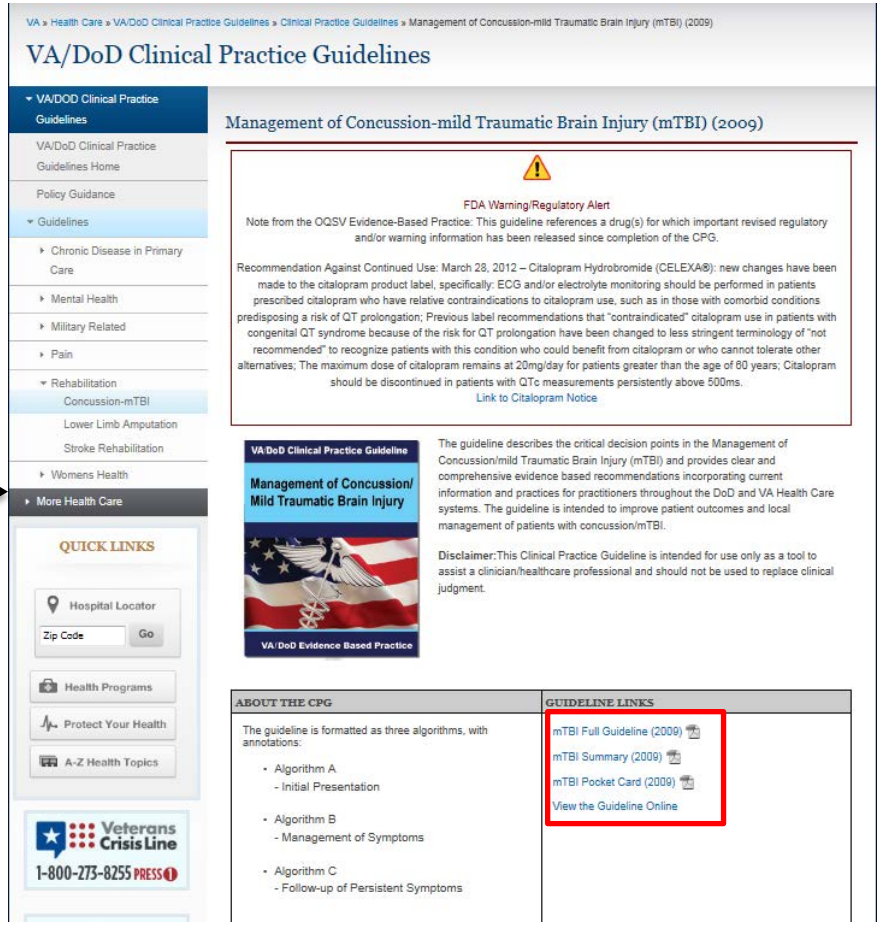
Traumatic Brain Injury: Intervention

– TBI: Intervention

Clinical Practice Guidelines

The following provide links to clinical practice guidelines for mild TBI and persistent symptoms. These guidelines offer information and direction to providers managing clients' recovery from mTBI:

- VA and DoD worked together to create the Clinical Practice Guidelines for mTBI to facilitate consistent and beneficial treatment. Download the guidelines.
- The Ontario Neurotrauma Foundation also created Guidelines for Concussion/Mild TBI and Persistent Symptoms, which include information about the treatment of persistent symptoms. Download the guidelines.



Co-occurring TBI and Mental Health Symptoms: Substance Abuse

Background Information

Problems with drinking or substance use may occur in response to stress or in combination with PTSD, depression, or other mental health and medical conditions. Pre-injury alcohol and drug abuse increases the risk for sustaining TBI (Vassallo et al., 2007). Additionally, clients with a history of substance abuse often have worse outcomes after sustaining a TBI (Corrigan, Rust, & Lamb-Hart, 1995). Substance use disorders typically decrease after an initial TBI, but there is usually an increase in substance use approximately two to three years after the TBI (Kreutzer, Marwitz & Witol, 1995). Substance use poses an increased risk for future TBIs.

