Functional Impairment is Associated with Long-Term Life Satisfaction in Veterans with mTBI

Elizabeth Sanford, MS[1,2]; Amber Lyle, BA[1,2]; Eden Crowsey, MS[1];
Rebecca Tapia, MD[2]; Alicia Swan, PhD[1,2]

[1]Department of Psychology, University of Texas San Antonio
[2]Polytrauma Rehabilitation Center, South Texas Veterans Health Care System

FUNCTIONAL IMPAIRMENT IS ASSOCIATED WITH LONG-TERM LIFE SATISFACTION IN VETERANS WITH MTBI

MILD TRAUMATIC BRAIN INJURY

The **American Congress of Rehabilitation Medicine (ACRM, 1993)** defines mTBI as a traumatically induced physiological disruption of brain function, including the head being struck, the head striking an object, and the brain undergoing an acceleration/deceleration movement (whiplash), as manifested by *at least one* of the following:

1. any period of loss of consciousness

2. any loss of memory for events immediately before or after the accident

3. any alteration in mental state at the time of the accident (e.g., feeling dazed, disoriented, or confused)

4. focal neurological deficit(s) that *may or may not* be transient

But where the severity of the injury does not exceed the following:

- loss of consciousness of approximately 30 minutes or less

- after 30 minutes, an initial Glasgow Coma Scale (GCS) of 13–15

- posttraumatic amnesia (PTA) not greater than 24 hours

BACKGROUND

- Mild Traumatic Brain Injury (mTBI) the signature wound of the post 9/11 era

- MTBI suppresses:

  1. **Life satisfaction**

  2. Typical activities of life

     - '**Functional Impairment**'

       - Degree of impairment may *also* facilitate life satisfaction

         - Non-traditional target for treatment programs, *beyond* **mental health**

THE PRESENT PROJECT

Goal:

- To examine the association between functional impairment related to mTBI and life satisfaction among a sample of veterans

Hypotheses:

- Milder **functional impairment** is associated with **higher** **life satisfaction**

- **Functional impairment** is more strongly associated with life satisfaction than **socio-demographics** or **mental health** variables

- **Functional impairment** *uniquely* and *substantially* contributes to life satisfaction above all other covariates
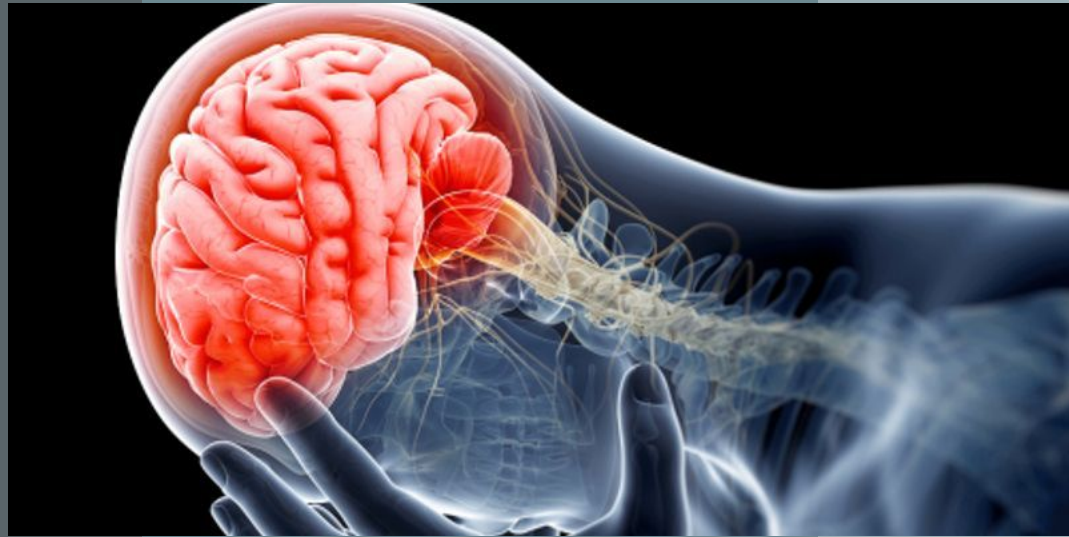
METHOD

METHOD: PARTICIPANTS

1,019 veterans with mTBI

All received outpatient treatment

◻ Between 2015 to 2020

◻ In the Polytrauma Rehabilitation Center (PRC), at the Polytrauma System of Care at the South Texas Healthcare System, housed in the Audie Murphy Memorial Hospital, under the Veterans Health Administration (VHA), San Antonio, TX
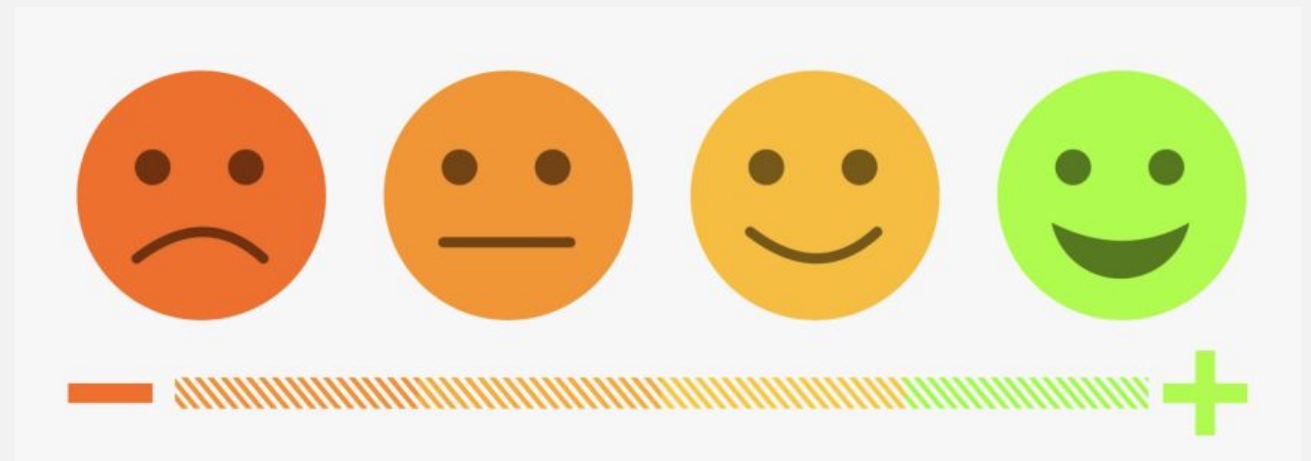
METHOD: VARIABLES AND ANALYSIS

Outcome of Interest: **Life satisfaction**

Covariates:

- **Socio-demographics**

- **Mental Health Distress**:
  - Disruption from affective symptoms
  - Post-traumatic stress symptoms

- **Functional impairment**

Procedure & Analysis: Using SPSS and Mplus . . .

