The Role of PTSD and Depressive Symptoms in Changing Patterns of Substance Use Post-trauma

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Continuing Medical Education Commercial Disclosure

I, Negar Fani, PhD, have no commercial relationships to disclose.
PTSD and alcohol/substance misuse are frequently comorbid (10%–61%)

• National Epidemiologic Survey on Alcohol and Related Conditions: 46%
• Psychiatric comorbidity and functional impairment
• SU emerges or worsens after trauma in some people
• Self-medication hypotheses
  • Substances used to alleviate PTSD-related distress
  • Onset of PTSD before SUD

Haller & Chasin (2019) longitudinal study N=377 adolescents, 11-15yo
3 waves (3-7 years apart)

4 Hypotheses

• High risk (HR): pre-trauma SU  →  trauma risk
• Susceptibility (SP): pre-trauma  SU  →  PTSD risk
• Self-medication (SM): PTSD sxs  →  SU
• Shared susceptibility vulnerability (SSV): PTSD and SUD due to shared risk factors

• HR: (B = 0.21, p = .33, OR = 1.23)
• SP: (B = 0.07, p = .40, IRR = 1.07)
• SM: PTSD predicted future alcohol use (B = 0.09, p = .003, IRR = 1.10) and SU (B = 0.09, p = .042, IRR = 1.10)
  • covariates: trauma exposure, pretrauma SUD, family adversity
• SSV: (B = 0.01, p = .92, IRR = 1.01)

Which PTSD symptoms relate most to increased substance use?

- Intrusive/re-experiencing
- Avoidance
- Anhedonia (emotional numbing)
  - loss of interest in activities
  - detachment from others
  - diminished positive affect
- Negative mood and cognitions
- Hyperarousal

Post-trauma anhedonia associated with increased SU in a recently-traumatized population\(^1\)

- N=165

Red: participants who increased SU over time

Blue: participants with consistently minimal (or absent) SU

\(^1\)Fani et al., PR, 2020
Patterns of alcohol and marijuana use after trauma

• Trajectories of use
  • Correspond with changes in PTSD and depressive symptoms
  • Which symptoms
  • Moderation by trauma profiles

• AURORA Freeze 2 (N~1600)
**PhenX Toolkit Alcohol** - “During the 30 days before the event (or in the past 2 weeks for week 2) that brought you to the ER, how many days did you have at least one drink of any kind of alcohol, not including small tastes or sips?”

**Table:**

<table>
<thead>
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<th>ED</th>
<th>Week 2</th>
<th>Week 8</th>
<th>Month 3</th>
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<tbody>
<tr>
<td>Range</td>
<td>0-15</td>
<td>0-14</td>
<td>0-15</td>
<td>0-15</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>2 (3.3)</td>
<td>.12 (.2)</td>
<td>2.2 (3.5)</td>
<td>1.9 (3.3)</td>
</tr>
<tr>
<td>Mode</td>
<td>0 (40%)</td>
<td>0 (54%)</td>
<td>0 (41%)</td>
<td>0 (47%)</td>
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**Graphs:**

**Week 2 Alcohol Use**
- 0: 40%
- 2: 11%
- 4: 3%

**Week 8 Alcohol Use**
- 0: 41%
- 2: 11%

**Month 3**
- Similar to Week 8
<table>
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<th>N=1600</th>
<th>ED</th>
<th>Week 2</th>
<th>Week 8</th>
<th>Month 3</th>
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<td>0-15</td>
<td>0-14</td>
<td>0-15</td>
<td>0-15</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>2.2 (4.8)</td>
<td>2.1 (4.7)</td>
<td>2 (4.7)</td>
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</tr>
<tr>
<td>Mode</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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</table>

**PhenX Toolkit Substances** - “During the 30 days before the event (or in the past 2 weeks for week 2) that brought you to the ER, how many days did you use marijuana?”
Alcohol Use: Latent Class Growth Analysis