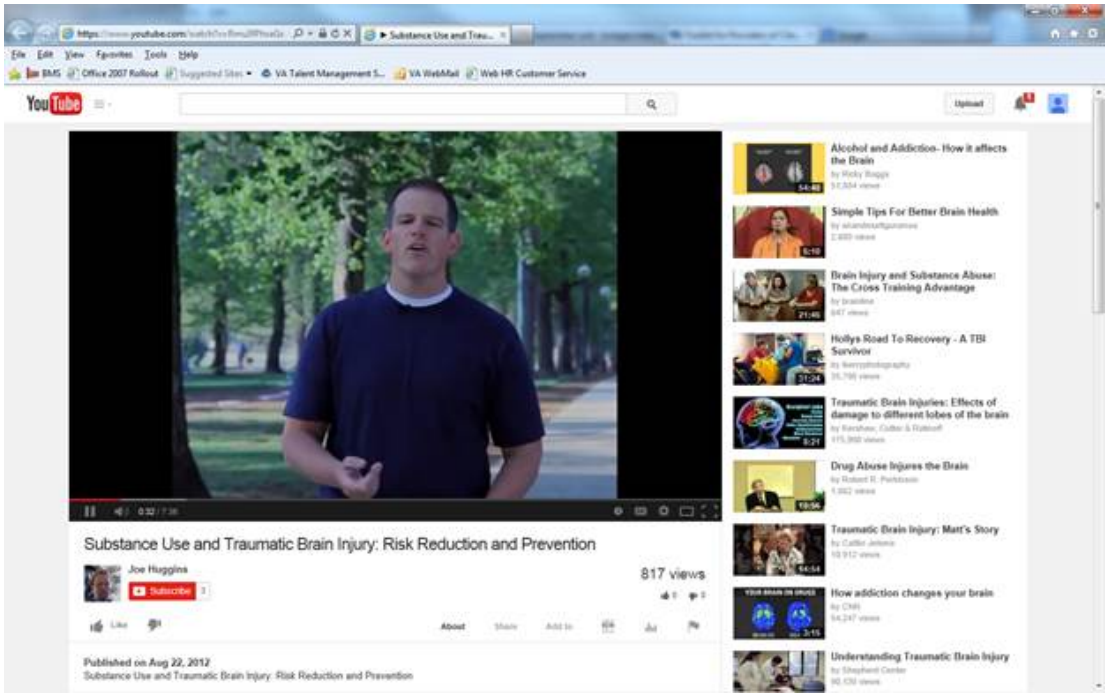
It is essential for providers to routinely assess substance use in the ongoing management of individuals who sustained a TBI. The video "Substance Use and Traumatic Brain Injury Risk Reduction and Prevention" may be helpful for you and your client to view together in practice. The video provides education on how substance use can influence a person with TBI, the risks associated with substance use after a TBI, and how to reduce risk from sustaining future injuries. This video was designed to open dialogue with clients on the topic of substance use.

brainline.org BrainLine provides more information about substance use and TBI at their website.

The Ohio Valley Center for Brain Injury Prevention and Rehabilitation (OVC) also provides useful information about working with individuals with TBI and substance use disorders.

OHIO STATE Wexner Medical Center

Another relevant article is Substance Use and Mild Traumatic Brain Injury Risk Reduction and Prevention: A Novel Model for Treatment co-authored by Jennifer Olson-Madden.



Resources

Rocky Mountain MIRECC TBI Toolkit

Home | TBI 101 | Mental Health/TBI | Justice Involved | Military & Veteran | Resources

Jump to: For Veterans | Family/Friends | Providers

Resources

ROCKY MOUNTAIN MIRECC

This page contains a variety of resources for Veterans, Family, Friends and Caregivers. There are also additional resources for Providers.

TreatmentWorksForVets – Veteran Portal: EBP Public Awareness and Engagement Web Portal for VHA and the Community