- Simple linear regression: assessed **Life Satisfaction** regressed on each variable *individually*

- Stepwise multiple regression: modeled incremental and combined effects of variables on **Life Satisfaction**
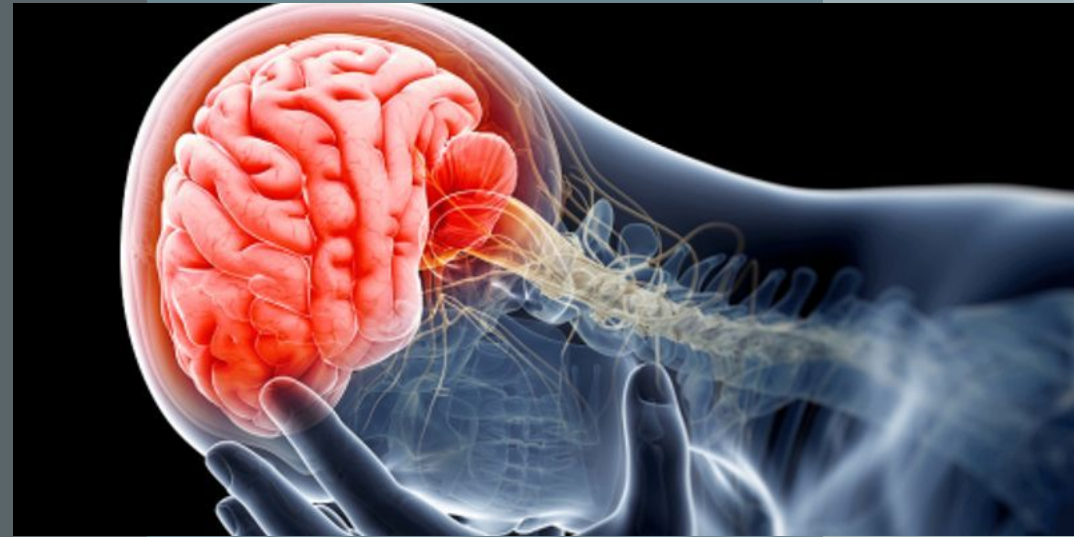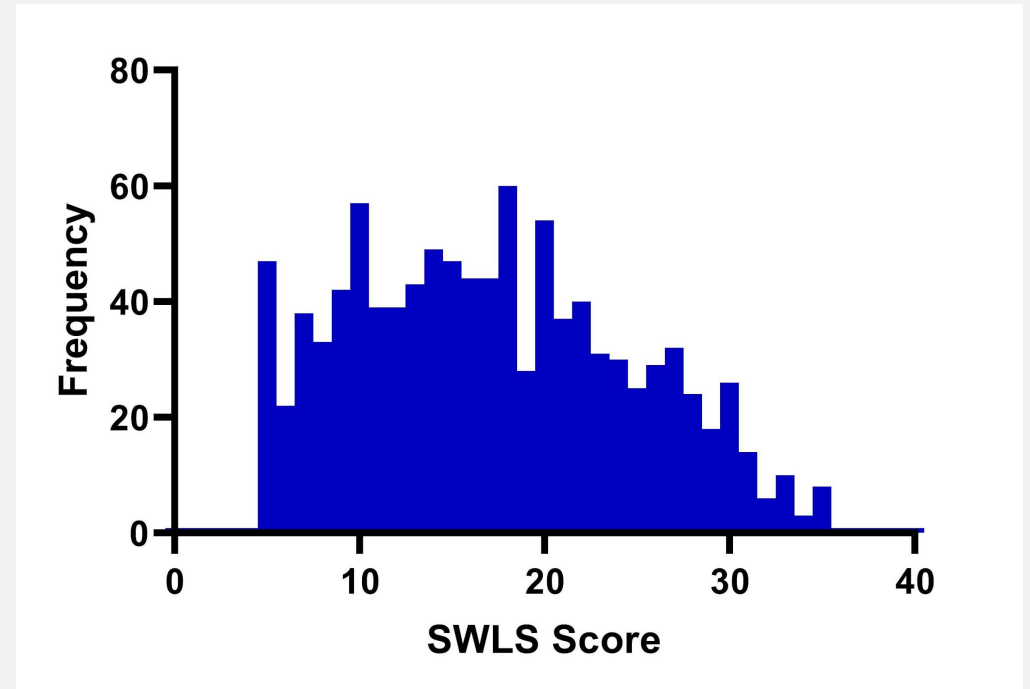
RESULTS

