Posttraumatic stress disorder and resilience in the aftermath of disaster

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I became what I am today at the age of twelve, on a frigid overcast day in the winter of 1975. I remember the precise moment, crouching behind a crumbling mud wall, peeking into the alley near the frozen creek. That was a long time ago, but it’s wrong what they say about the past, I’ve learned, about how you can bury it. Because the past claws its way out. Looking back now, I realize I have been peeking into that deserted alley for the last twenty-six years."

The Kite Runner, 2003
Tohoku Earthquake March 2011
Posttraumatic stress disorder and resilience in the aftermath of disaster

- „Trauma crash course“
- PTSD in accident survivors
- Resilience
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Lifetime Prevalence for Potentially Traumatic Events
Lifetime prevalence for PTSD
Posttraumatic Stress Disorder (DSM-IV)

A) Stressor criterium:
   - Event: Threat to life or physical integrity
   - Reaction: Intense anxiety, helplessness, or horror

B) Re-experiencing symptoms: flashbacks, nightmares

C) Avoidance symptoms: avoidance of specific reminders of the traumatic event

D) Anxiety or psychophysiological hyper-arousal

E) Duration of symptoms at least one month

F) Substantial suffering or decrease in social, professional or other areas of functioning
PTSD rate depends on type of trauma

Kessler et al., 1995
Lifetime Prevalence for Trauma and PTSD Depending on Gender and Type of Trauma

% 70

Männer Trauma  Männer PTSD  Frauen Trauma  Frauen PTSD


University of Zurich

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PTSD symptoms (CAPS total scores) in severely injured accident survivors over 3 years (N=90)
PTSD: The Building Block Effect

% PTSD

number of traumatic events

0-3 4-7 8-11 12-19 20-27 28 and up

679 1056 749 542 95 58

Neuner et al., BMC Psychiatry 2004
## Risk factors for PTSD

Brewin et al. 2000

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Weighted average effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (female)</td>
<td>.13</td>
</tr>
<tr>
<td>Younger age</td>
<td>.06</td>
</tr>
<tr>
<td>Low socio-economic status</td>
<td>.14</td>
</tr>
<tr>
<td>Lack of education</td>
<td>.10</td>
</tr>
<tr>
<td>Low intelligence</td>
<td>.18</td>
</tr>
<tr>
<td>Race (minority status)</td>
<td>.05</td>
</tr>
<tr>
<td>Psychiatric history</td>
<td>.11</td>
</tr>
<tr>
<td>Childhood abuse</td>
<td>.14</td>
</tr>
<tr>
<td>Other previous trauma</td>
<td>.12</td>
</tr>
<tr>
<td>Other adverse childhood</td>
<td>.19</td>
</tr>
<tr>
<td>Family psychiatric history</td>
<td>.13</td>
</tr>
<tr>
<td>Trauma severity</td>
<td>.23</td>
</tr>
<tr>
<td>Lack of social support</td>
<td>.40</td>
</tr>
<tr>
<td>Life stress</td>
<td>.32</td>
</tr>
</tbody>
</table>
Trauma and PTSD: Epidemiology

- Lifetime prevalence for potentially traumatic events: 50-90%

- Posttraumatic stress disorders (PTSD) following potentially traumatic events: ~10%

- Lifetime prevalence for posttraumatic stress disorders: 8%
  - Men: 6%
  - Women: 12%
Specific and unspecific posttraumatic mental disorders

- **Specific posttraumatic mental disorders:**
  - Acute Stress Disorder
  - Posttraumatic Stress Disorder (PTSD)
  - Enduring Personality Disorder after Extreme Traumatization

- **Unspecific posttraumatic mental disorders, z.B.:**
  - Depressive Disorders
  - Anxiety Disorders
  - Somatoform Disorders
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**1st study of severely injured accident survivors**

**Inclusion criteria:**
- Referral to the Intensive Care Unit due to a recent accident
- Injury Severity Score (ISS) ≥10
- Interview possible within a month after the accident
- Between 18 and 70 years of age
- Adequate knowledge of German

**Exclusion criteria:**
- Glasgow Coma Scale GCS <9
- Major somatic and/or mental problems prior to trauma
- Injuries due to attempted suicide
- Injuries due to a physical attack
Incidence of PTSD in severely injured accident survivors


