



**UsAgainstAlzheimer's**



**Brain Injury  
and Dementia**



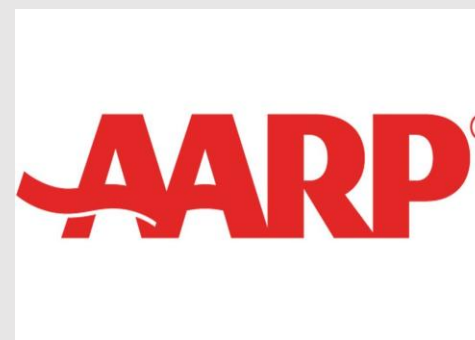
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**Brain Injury and Dementia**

**September 12, 2024**

# Acknowledgements

This course and continuing education credit is provided free of charge, with support from



# Presenter



## Dr. Erica Kornblith

Dr. Kornblith is a licensed clinical neuropsychologist and clinical researcher at San Francisco VA Medical Center (SFVAMC) and assistant prof. at UCSF with expertise in traumatic brain injury (TBI) and cognitive aging, rehabilitation research, telehealth, and clinical trials. Her research program broadly focuses on understanding the impact of traumatic brain injury and social determinants of health on cognitive aging; characterizing cognitive and functional impairment in older adults with traumatic brain injury; and leveraging telehealth technology to increase access to effective treatment for as many TBI patients as possible regardless of demographics. She currently serves as PI of a VA-funded clinical trial adapting an existing cognitive rehabilitation intervention for telehealth delivery to Veterans with TBI. She also leads other projects funded by the Alzheimer's Association and the UCSF Academic Senate.

# Course Description

Studies have shown a significant relationship between brain injury and dementia. Researchers have learned that a history of traumatic brain injury (TBI) increases the risk of developing dementia later in life. This course will address the impact of brain injuries on cognitive function and how to mitigate the risk of cognitive decline in individuals with a history of brain injury.

# Learning Objectives

- List 6 or more modifiable risk factors for dementia
- Participants will be able to summarize link between brain injury and dementia
- Recognize the possible negative outcomes of brain injuries and explore their impact on cognitive function
- Identify special considerations for high-risk populations

# Disclosures

- Dr. Kornblith has no relevant relationships to report
- Dr. Kornblith receives funding for her work from the United States Department of Veterans Affairs Rehabilitation Research and Development; the United States Department of Defense; the Alzheimer's Association; and the UCSF Academic Senate
- The opinions presented herein are those of the author and do not necessarily reflect the policy of the U.S. government or any government entity

01

# Facts: Alzheimer's and related dementias (ADRD)



# Inequities in Brain Health

African American people are  
**2X AS LIKELY**  
to have Alzheimer's

Latino people are  
**1.5X AS LIKELY**  
to have Alzheimer's



**Less likely** than White patients to receive a timely diagnosis;

In a recent study of Medicare beneficiaries, Black Americans (18.2%) and Latinos (15.8%) were less likely to receive a timely diagnosis when compared to Whites (23.3%).<sup>4</sup>



**More likely** to report experiencing racial discrimination along their patient and caregiver journeys;

Half of Black Americans (50%) and one in three Latino Americans (33%) report they have experienced healthcare discrimination.<sup>5</sup>



**Less likely** to be enrolled in cutting-edge Alzheimer's and brain health research.

Latino and Black Americans make up less than 10% of all clinical trial participants in active ADRD research.<sup>6</sup>



# Health Disparities & Comorbidities for Alzheimer's in the African American Community

44% More Likely to have a stroke.

23% More Likely to live with obesity.

25% More Likely to die from heart disease.

72% More Likely to be diabetic.

**2X AS LIKELY**  
TO HAVE ALZHEIMER'S



02

# Modifiable Risk Factors for Dementia



# Alzheimer's: Non-Modifiable Risk Factors

## Age

- Number one risk factor is advancing age.
- Risk doubles every 5 years after age 65.

## Family History

- Genetics vs environmental factors.

## Education

- Fewer years of formal education and lower levels of cognitive engagement may be risk factors.