OUTCOME VARIABLE: LIFE SATISFACTION

Satisfaction With Life Scale, **SWLS**

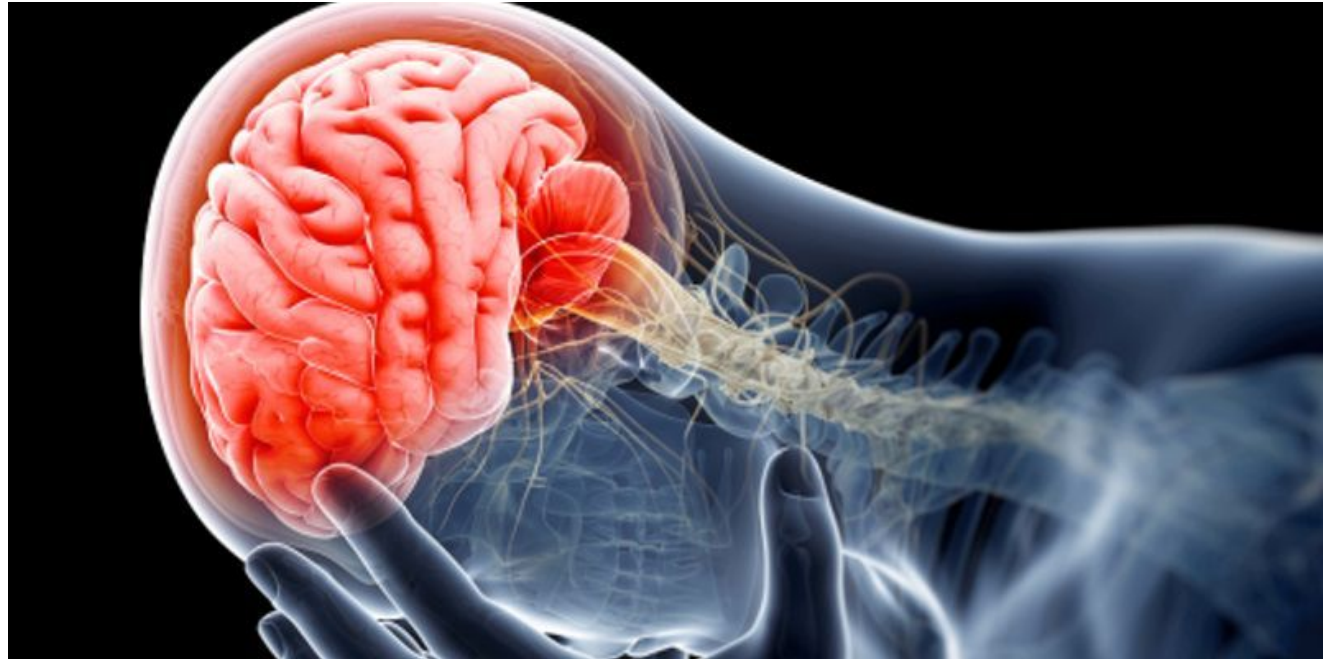Possible scores range from 5 to 35; α=.87

Mean score=17.2 (SD=7.5)

The average veteran self-evaluated in the ***slightly dissatisfied*** range (Diener et al., 1985)

FACTORS

Variable description and simple linear relationships between each variable and **SWLS**

SOCIO-DEMOGRAPHICS

Sex

In general **men** and **women** report similar SWLS, ns
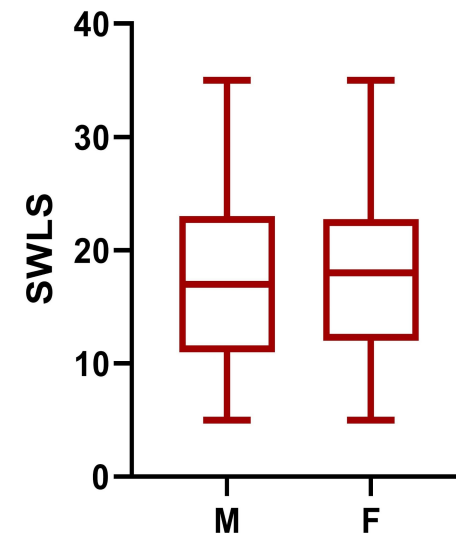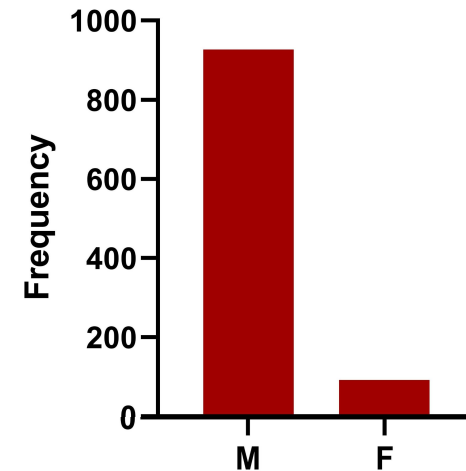
Men (0) M=17.1 (SD=7.5)

Women (1) M=18.2 (SD=7.8)

SWLS regressed on **Sex**

r=.045 ns

R^2=.002 ns

Women reported life satisfaction scores on average about 1.1 points higher than their male counterparts, but sex was not significant in a simple linear regression

SOCIO-DEMOGRAPHICS
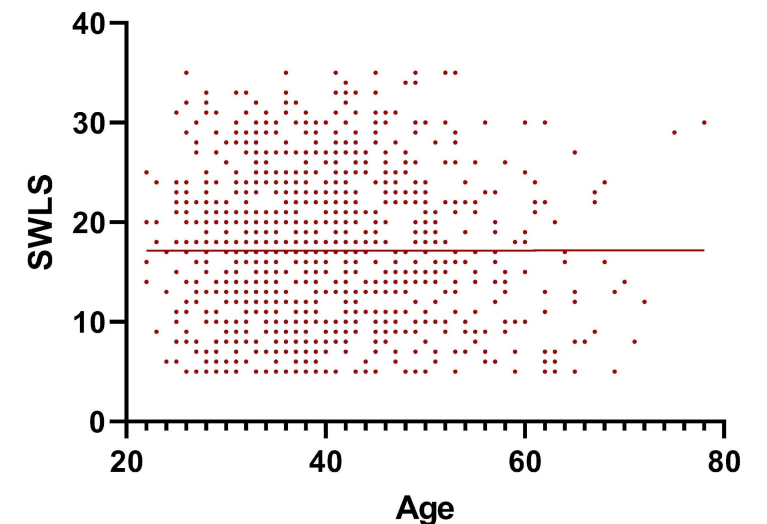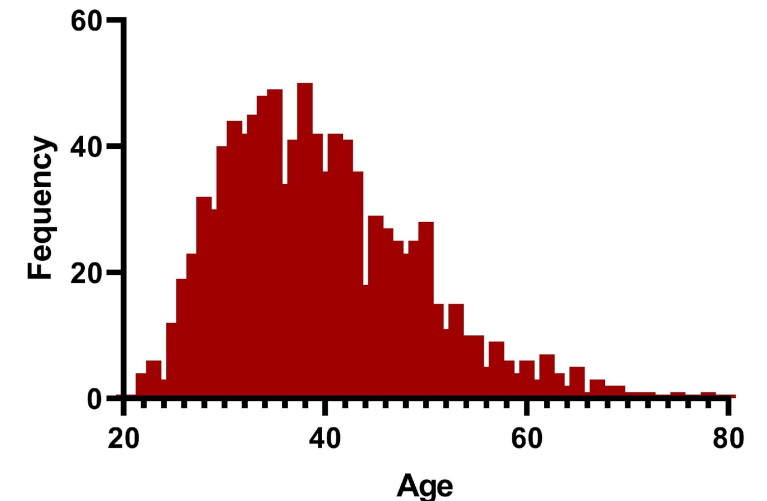
Age

Mean age=39.6 years old (*SD*=9.5 years)

Age at time of assessment ranged from 22 to 78 years

SWLS regressed on **Age**

r=.001 ns

R^2=.000 ns

When evaluated by itself, age was not a significant predictor of SWLS.

