The Effects of Concussion History and Resilience on Positive Psychological Outcomes in Active Special Operations Forces (SOF) Combat and Combat Support Soldiers

Nikki Barczak, MSc
Doctoral Student, Human Movement Science Curriculum
Matthew Gfeller Sport-Related TBI Research Center
The University of North Carolina at Chapel Hill

Acknowledgments
These data were collected through contracts funded by the United States Army Special Operations Command. These data have not been previously presented or published.

Cassie B. Ford, PhD
Patricia R. Combs, MEd, ATC
LTC Stephen M. DeLellis, MPAS, PA-C
CPT Marshall Healy, APA-C
Shawn F. Kane, MD
COL James H. Lynch, MD, FACSM
LTC Gary E. Means, MD
Jason P. Mihalik, PhD, CAT(C), ATC

Agenda

Background - Purpose - Methods - Results - Discussion
Mental Illness in Military

- The Department of Defense launched a Health Related Behaviors Survey (HRBS)
- All branches of the U.S. military

Why?
Continual Exposure to Stressors

Concussive Injury - 33,149 U.S. military personnel were diagnosed with a TBI in 2011

Why?
Concussive Injury - 33,149 U.S. military personnel were diagnosed with a TBI in 2011
Why?
Concussive Injury

Concussive Injury ➔ Psychological Consequences

- Depression
- Anxiety
- Post-traumatic Stress

Background – Purpose – Methods – Results – Discussion

Dual Continua of Mental Health

Mental Illness

Clinical Mental Illness ➔ Lack of Mental Illness

Subjective Well-being

Flourishing ➔ Clinical Mental Illness 
Lack of Mental Illness ➔ Languishing

(Maye & Lopez, 2002; Maye, 2011)

(Maye & Lopez, 2002; Maye, 2011)
Subjective Well-Being

Subjective Well-being

Background – Purpose – Methods – Results – Discussion

(Keyes & Lopez, 2002; Keyes, 2014)

Subjective Well-Being

Languishing

Flourishing

Low subjective well-being
1. Negative affective states
2. Psychosocial impairment

High subjective well-being
1. Emotional vitality
2. Psychological functioning
3. Social functioning

Positive emotions — brief, multifaceted responses to changes how one interprets/appraises current circumstances.

(Keyes & Lopez, 2002; Keyes, 2014)
Resilience

[Block & Kremen, 1995; Tugade & Fredrickson, 2004; Hoge, Audie, & Pollack, 2007; Sullivan, Kempe, Edmed, & Bonanno, 2016]

Background – Purpose – Methods – Results – Discussion

Greater resilience:
1. Well-being and emotional flexibility
2. Lower PTSD and post-concussion symptoms

Purpose of Present Study

The purpose of this study was to investigate the influence of concussion history and resilience on positive psychological constructs (flourishing mental health and positive emotions) in SOF soldiers.
Methods

Demographic Information
- Age
- Gender
- Position
- Concussion History

Psychometric Assessments
- Flourishing Mental Health (MHC-SF)
- Positive Emotions (mDES)
- Psychological Resilience (ER89)

Statistical Analysis
- Descriptive Statistics
- General Linear Model Regression Analyses

Psychometrics
- Mental Health Continuum Short Form (MHC-SF) (Keyes, 2005)
  - Uses 14 items to assess flourishing mental health
  - Higher scores indicate greater flourishing mental health

<table>
<thead>
<tr>
<th>Frequency of Feelings</th>
<th>Item 1</th>
<th>Item 2</th>
<th>Item 3</th>
<th>Item 4</th>
<th>Item 5</th>
<th>Item 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never (0)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Once or Twice (1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>About Once a Week (2)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>About 2 or 3 Times a Month (3)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>About Every Day (4)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Every Day (5)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

If you feel you had something important to contribute to society, you are asked how often you experienced it in the last two weeks.
Psychometrics

• Ego Resilience Scale (Block & Kremen, 1996)
  • Uses 14 items to assess psychological resilience
  • Higher scores indicate greater resilience

<table>
<thead>
<tr>
<th>Statement</th>
<th>Applies very strongly (4)</th>
<th>Applies strongly (3)</th>
<th>Applies slightly (2)</th>
<th>Does not apply at all (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am generous with my friends.</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>I quickly get over and recover from being rejected.</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Background – Purpose – Methods – Results – Discussion

Psychometrics

• Modified Differential Emotion Scale (Fredrickson, 2014)
  • Assesses 10 positive and 10 negative emotions
  • Higher scores indicate more experiences of emotions

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Not at all (0)</th>
<th>A little bit (1)</th>
<th>Moderately (2)</th>
<th>Quite a bit (3)</th>
<th>Extremely (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amused, Funny, Silly</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>Awe, Wonder, Amazement</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

Background – Purpose – Methods – Results – Discussion

Methods

• Age
• Gender
• Position
• Concussion History
• Flourishing Mental Health (MHCSF)
• Positive Emotions (mDES)
• Psychological Resilience (ER89)
• Descriptive Statistics
• General Linear Model
• Regression Analysis
Results: Descriptive Statistics

Means, Standard Deviations, and Ranges (N = 34)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Study Range</th>
<th>Possible Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Emotions</td>
<td>30.50 (5.82)</td>
<td>18-40</td>
<td>0-40</td>
</tr>
<tr>
<td>Flourishing Mental Health</td>
<td>59.94 (8.12)</td>
<td>38-70</td>
<td>0-70</td>
</tr>
<tr>
<td>Resilience</td>
<td>48.06 (4.10)</td>
<td>39-55</td>
<td>14-56</td>
</tr>
<tr>
<td>Concussion History</td>
<td>Mode = 0</td>
<td>0-8</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Results: Correlations Among Study Variables