## Sex

- 2/3 of those with Alzheimer's are women.
- 16% of women age  $\geq 71$  (11% of men).
- After age 65, have more than 1 in 5 chance (1 in 11 for men).

# Modifiable Risk Factors

**45%**

of dementia cases  
could be prevented  
by addressing these  
lifestyle factors

## INCREASE

- Healthy Diet
- Physical Activity
- Mental Activity
- Cognitive and social activity

## DECREASE

- Hypertension
- LDL cholesterol
- Uncontrolled diabetes
- Obesity
- Smoking
- Depression
- Excessive Alcohol Intake
- Head Injury
- Air Pollution
- Hearing Loss
- Vision Loss

03

# The Link between Traumatic Brain Injury and ADRD



# Defining traumatic brain injury (TBI)

- Blow to the head/neck OR exposure to a physical force (i.e., blast wave) resulting in:
  - Loss of consciousness
  - OR
  - Alteration of consciousness (memory gap, feeling dizzy, disoriented, "seeing stars")
- Mild (=concussion), moderate, or severe

[National Vital Statistics System Mortality Data](#) — United States, 2001–2010 (Deaths)  
Centers for Disease Control and Prevention. (2015). Report to Congress on Traumatic Brain Injury in the United States: Epidemiology and Rehabilitation. National Center for Injury Prevention and Control; Division of Unintentional Injury Prevention. Atlanta, GA.

# Defining traumatic brain injury (TBI)

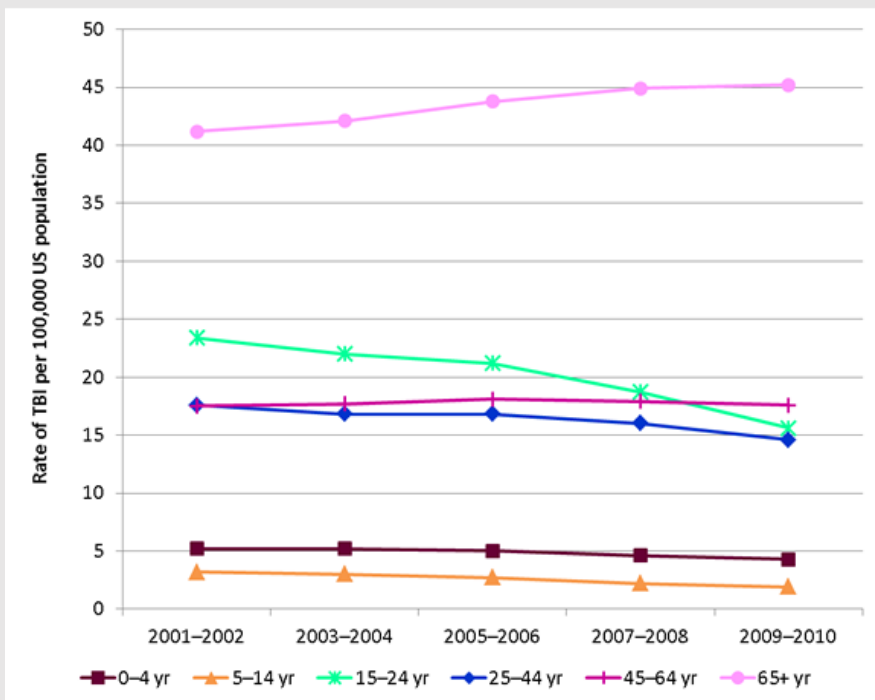
- TBI: historical event vs. chronic medical condition?