SOCIO-DEMOGRAPHICS

Years of Service

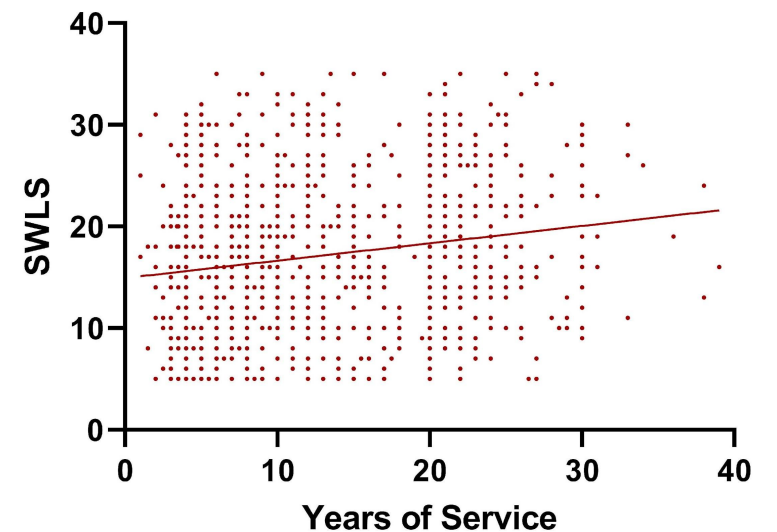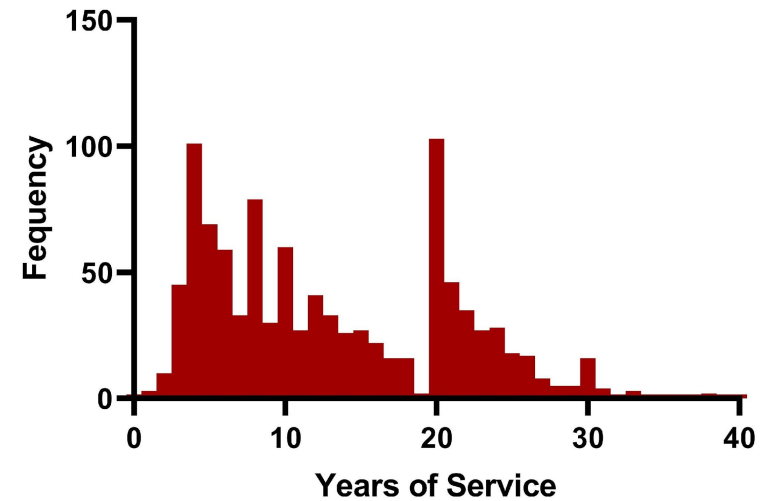Veterans averaged approximately 13.0 years of service (*SD*=7.9 years) before separating

Length of service ranged from 1 to 39 years

SWLS regressed on **Years in Service**

r=.180 (*p*<.001)

R^2=.033 (3% variance in SWLS explained)

Individuals who served longer reported *higher* life satisfaction (mild positive)

MENTAL HEALTH DISTRESS

Neurobehavioral Symptoms Checklist **Affective** Subscale, **NSI-Affective (NSI-Aff)**
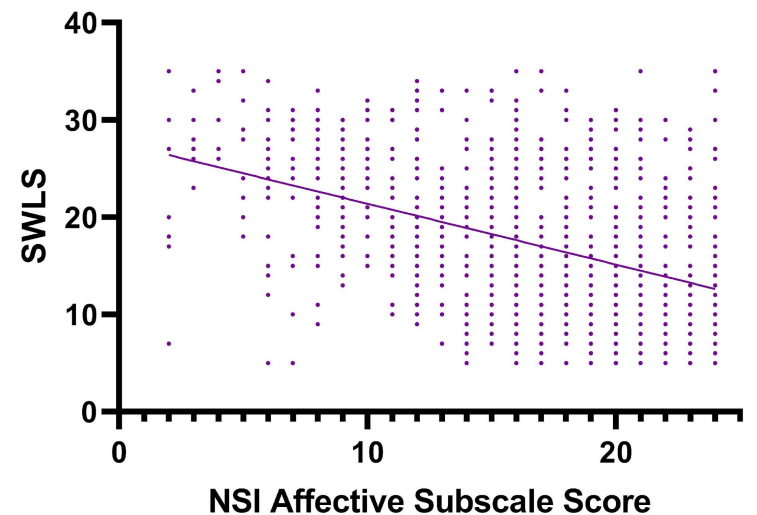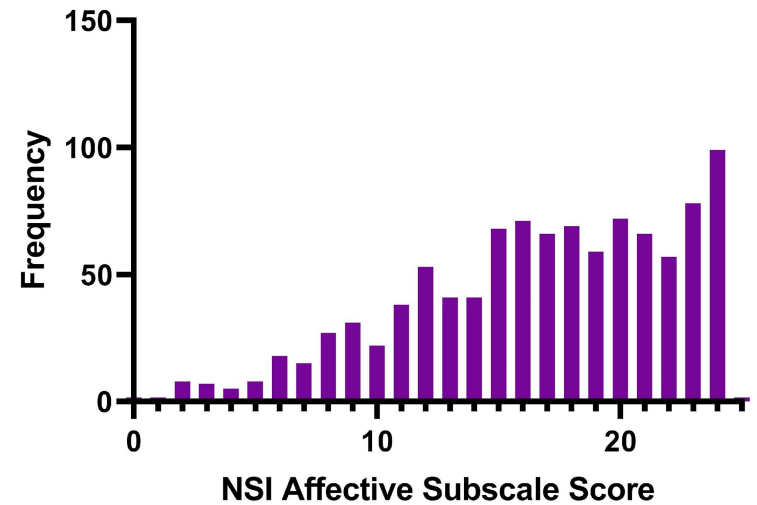
Mean score=16.8 (*SD*=5.4), α=.87

Average score is in the **borderline clinical** to **clinical range** (normed on service members with mTBI).