Class 1: n=29
Class 2: n=1500
Class 3: n=86

*quadratic
decrease: 31%
No change: 39%
increase: 30%
*no sex effects or associations with age

Amanda Liew, MPH
Alcohol use and change in PTSD symptoms

- No associations with overall PTSD symptom change
- After removing participants with ED use scores of 0 (n~500)
  - PTSD symptoms ($r=.1$, $p=.04$)
    - Anhedonia, dysphoria and avoidance ($r=.13$, $p=.005$)
  - **Sex differences:** In women, not men, EtOH change correlates with anhedonia and dysphoria symptom change ($r=.13$, $p=.02$)
Alcohol use and change in depression symptoms

PROMIS Depression Short Form (8 items)

$r_{1200} = .13, p=0.000003$

- After removing non-users at ED
$r_{710} = .13, p=0.00005$

-not moderated by sex, demographics and prior drug use
Does trauma history moderate associations between substance use trajectories and PTSD symptom change?

Latent Trauma Class

Class 1: high trauma; polytrauma, high sexual trauma
Class 2: moderate trauma; high MVA + physical assault
Class 3: low trauma; primarily MVA

Archana Basu, PhD
Latent Trauma Class

**Class 1:** high trauma; polytrauma, high sexual trauma

**Class 2:** moderate trauma; high MVA + physical assault

**Class 3:** low trauma; primarily MVA

Archana Basu, PhD

Differences in patterns of alcohol and marijuana use over time

F\(_{2,1140}\) = 2.9, p = .05

*no interaction with sex

F\(_{2,1134}\) = 4, p = .02
Marijuana Use Trajectories: Latent Class Growth Analysis

Consistently low use n=1239 (77%)
High use n= 258 (16%)
Increasing use n=107 (7%)

Amanda Liew, MPH
Marijuana Use Latent Classes and Change in Depressive Symptoms

**Men**

- Latent Use: Marijuana
  - 1: Consistently high use
  - 2: Consistently low use
  - 3: Increasing use

**Women**

- Latent Class: Marijuana Use
  - 1
  - 2
  - 3

MJ use latent class x sex x time: $F_{2,1172}=5.6$ p=.004

*No significant effects with PTSD symptom change*
Change in PTSD Symptoms: Latent MJ use class x trauma class x time

PTSD overall: $F_{2,621} = 6.9$ $p = .000017$

*No sex main effects or interactions*

**Polytrauma group**

**Moderate Trauma**

**Low trauma/MVA**

**Blue** Consistently high use

**Red** Consistently low use

**Green** Increasing use

**Hyperarousal:** $F_{2,705} = 6.2$ $p = .00006$

**Neg mood/Cognitions:** $F_{2,705} = 5.7$ $p = .00016$

**Anhedonia:** $F_{2,705} = 5.6$ $p = .00018$
PTSD and Substance Use

Self-medication hypothesis
- Alcohol use associated with depressive symptoms post-trauma
  - In “at risk” users, use corresponds with anhedonic, dysphoric, avoidance PTSD symptoms, particularly women
- Minority (7%) of marijuana users escalate use after trauma
  - Associated with increasing depression, particularly men
- Trauma profiles moderate relationships of marijuana use and PTSD
  - Polytrauma → higher risk of increasing marijuana use and PTSD symptoms, particularly anhedonia and dysphoria
  - May be a larger proportion of “at risk” and escalating users in samples with more interpersonal trauma
Future directions: Neural pathways of shared susceptibility for PTSD and SUD

At risk alcohol or marijuana use

Hyperarousal, Anhedonia, Dysphoria

Escalate use to mitigate symptoms

SUD

Structural integrity
Reward, threat inhibition pathways

Monitoring of reward value

Sensitivity to reward

trauma

OFC

dmPFC

Insula

Striatum

Hippocampus

Amygdala
Fronto-limbic and fronto-striatal integrity in the development of post-trauma anhedonia


Harnett...Fani, Depress Anxiety (2020)
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Kerry J Ressler (Harvard)

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