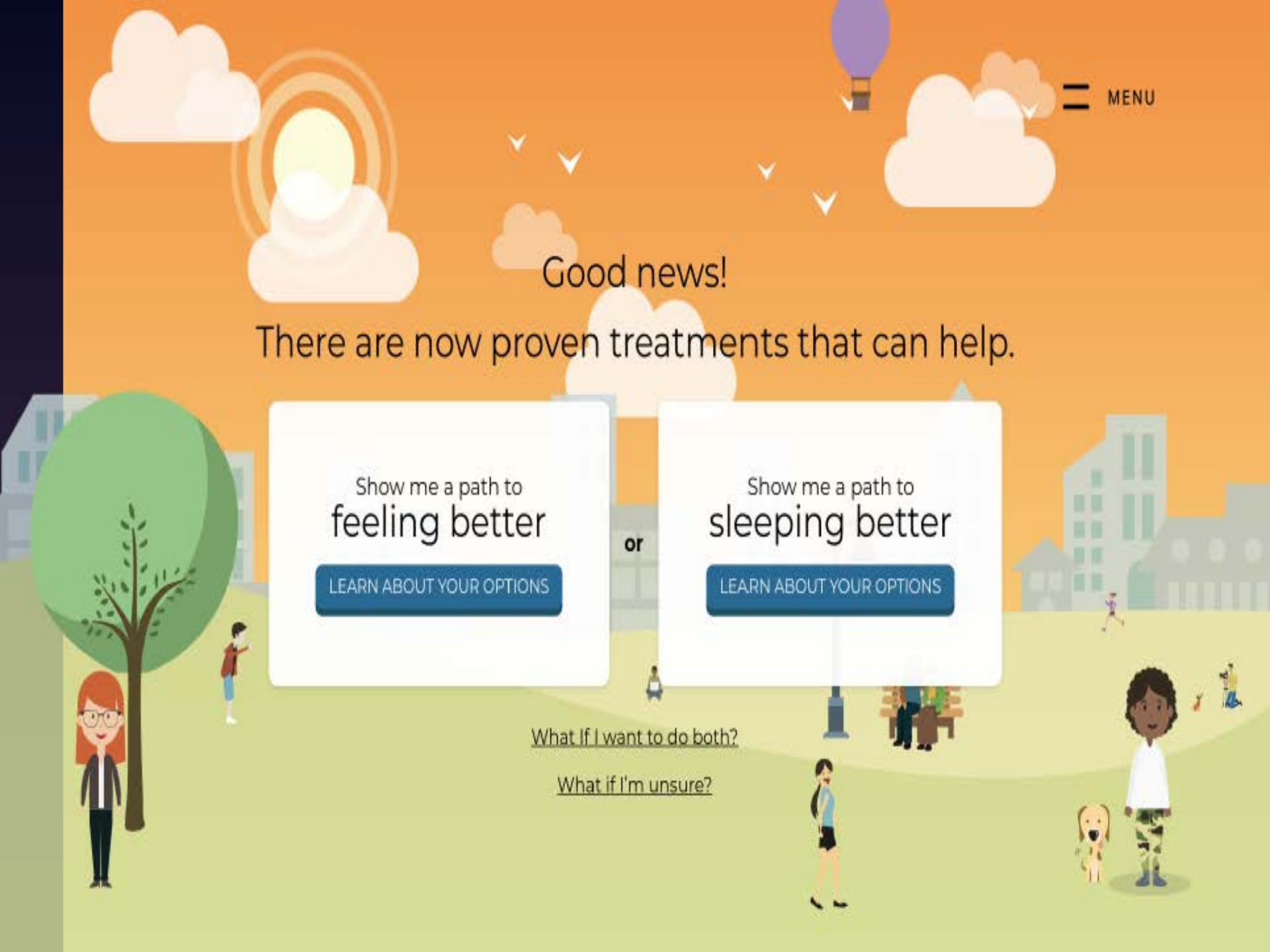
Initial Focal Areas:
(1) Cognitive Behavioral Therapy for Depression
(2) Cognitive Behavioral Therapy for Insomnia
(3) Cognitive Behavioral Therapy for SUD*
(4) Acceptance and Commitment Therapy for Depression*

Overall Goals:
•Increase Veteran and family member awareness of EBPs
•Promote positive beliefs and motivation toward treatment
•Increase uptake of EBPs

TreatmentWorksForVets – Provider Portal: Shared Decision Making

Approach: Develop processes and decision support tools for promoting shared decision-making and patient engagement beginning prior to the initiation of treatment

Overall Goals:
•Provide a structured, yet flexible, processes for increasing Veteran awareness of EBPs (and other treatment options) and allowing for informed choice
•Increase shared treatment decision-making between clinicians and Veterans, with important focus on interpersonal trust and connection
•Enhance treatment readiness for maximizing initial and ongoing engagement in treatment


MENU
Good news!
There are now proven treatments that can help.
Show me a path to
feeling better
LEARN ABOUT YOUR OPTIONS
or
Show me a path to
sleeping better
LEARN ABOUT YOUR OPTIONS
What If I want to do both?
What if I'm unsure?