SWLS regressed on **NSI-Aff**

r = -.447 (*p*<.001)

R^2=.20 (20% variance in SWLS explained)

Individuals who experienced less neuro-affective disruption reported higher life satisfaction (moderately strong inverse)

MENTAL HEALTH DISTRESS

PTSD Checklist – Military for DSM-IV, **PCL-M**

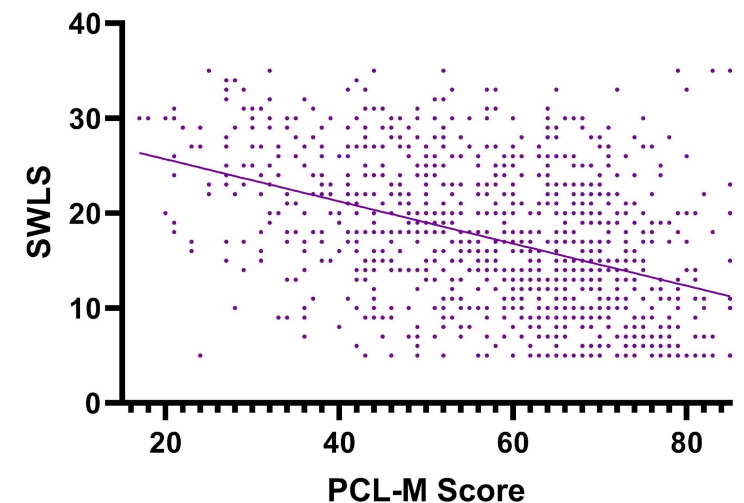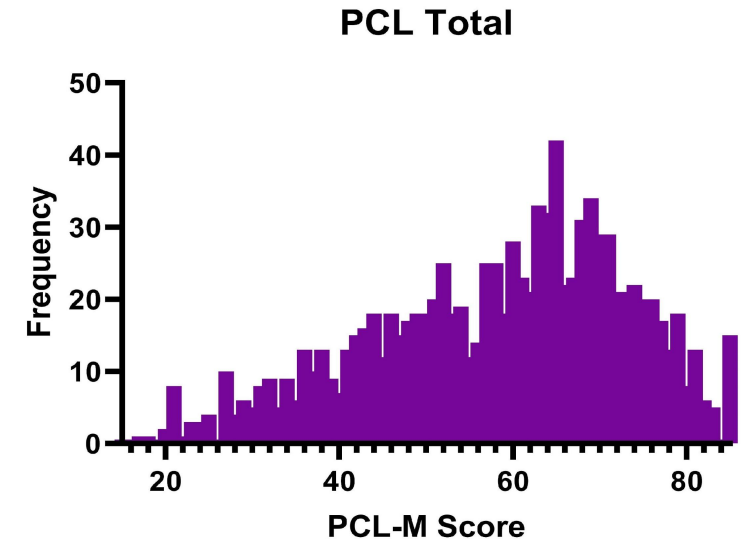Mean score=58.4 (SD=14.8), possible score ranges from 17 to 85

The average scores are *consistent with PTSD* (VA National Center for PTSD, 2010)

SWLS regressed on **PCL-M**

r= -.440 (*p*<.001)

R^2=.193 (19% variance in SWLS explained)

Individuals who experienced fewer post traumatic symptoms reported higher life satisfaction (moderately strong inverse)

PCL Total

FUNCTIONAL IMPAIRMENT

Mayo-Portland Adaptability Inventory-4 Participation Index, **M2PI**

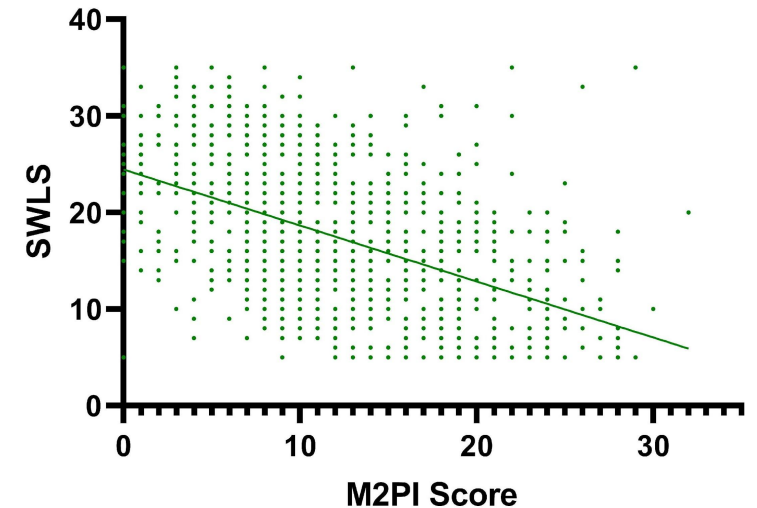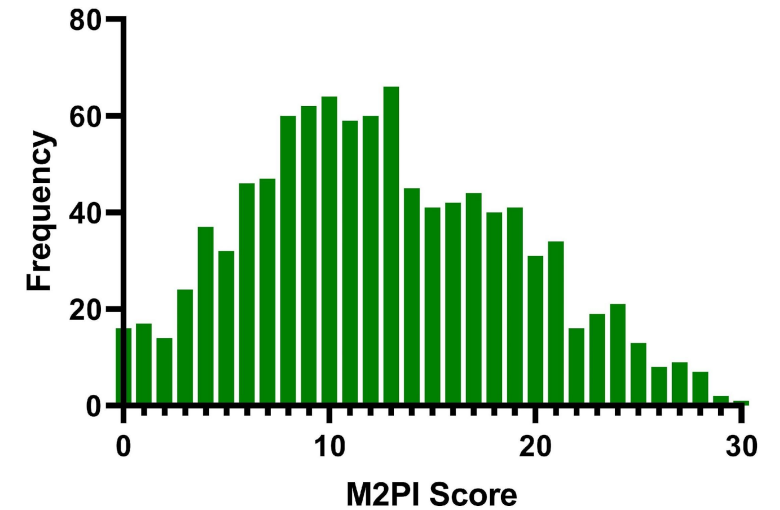Mean score=12.6 (*SD*=6.5), possible score ranges from 0 to 32; α=.85