# Traumatic brain injury (TBI)

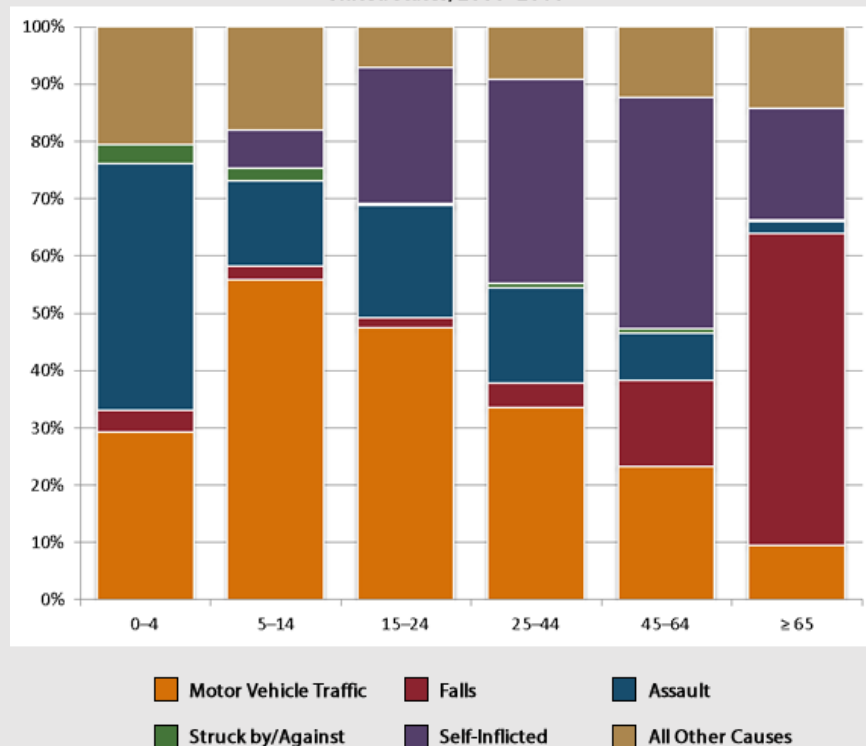
Common among older adults in the United States

- Highest incidence is in 75+

Rates of TBI-related Deaths by Age Group — United States, 2001–2010



Percent Distributions of TBI-related Deaths by Age Group and Injury Mechanism — United States, 2006–2010

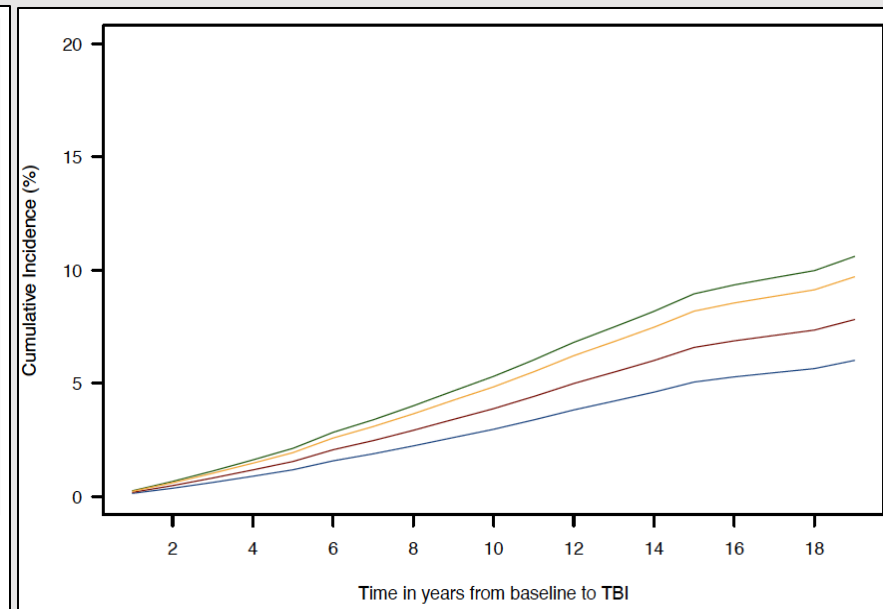
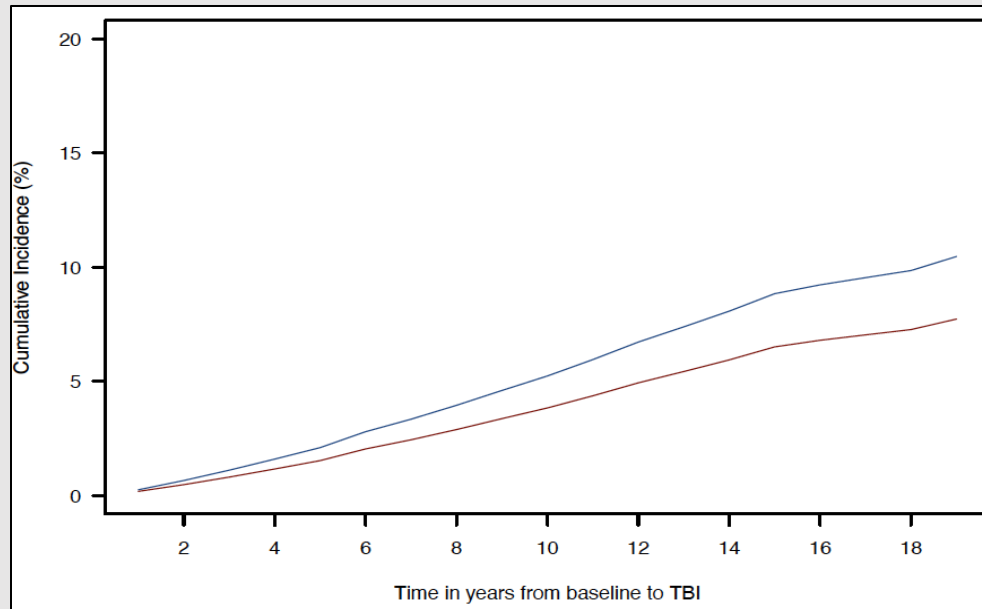