Veteran Portal

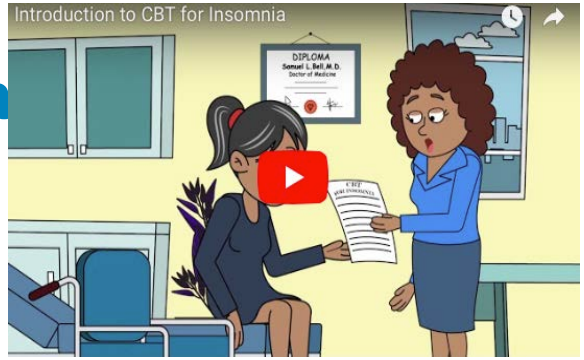
Users follow a guided and increasingly immersive experience, with the option to manually navigate to specific pages and content as they wish

Introduction to CBT-D

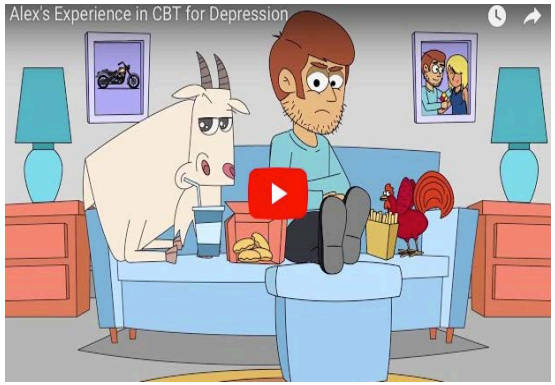
, Animated EBP Explain

Introduction to EBPs

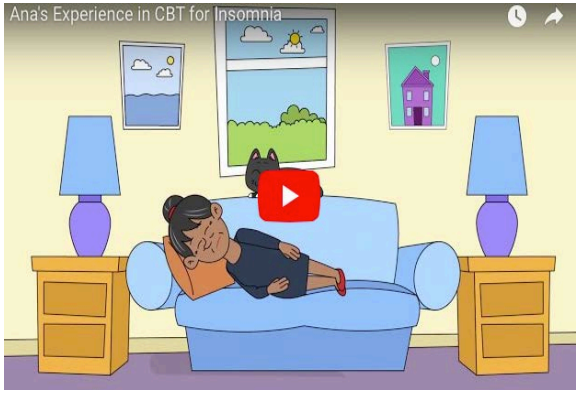
Introduction to CBT-I



Alex's Experience in CBT-D



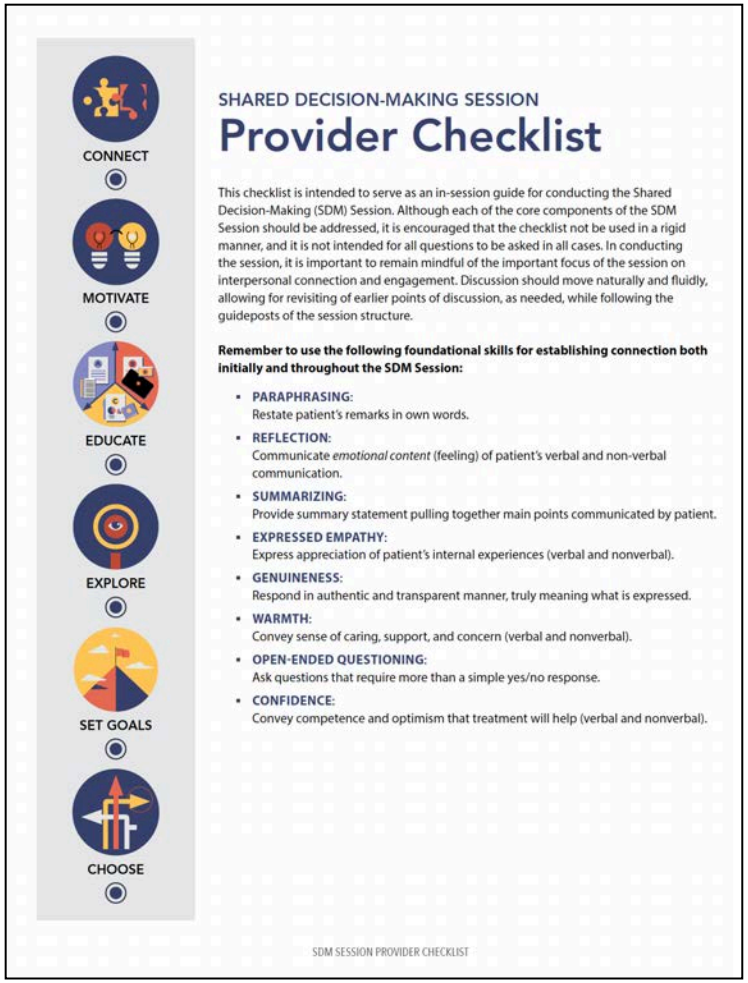
Ana's Experience in CBT-I



The SDM Session

1. **Connect:** Establish Initial Trust and Connection
2. **Motivate:** Assess and Promote Motivation for Treatment
3. **Educate:** Educate Veteran about EBPs and Other Treatment Options
4. **Explore:** Examine Values and Preferences
5. **Set Goals:** Identify Potential Treatment Goals
6. **Choose:** Select Treatment or Determine Next Steps