Average scores were in the **moderately** to **severely impaired** range on scale normed for patients with ABI (Malek & Lezak, 2008)
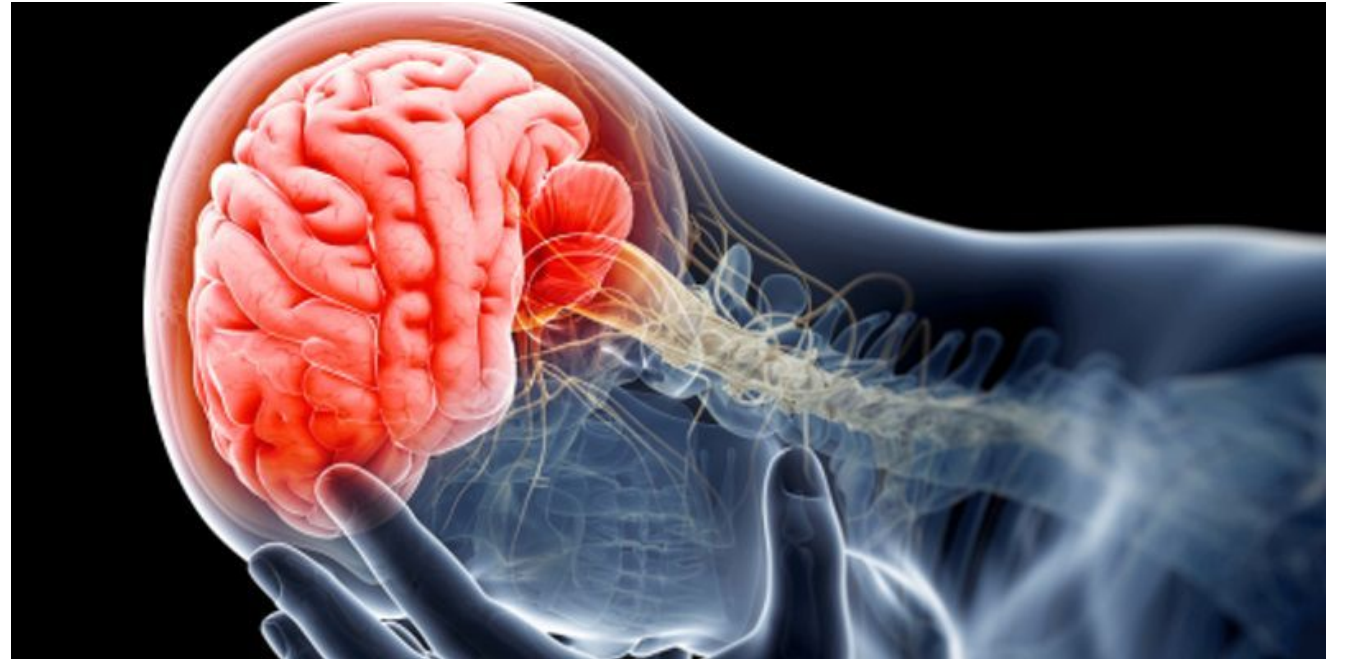
SWLS regressed on **M2PI**

r= -.499 (*p*<.001)

R^2=.249 (25% variance in SWLS explained)

Individuals who reported milder impairments also reported higher life satisfaction (strong inverse)

MODELS

3 SUCCESSIVE STEPWISE MODELS

To evaluate the incremental contribution of socio-demographic characteristics and mental health distress, as well as the unique contribution of functional impairment on life satisfaction, stepwise multiple linear regression was implemented

1. Modeling the contribution of all **socio-demographics**

2. Modeling the combined contribution of **socio-demographics** and **mental health distress**

3. And a fully adjusted model, controlling for all previously modeled predictors plus **functional impairment**

MODEL 1: SOCIO-DEMOGRAPHICS ONLY
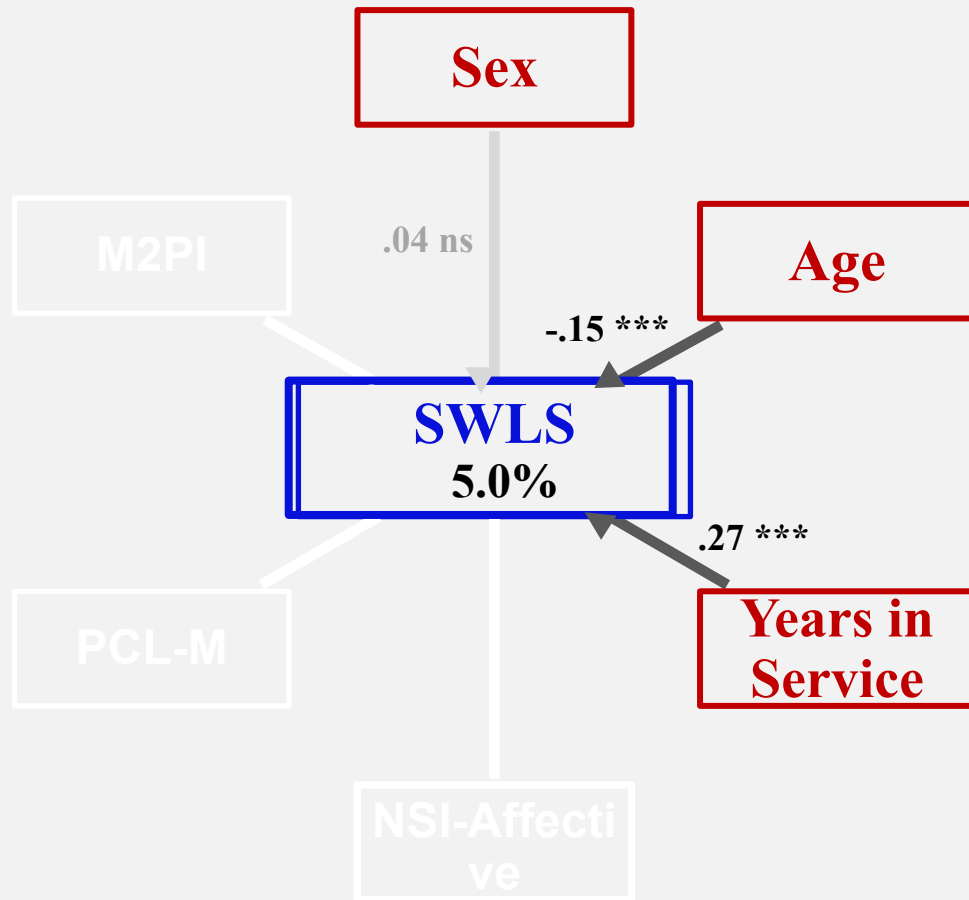
Accounted for **5%** of the variance in SWLS