<table>
<thead>
<tr>
<th>Positive Emotions</th>
<th>Flourishing Mental Health</th>
<th>Concussion History</th>
<th>Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Emotions</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flourishing Mental Health</td>
<td>&lt; 0.0001</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Concussion History</td>
<td>0.0409</td>
<td>0.0003</td>
<td>1.00</td>
</tr>
<tr>
<td>Resilience</td>
<td>0.56</td>
<td>0.49</td>
<td>-0.23</td>
</tr>
</tbody>
</table>
### Results: Correlations Among Study Variables

<table>
<thead>
<tr>
<th></th>
<th>Positive Emotions</th>
<th>Flourishing Mental Health</th>
<th>Concussion History</th>
<th>Resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Emotions</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flourishing Mental Health</td>
<td>0.63 &lt; 0.001</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concussion History</td>
<td>0.35</td>
<td>0.58</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Resilience</td>
<td>0.58</td>
<td>0.49</td>
<td>-0.23</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>0.0004</td>
<td>0.0033</td>
<td>0.1839</td>
<td></td>
</tr>
</tbody>
</table>

### Results: Correlations

- Emotional Vitality
- Psychological Functioning
- Social Functioning
- Positive Emotions

### Results: General Linear Model

Positive linear relationship between positive emotions and resilience

\[ F_{1,2} = 0.63 \]
\[ p < 0.001 \]
\[ R^2 = 0.3831 \]
Results: General Linear Model

Relationships between concussion history and resilience with flourishing mental health

Higher Flourishing Mental Health
Lower Flourishing Mental Health

Flourishing

Languishing

Summary

Flourishing
High subjective well-being
1. Emotional vitality
2. Psychological functioning
3. Social functioning

Languishing
Low subjective well-being
1. Negative affective states
2. Psychosocial impairment

Background – Purpose – Methods – Results – Discussion

Concussion History

F(2,31) = 13.86
p < 0.0001
R² = 0.4721
Significance

- Overall, participants reported moderate levels of well-being and positive emotions
- Resilience (+)
- Concussion history (−)

Limitations and Future Directions

- Need longitudinal design
- Better understanding of mental health
  - Also has implications for improving acute tactical performance
- Need intervention mechanism
Acknowledgments

• LTC Stephen DeLellis, MPAS, PA-C
• COL James Lynch, MD, FACSM
• LTC Gary Means, MD
• LTC Patrick Degenbrock
• MAJ Riley Burke, DO
• COL (Ret.) Robert Lutz, MD

Further Acknowledgments

• LTC Stephen DeLellis, MPAS, PA-C
• COL James Lynch, MD, FACSM
• LTC Gary Means, MD
• LTC Patrick Degenbrock
• MAJ Riley Burke, DO
• COL (Ret.) Robert Lutz, MD

Thank You

Nikki Barczak, MSc
Matthew Gfeller Sport-Related TBI Research Center
The University of North Carolina at Chapel Hill
barczak@email.unc.edu
### Original Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE</td>
<td>34</td>
<td>30.50000</td>
<td>5.82185</td>
</tr>
<tr>
<td>MHC</td>
<td>34</td>
<td>59.94118</td>
<td>8.12382</td>
</tr>
<tr>
<td>CxHist</td>
<td>34</td>
<td>1.46118</td>
<td>1.65668</td>
</tr>
<tr>
<td>ER89</td>
<td>34</td>
<td>46.05852</td>
<td>4.10426</td>
</tr>
</tbody>
</table>

Pearson Correlation Coefficients, N = 34

<table>
<thead>
<tr>
<th></th>
<th>PE</th>
<th>MHC</th>
<th>CxHist</th>
<th>ER89</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE</td>
<td>1.00000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MHC</td>
<td>0.63046 &lt;.0001</td>
<td>1.00000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CxHist</td>
<td>-0.35242 0.0409</td>
<td>-0.25636 0.0322</td>
<td>1.00000</td>
<td></td>
</tr>
<tr>
<td>ER89</td>
<td>0.57705 0.0001</td>
<td>0.49897 -0.23347</td>
<td>0.23347 0.1839</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

### Updated Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE</td>
<td>77</td>
<td>28.00000</td>
<td>7.00000</td>
</tr>
<tr>
<td>MHC</td>
<td>77</td>
<td>58.68831</td>
<td>9.24414</td>
</tr>
<tr>
<td>CxHist</td>
<td>70</td>
<td>2.205714</td>
<td>2.47558</td>
</tr>
<tr>
<td>ER89</td>
<td>76</td>
<td>47.02115</td>
<td>4.67959</td>
</tr>
</tbody>
</table>

Pearson Correlation Coefficients, N = 77

<table>
<thead>
<tr>
<th></th>
<th>PE</th>
<th>MHC</th>
<th>CxHist</th>
<th>ER89</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE</td>
<td>1.00000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MHC</td>
<td>0.64581 &lt;.0001</td>
<td>1.00000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CxHist</td>
<td>-0.25634 0.0322</td>
<td>-0.07671 0.5310</td>
<td>1.00000</td>
<td></td>
</tr>
<tr>
<td>ER89</td>
<td>0.49443 &lt;.0001</td>
<td>0.57725 &lt;.0001</td>
<td>-0.23347 0.1839</td>
<td>1.00000</td>
</tr>
</tbody>
</table>

### Results – GLM with Updated Sample

![Graphs showing correlation results](attachment:graphs.png)