Provider In-Session Tools



CONNECT

MOTIVATE

EDUCATE

EXPLORE

SET GOALS

CHOOSE

SHARED DECISION-MAKING SESSION

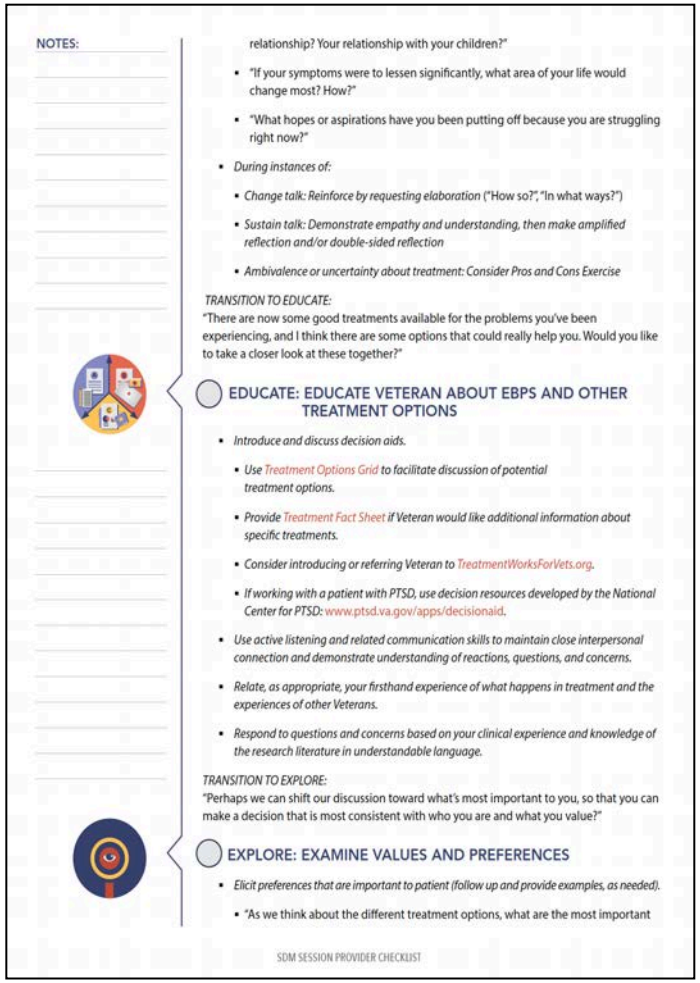
Provider Checklist

This checklist is intended to serve as an in-session guide for conducting the Shared Decision-Making (SDM) Session. Although each of the core components of the SDM Session should be addressed, it is encouraged that the checklist not be used in a rigid manner, and it is not intended for all questions to be asked in all cases. In conducting the session, it is important to remain mindful of the important focus of the session on interpersonal connection and engagement. Discussion should move naturally and fluidly, allowing for revisiting of earlier points of discussion, as needed, while following the guideposts of the session structure.