Years in service by itself explained **3%** variance in SWLS

Age and years in service were significant partial model predictors
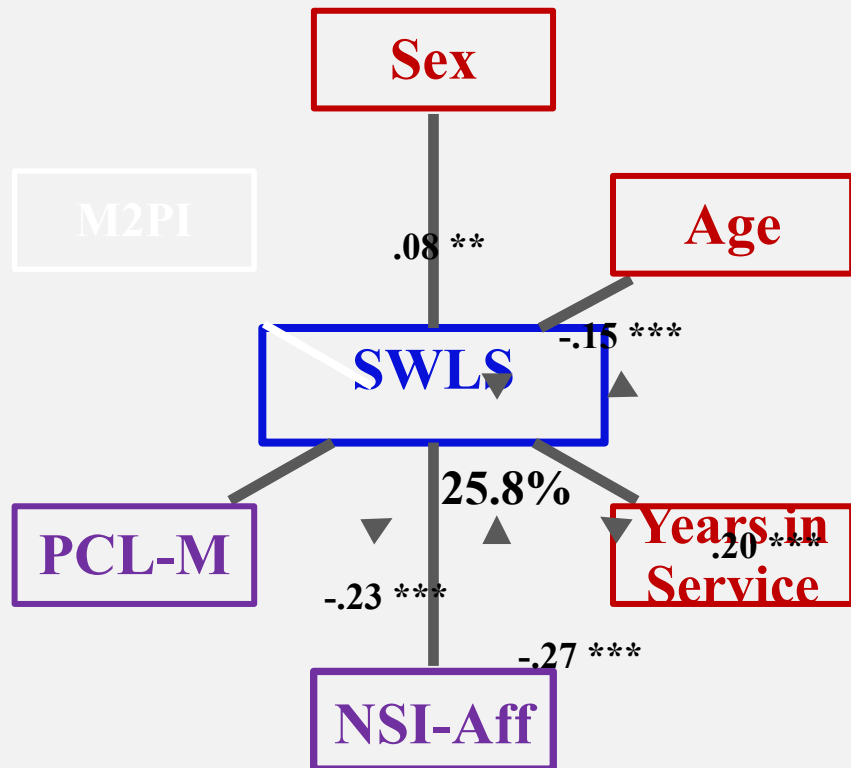
- Age, while not significant alone, was a significant predictor when factored with years in service only

Sex was not a significant model predictor

MODEL 2: SOCIO-DEMOGRAPHICS + MENTAL HEALTH DISTRESS
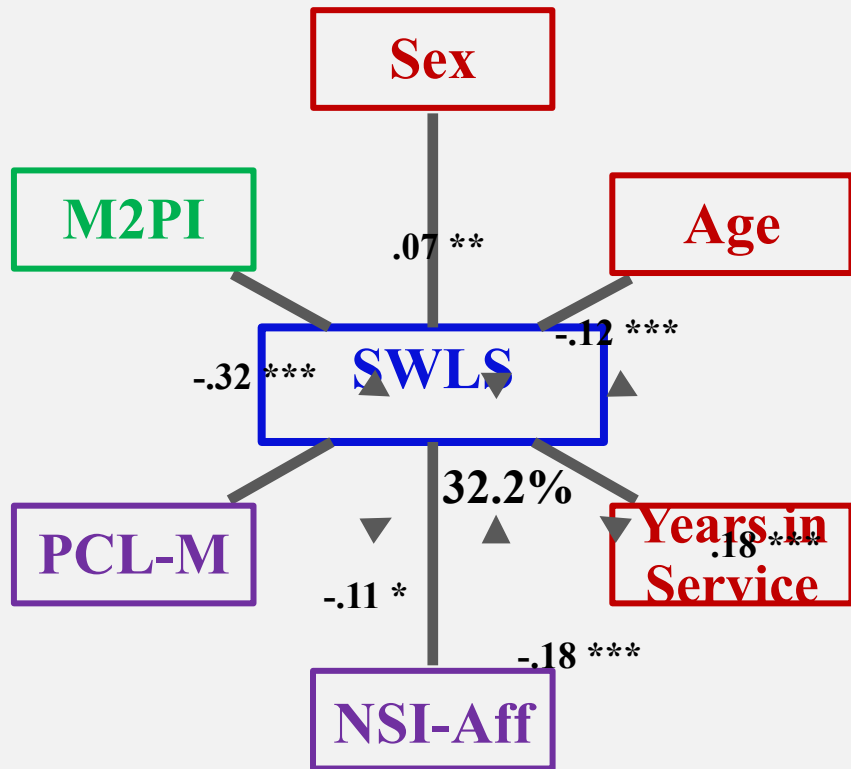

Accounted for 25.8% of variance

When Mental Health Distress variables were added to the model, an additional 20.8 % of SWLS variance was explained

Sex became a significant predictor when it was factored with mental health distress variables

- Female veterans reported significantly higher life satisfaction than men, but only after controlling for mental health distress

MODEL 3: SOCIO-DEMOGRAPHICS + MENTAL HEALTH DISTRESS + FUNCTIONAL IMPAIRMENT

32.2% of total variance

Functional impairment strongest SWLS predictor

It uniquely accounted for 6.4% variance in SWLS

Mental health became a less salient influence on life satisfaction with functional impairment factored