[National Vital Statistics System Mortality Data](#) — United States, 2001–2010 (Deaths)

Centers for Disease Control and Prevention. (2015). Report to Congress on Traumatic Brain Injury in the United States: Epidemiology and Rehabilitation. National Center for Injury Prevention and Control; Division of Unintentional Injury Prevention. Atlanta, GA.



# Epidemiology of TBI in Older Adults



- In a nationally representative sample of older adults 65+ (Health and Retirement Study) who agreed to have survey data linked to Medicare claims data, **over 13%** experienced an *incident* TBI over an 18-year follow-up

# Older Adults and TBI: Biological Factors

- Due to age-related changes:
  - white matter and vasculature more vulnerable
  - changes in autophagy, other injury response mechanisms
- Older adults are more likely to have other medical or neurological conditions that increase susceptibility to negative outcomes after TBI
- Fall injuries -> mass lesions (i.e., SDH) vs. DAI (common after acceleration/deceleration in MVA, etc.)
- Older adults are at increased risk for seizures post-TBI

# TBI and Cognitive Aging/Dementia

- TBI is a risk factor for cognitive impairment and dementia.
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[And more!](#)

September 29, 2020; 95 (13) ARTICLE

## Sex, race, and risk of dementia diagnosis after traumatic brain injury among older veterans

Erica Kornblith, Carrie B. Peltz, Feng Xia, Brenda Plassman, Tatjana Novakovic-Apopain, Kristine Yaffe

First published September 4, 2020, DOI: <https://doi.org/10.1212/WNL.0000000000010617>

# TBI and Dementia: Pathophysiology

- We know TBI increases risk for poor cognitive outcomes in aging/dementia BUT etiology, mechanisms underlying the relationship between TBI and dementia risk are unknown
- One possible link: cardiovascular disease (CVD)
  - Individuals with TBI have a high burden of CVD, and CVD is a well - documented risk factor for cognitive impairment and dementia
- BUT the relationship between TBI and CVD is not yet well-understood
  - Existing CVD may increase TBI risk through vulnerability to falls
- TBI may also increase risk for, or even cause, CVD:
  - Increases risk for subsequent CVD
  - Vascular damage is a commonly-reported outcome of TBI

\*note: strokes (as well as other injuries resulting in loss of oxygen to the brain, like carbon monoxide poisoning) fall under the category of *acquired* brain injury- different from a traumatic brain injury, but also linked with cognitive impairment and dementia

# TBI and Dementia: Pathophysiology

## Brain Injury >

Volume 36, 2022 - Issue 5: Practical Approaches to Assessing and Mitigating the Risk of Cognitive Decline after Concussion: Findings from the Long-term Impact of Military-relevant Brain Injury Consortium (LIMBIC)