Remember to use the following foundational skills for establishing connection both initially and throughout the SDM Session:

- **PARAPHRASING:** Restate patient's remarks in own words.
- **REFLECTION:** Communicate *emotional content* (feeling) of patient's verbal and non-verbal communication.
- **SUMMARIZING:** Provide summary statement pulling together main points communicated by patient.
- **EXPRESSED EMPATHY:** Express appreciation of patient's internal experiences (verbal and nonverbal).
- **GENUINENESS:** Respond in authentic and transparent manner, truly meaning what is expressed.
- **WARMTH:** Convey sense of caring, support, and concern (verbal and nonverbal).
- **OPEN-ENDED QUESTIONING:** Ask questions that require more than a simple yes/no response.
- **CONFIDENCE:** Convey competence and optimism that treatment will help (verbal and nonverbal).

SDM SESSION PROVIDER CHECKLIST



NOTES:

relationship? Your relationship with your children?"

- "If your symptoms were to lessen significantly, what area of your life would change most? How?"
- "What hopes or aspirations have you been putting off because you are struggling right now?"

- *During instances of:*
  - *Change talk: Reinforce by requesting elaboration* ("How so?", "In what ways?")
  - *Sustain talk: Demonstrate empathy and understanding, then make amplified reflection and/or double-sided reflection*
  - *Ambivalence or uncertainty about treatment: Consider Pros and Cons Exercise*

TRANSITION TO EDUCATE:
"There are now some good treatments available for the problems you've been experiencing, and I think there are some options that could really help you. Would you like to take a closer look at these together?"

EDUCATE: EDUCATE VETERAN ABOUT EBPS AND OTHER TREATMENT OPTIONS

- *Introduce and discuss decision aids.*
  - *Use Treatment Options Grid to facilitate discussion of potential treatment options.*
  - *Provide Treatment Fact Sheet if Veteran would like additional information about specific treatments.*
  - *Consider introducing or referring Veteran to TreatmentWorksForVets.org.*
  - *If working with a patient with PTSD, use decision resources developed by the National Center for PTSD:* www.ptsd.va.gov/apps/decisionaid.
- *Use active listening and related communication skills to maintain close interpersonal connection and demonstrate understanding of reactions, questions, and concerns.*
- *Relate, as appropriate, your firsthand experience of what happens in treatment and the experiences of other Veterans.*
- *Respond to questions and concerns based on your clinical experience and knowledge of the research literature in understandable language.*

TRANSITION TO EXPLORE:
"Perhaps we can shift our discussion toward what's most important to you, so that you can make a decision that is most consistent with who you are and what you value?"

EXPLORE: EXAMINE VALUES AND PREFERENCES

- *Elicit preferences that are important to patient (follow up and provide examples, as needed).*
  - "As we think about the different treatment options, what are the most important

SDM SESSION PROVIDER CHECKLIST

Educate subpage Provider portal:
www.treatmentworksforvets.org/Provider/Educate

Veteran Card

Provider Card

SUICIDE RISK MANAGEMENT Consultation Program

FOR PROVIDERS WHO SERVE VETERANS

Expert one-on-one consultations are available at no charge to any provider who serves Veterans (VA/Non-VA) and has questions about:

- Assessment
- Conceptualizing and Stratifying Suicide Risk
- Lethal Means Safety Counseling
- Treatment Engagement
- Evidence-based Resources for Suicide Risk Management
- Postvention

To arrange a consultation email: SRMconsult@va.gov

For more information visit: www.mirecc.va.gov/visn19/consult/index.asp

#NeverWorryAlone

https://www.youtube.com/watch?v=wkKPZkqQ3KQ

“…talk to a professional. That's why you guys are here professionally trained to deal with people with my problem or problems like I have, you know…Left to myself, I'd probably kill myself. But that didn't feel right so I turned to professionals, you guys. “

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@RMIRECC

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