Years in service emerged as the second strongest model predictor of life satisfaction
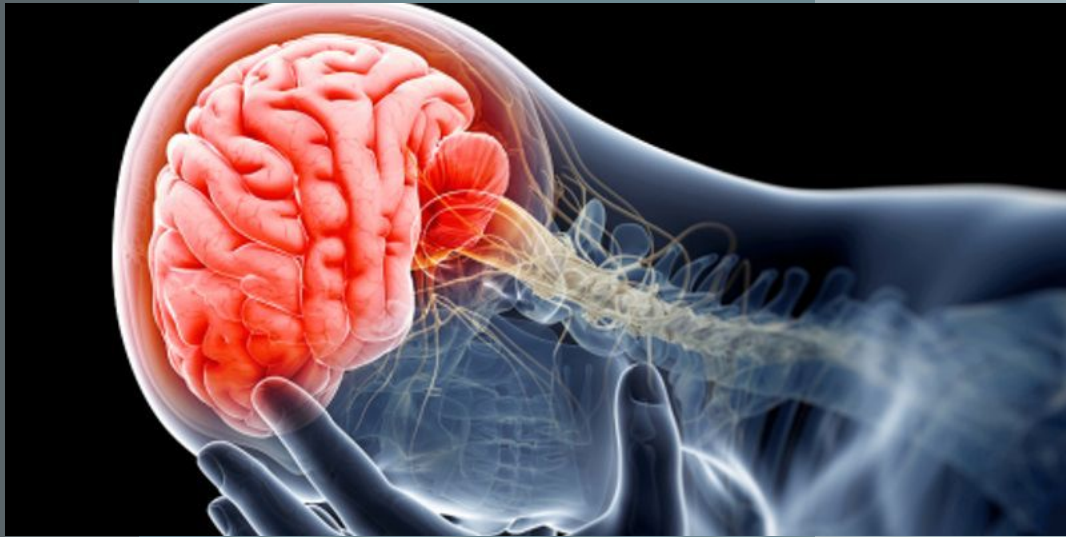
DISCUSSION

FUNCTIONAL IMPAIRMENT

After all covariates were factored, M2PI exerted the strongest, most negative influence on SWLS of any factor in the model. Among this sample of veterans, deficits in ability to **live independently functional lives** after neurotrauma appears to inhibit life satisfaction more than any other modeled variable.

Increasing functional autonomy **alone** may:

1. Improve veteran life satisfaction

But it could also…

2. Reduce disruption from neuro-affective distress

3. Help relieve frequency/severity of post traumatic symptoms

YEARS IN SERVICE

- **Years in service** was second strongest model predictor of life satisfaction
- More years in service = higher perceived veteran life satisfaction
  - Career goals? Identity/Self-worth? Patriotism?
- Simply retiring after 20 years may directly contribute to positive outcomes
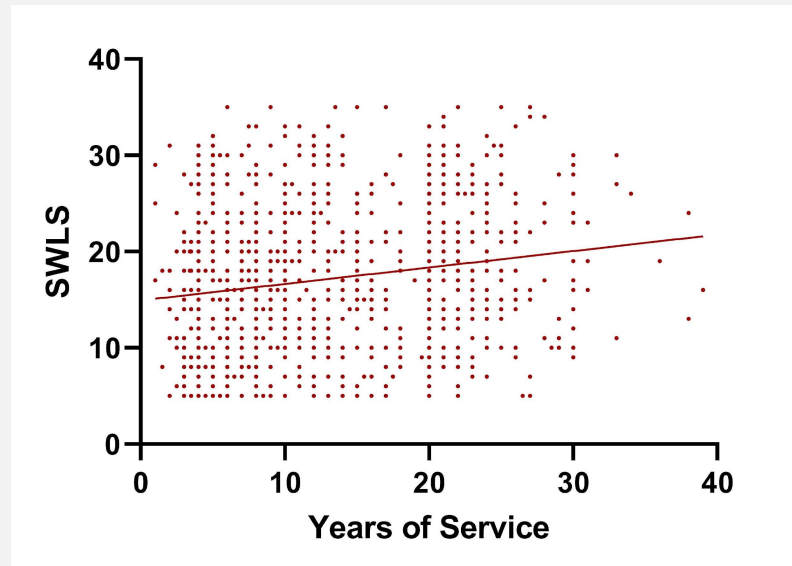
POLICY IMPLICATIONS

1. Veterans with mTBI need holistic, whole health interventional approaches that promote functional autonomy in addition to addressing mental health distress

2. Initiatives that allow service members with mTBI to remain in service longer should be considered case-by-case

FUTURE DIRECTIONS & LIMITATIONS

Future Directions:

- Identify the specific functional impairments that can be ameliorated to impact on life satisfaction
    - Identify the specific impact of each functional area on life satisfaction: social networks, non-family friendships, ability to participate in recreational activities, etc…
- Identify changes in factors over time in longitudinal study
- Examine the influence of race/ethnicity
- Examine the influence of sex with a more representative Male/Female ratio

Limitations:

- Participants self-selected; results may not be generalizable to other mTBI groups or other groups of veterans
- The disproportionate male to female ratio may have limited generalizability
- Data was cross-sectional: no causality can be established or inferred

ANY QUESTIONS???

REFERENCES

American Congress of Rehabilitation Medicine (1993). Definition of mild traumatic brain injury. *J Head Trauma Rehabil., 8*, 86-87.

Belanger, H., Lange, R., Bailie, J., Iverson, G., Arrieux, J., Ivins, B., & Cole, W. (2016). Interpreting change on the neurobehavioral symptom inventory and the PTSD checklist in military personnel. *The Clinical Neuropsychologist, 30*(7), 1063-1073. https://doi.org/10.1080/13854046.2016.1193632

Cicerone, K. (1995). Persistent postconcussion syndrome: The structure of subjective complaints after mild traumatic brain injury. *The Journal of Head Trauma Rehabilitation, 10*(3), 1-17. https://doi.org/10.1097/00001199-199506000-00002

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*, 71-75. https://doi.org/10.1207/s15327752jpa4901_13

Malec, J., & Lezak, M. (2008). *Manual for the Mayo-Portland Adaptability Inventory (MPAI-4) for Adults, Children, and Adolescents.* http://www.tbims.org/mpai/manual.pdf

Soble, J., Silva, M., Vanderploeg, R., Curtiss, G., Belanger, H., Donnell, A., & Scott, S. (2014) Normative Data for the Neurobehavioral Symptom Inventory (NSI) and Post-Concussion Symptom Profiles Among TBI, PTSD, and Nonclinical Samples. *The Clinical Neuropsychologist, 28*(4), 614-632. https://doi.org/10.1080/13854046.2014.894576

VA National Center for PTSD (2010). *Using the PTSD Checklist (PCL).* http://www.ptsd.va.gov