153 0

Views CrossRef citations to date

3

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Research Article

## Traumatic brain injury, cardiovascular disease, and risk of dementia among older US Veterans

Erica Kornblith , Amber Bahorik, Yixia Li,

Carrie B. Peltz, Deborah E. Barnes  & Kristine Yaffe

Pages 628-632 | Received 17 May 2021, Accepted 21 Jan 2022,

Published online: 31 Jan 2022

04

# Negative Outcomes associated with TBI



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# Older Adults and TBI: Negative Outcomes

## Mood:

- TBI in older adults associated with increased risk of **new onset** of depression and PTSD
  - Careful screening of mood for geriatric TBI survivors is very important especially in the first months to years following the injury

## Cognition:

- Older adults recover more slowly vs. younger adults and generally have worse cognitive outcomes
  - ...but after adjustment for age, older adults may actually recover cognitively better than younger adults?!?
- Important to account for expected age-related changes when evaluating cognition in older TBI patients

+ sleep problems, pain, reduced physical activity...

# Older Adults and TBI: Negative Outcomes

## Physical and Functional Impairment



## U.S. Department of Veterans Affairs

Public Access Author manuscript

*J Head Trauma Rehabil.* Author manuscript; available in PMC 2021 July 01.

Published in final edited form as:

*J Head Trauma Rehabil.* 2020 ; 35(4): E320–E329. doi:10.1097/HTR.0000000000000552.

## Physical and Functional Impairment Among Older Adults With a History of Traumatic Brain Injury

Erica S. Kornblith, PhD<sup>\*,a</sup>, Kenneth M. Langa, MD, PhD<sup>b</sup>, Kristine Yaffe, MD<sup>a,c,d</sup>, Raquel C. Gardner, MD<sup>a,c</sup>



# Older Adults and TBI

- Slower to recover, with worse outcomes across multiple domains, compared to younger TBI patients
    - > Due to higher burden of med/psych comorbidities
  - May not get adequate treatment because of poor prognosis
- ...**BUT** some recover well!

06

# The Impact of Social Determinants of Health



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# Epidemiology: What is the scope of the problem?

## Methodological challenges in studying TBI in older adults:

- **Reporting**
  - 42% of respondents to an online survey did not seek medical care after experiencing a TBI, and older respondents were less likely to see care as well as those experiencing a mild TBI and those who were injured at home.
  - A similar study found that 50% of adults who experience what they suspect is a TBI do not seek medical care, and most of these injuries were related to falls
- **Public health messaging**

# Social Determinants of Health



**Figure 1. Conceptual Framework: Social Determinants of Health**

From: [Artificially Intelligent Social Risk Adjustment: Development and Pilot Testing in Ohio](#)  
2022. Research Triangle Institute

# Social Determinants of Health

## Sex Differences in the Risk of Dementia in Older Veterans

Get access >

Jennifer Eastman, PhD, Amber Bahorik, PhD,  
Erica Kornblith, PhD, Feng Xia, MS, MPH,  
Kristine Yaffe, MD ✉

*The Journals of Gerontology: Series A*, glac029,  
<https://doi.org/10.1093/gerona/glac029>

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### Abstract

#### Background

Studies have demonstrated women to have a higher prevalence of dementia compared to men. However, sex differences in dementia incidence are controversial with conflicting reports showing women with higher, lower, or similar incidence. Source of difference may be due to clinical setting and lack of consideration of competing risk of death. We examined dementia incidence in a sample of the national Veteran population to determine differences by sex.

### Results

During the follow-up (mean 8.4 years), 11.3% ( $n = 106\ 977$ , 11.4% men and 8.0% women) of Veterans developed dementia. Age-adjusted incidence was 12.6/1 000 person-years for men and 12.7/1 000 person-years for women. Compared to male Veterans, risk dementia was slightly higher among females (hazard ratio = 1.15; 95% confidence interval: 1.10–1.20), and on average, female Veterans developed dementia 0.2 years earlier than male Veterans. After additional adjustment for race, education, medical, and psychiatric conditions, results were similar.

### Conclusions

Among older Veterans in a national cohort, women had a slightly increased risk for developing dementia compared to men after accounting for competing risk of death.

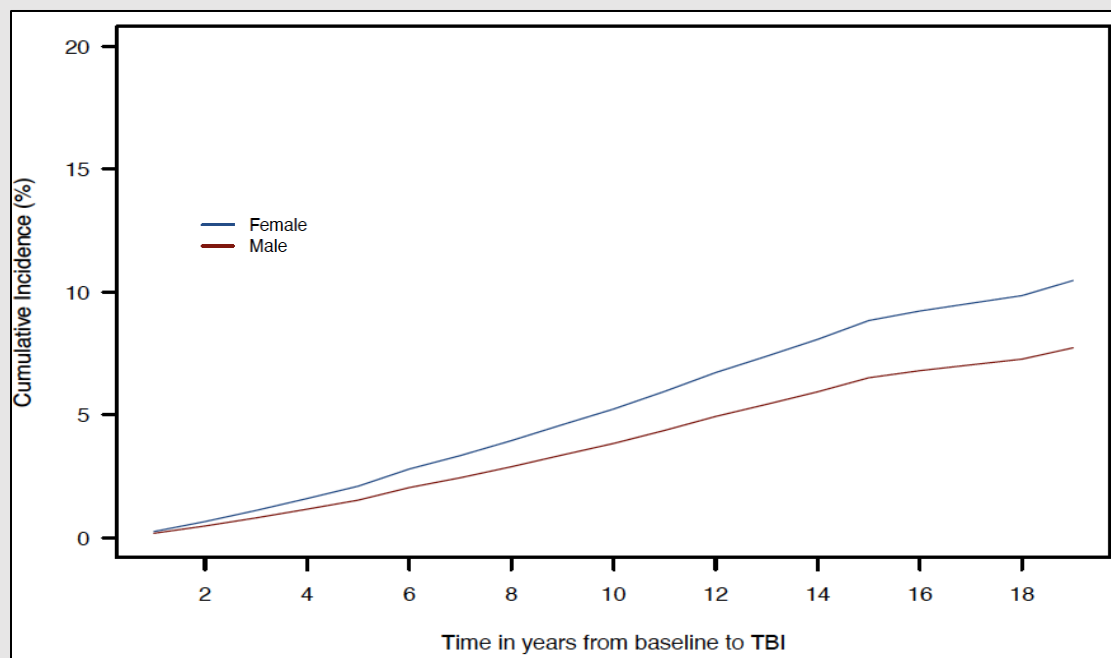
# Sex Differences in Dementia

- Women are at increased risk for developing dementia (and especially AD)
- Goes beyond living longer- hypothesized causes include menopause/other hormonal issues, immunological factors
  - Menopause -> reduced estrogen ? -> increased dementia risk
  - Later menopause associated with healthier cognitive aging
  - Women much more likely to have autoimmune disorders
    - Are AD plaques a byproduct of the immune system??

# Older Women: Unique risk

Increased age-related risk for TBI + increased sex-related risk for AD/dementia  
-how might the SDOH conceptual framework be at work here?

# Epidemiology of TBI in Older Women



*Newer research asks: Among older adults, do women have increased risk for TBI??*

Kornblith et al., *Jama Network Open*, 2024



# Other Social Determinants

What about wealth? Education? Access to resources?

→ These factors account for much of what drives health disparities

05  
Interventions for older  
adults with TBI:  
Considerations for  
Implementation



# Interventions for Older Veterans with TBI

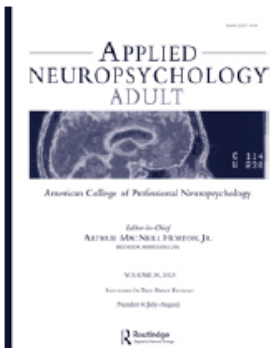
- The sequelae of TBI are multidimensional and impact health and quality of life in a variety of ways
- Some of these negative outcomes (i.e., poor sleep, depression/mood problems) are also independently associated with cognitive impairment/dementia
- → Successful treatment = multiple avenues for reducing risk??

# Interventions for Older Veterans with TBI

- Evidence based TBI treatments exist:
  - Mindfulness
  - Manualized psychotherapy (e.g., CBT-I)
  - Physical activity
  - Cognitive training additionally targeting 1 or 2 individual symptom domains (i.e., either mood or sleep)  
+CogSMART
- ***BUT*** no accessible, multimodal treatment exists that comprehensively addresses the full spectrum of TBI symptoms for older adults

\*bottom line: treatment works, even for individuals with remote injuries, but is challenging to access and not comprehensive

# Interventions for Older Veterans with TBI



## Applied Neuropsychology: Adult

 **Routledge**  
Taylor & Francis Group

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/hapn21>

## Telehealth delivery of group-format cognitive rehabilitation to older veterans with TBI: a mixed-methods pilot study

Erica Kornblith, Sara Schweizer, Gary Abrams, Raquel Gardner, Deborah Barnes, Kristine Yaffe & Tatjana Novakovic-Agopian

# Next steps: TeleTBI Trial

- Mixed methods study designed to:
  - A) collect data on **what older Veterans want in a TBI treatment** as well as what they have found useful/not useful in previous treatments
  - B) iteratively design a **new, multimodal, accessible and scalable group telehealth intervention** with stakeholder input on all aspects, including structure, content, and materials

## Methods

Six Veterans (Mean age = 46.83; Mean education = 15.33, Gender = 67% Male) with history of military or civilian mTBI were recruited through the San Francisco VA Medical Center

### Eligibility measures:

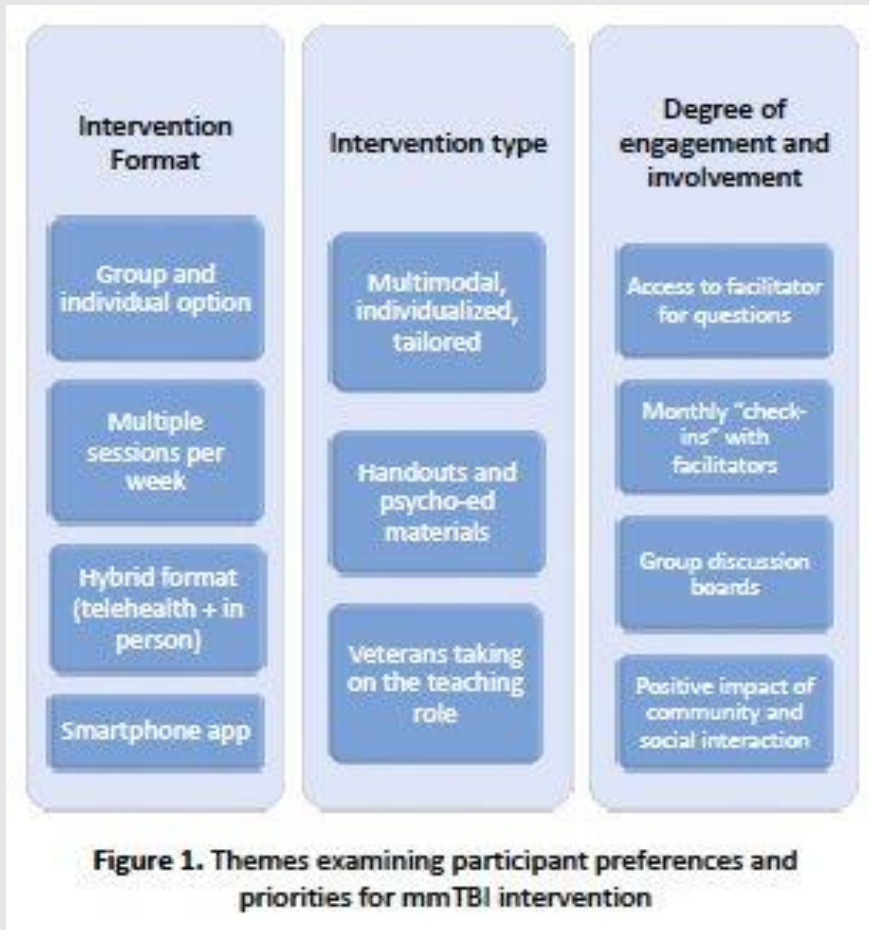
- Ohio State University TBI Identification Method (OSU TBI ID)
- Neurobehavioral Symptom Inventory (NSI)

### Self-report questionnaires:

- Beck Depression Inventory-II
- PTSD Checklist for DSM-5

Semi-structured interview examining TBI treatment preferences and needs. Responses were audio recorded, transcribed, and thematically coded using Rapid Qualitative Analysis

# TeleTBI Trial: Preliminary Results



Participant	Age	# ofTBIs	Current TBI symptom(s)	Self-Reported Symptom Severity
1	37	6	Memory problems Headaches Mood (i.e. Irritability/anger)	BDI-II: 31 PCL-5: 49 NSI: 53
2	63	3	Memory problems Concentration problems Reading/word tracking	BDI-II: 16 PCL-5: 45 NSI: 34
3	70	3	Memory problems Migraines Mood (i.e., depression, hypervigilance)	BDI-II: 49 PCL-5: 62 NSI: 67
4	36	6	Memory problems Slowed processing	BDI-II: 11 PCL-5: 15 NSI: 19
5	44	6	Memory problems Migraines Mood (i.e., anxiety, depression) Concentration problems	BDI-II: 16 PCL-5: 50 NSI: 50
6	31	5	Memory problems Concentration problems	BDI-II: 29 PCL-5: 40 NSI: 32

**Table 1. Participant self-reported head injury history and current symptoms**

# TeleTBI Trial: Preliminary Results

## Results

- Most respondents (n = 5, 83%) consider cognition the primary topic area of interest for a multimodal TBI intervention
- All respondents endorse memory difficulties as a primary complaint
- Cognitive training was ranked as the most-desired intervention type (n=4; 67 %), followed by physical activity, manualized psychotherapy (e.g., cognitive behavioral therapy for insomnia), and mindfulness

## Conclusions

- Respondents are interested in cognition and cognitive training as the primary areas of intervention, with an emphasis on accessible, (e.g., hybrid, smartphone app), multimodal (i.e., addressing multiple symptoms domains), and individualized treatment approaches
- A novel, accessible treatment should address perceived memory complaints



Figure 2. Participant quotes on mmTBI treatment preferences and priorities



08

# What patients think (A-List)



# What Matters Most Insights Survey: Traumatic Brain Injury



- **54%** of people are unaware or unsure of the signs and symptoms of traumatic brain injury (TBI).
- **16%** of respondents have experienced a TBI.
- **60%** have had a fall or accident that resulted in a bump, blow or jolt to the head. **13%** have done so in the past year.
- The most common symptoms after a head injury people have experienced are loss of consciousness (**27%**), concussion diagnosis (**21%**), lasting headaches or memory problems (**16%**), mood disorders (i.e., depression and anxiety) (**13%**) and hospitalization (**11%**).
- **43%** of people who had a fall sought treatment for a head injury, typically from a:
  - Emergency Room Doctor (**72%**) or a General Practitioner (**38%**).
- **19%** of people engaged in treatments aimed at regaining cognitive or brain function after an injury.
- Common symptoms of TBI reported in the past year include difficulty with memory (**30%**), sleep disturbances (**27%**), headaches or migraines (**23%**), mood or emotional changes (**21%**) and dizziness (**20%**).
- **66%** of people believe there is a link between reduced cognition and head injuries.

- **A small percentage of those diagnosed with ADRD/ MCI continue to engage in potentially risky activities: 7% still drive, 4% participate in chores involving ladders, and 5% handle tasks requiring tools or heavy lifting.**

Respondents largely over age 65 (73%), Caucasian (92%), Female (79%), College educated or greater (76%)

N=606 (ADRD/MCI diagnosis: 56; high risk for ADRD: 154; current caregivers: 74; former caregivers: 163; general interest in brain health: 158)

07

# Tools and resources for health professionals



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# Tools and Resources

- [Preventing Alzheimer's Disease: What Do We Know?](#)
- [Brain Health Equity Practical Guide](#)
- [BrainGuide™](#)
- [Provider Toolkit](#)
- [National Institute of Aging | Alzheimer's and Related Dementias Resources for Professionals](#)

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Rehabilitation of Executive Function in  
Aging Veterans with History of TBI

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## Other Projects:

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*The Role of Social Determinants of Health in Risk  
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# Thank you!



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