<table>
<thead>
<tr>
<th></th>
<th>2 weeks(^1) (N=90)</th>
<th>12 months (N=90)</th>
<th>36 months (N=90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full PTSD</td>
<td>5 (5.6%)</td>
<td>2 (2.2%)</td>
<td>4 (4.4%)</td>
</tr>
<tr>
<td>Subsyndromal PTSD</td>
<td>19 (21.1%)</td>
<td>10 (11.1%)</td>
<td>9 (10.0%)</td>
</tr>
</tbody>
</table>

\(^1\) Time criterion for PTSD not fulfilled
## Predictors of PTSD symptoms 12 months post accident


<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury Severity Score (ISS)</td>
<td>.02</td>
<td>n.s.</td>
</tr>
<tr>
<td>Female sex</td>
<td>.11</td>
<td>n.s.</td>
</tr>
<tr>
<td>Biographical risk factors</td>
<td>.24</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Stress due to life events (last 2 years)</td>
<td>.01</td>
<td>n.s.</td>
</tr>
<tr>
<td>Social network</td>
<td>-.07</td>
<td>n.s.</td>
</tr>
<tr>
<td>Sense of death threat</td>
<td>.26</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Subjective appraisal of accident severity</td>
<td>.07</td>
<td>n.s.</td>
</tr>
<tr>
<td>IES subscale intrusion</td>
<td>.23</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Active, problem-oriented coping</td>
<td>.20</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Sense of Coherence (SOC)</td>
<td>-.07</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

*Multiple regression: N = 104, R = .63, adjusted R^2 = .34, p < .001*
2\textsuperscript{nd} study of severely injured accident survivors

T1
(5 days post accident)

Eligible Patients
N = 534

Not contacted
N = 148

Participants
N = 335

Refusers
N = 51

Accident survivors
N = 323

Assault victims
N = 12

T2
(6 months)

Participants
N = 255

Drop-outs
N = 68

T3
(12 months)

Participants
N = 218

Drop-outs
N = 37
## Incidence of ASD and PTSD

*Fuglsang et al. (2002) Psychother Psychosom 71: 214-222*

*Schneider et al. (2008) Psychother Psychosom 77: 111-118*

### Acute Stress Disorder

(5 days post accident, N = 255)

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD</td>
<td>10</td>
<td>3.9</td>
</tr>
<tr>
<td>Subsyndromal ASD</td>
<td>25</td>
<td>9.8</td>
</tr>
</tbody>
</table>

### Post-Traumatic Stress Disorder

(Six-month follow-up, N = 255)

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD</td>
<td>8</td>
<td>3.1</td>
</tr>
<tr>
<td>Subsyndromal PTSD</td>
<td>20</td>
<td>7.8</td>
</tr>
</tbody>
</table>
Prediction of PTSD symptoms at 6-month follow-up

*Schneider et al. (2008)* Psychother Psychosom 77: 111-118

<table>
<thead>
<tr>
<th>Independent variable (T1)</th>
<th>beta</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female sex</td>
<td>.09</td>
<td>.077</td>
</tr>
<tr>
<td>Pre-existing mental disorder</td>
<td>.03</td>
<td>.531</td>
</tr>
<tr>
<td>Insufficient German proficiency</td>
<td>.10</td>
<td>.076</td>
</tr>
<tr>
<td>Sense of Coherence</td>
<td>-.13</td>
<td>.029</td>
</tr>
<tr>
<td>Injury Severity Score</td>
<td>.10</td>
<td>.089</td>
</tr>
<tr>
<td>Mild traumatic brain injury</td>
<td>.21</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Pain</td>
<td>.11</td>
<td>.046</td>
</tr>
<tr>
<td>ASD criterion A</td>
<td>.06</td>
<td>.330</td>
</tr>
<tr>
<td>ASD score</td>
<td>.25</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Perceived responsibility for accident</td>
<td>-.16</td>
<td>.004</td>
</tr>
<tr>
<td>Emotional coping</td>
<td>.19</td>
<td>.001</td>
</tr>
<tr>
<td>Type of accident: Traffic</td>
<td>.01</td>
<td>.889</td>
</tr>
<tr>
<td>Sports / leisure time</td>
<td>-.02</td>
<td>.745</td>
</tr>
</tbody>
</table>

N= 241, R=.66, adjusted $R^2=.40$ (p<.001)
Possible explanations for the low rates of PTSD following accidental injuries in Switzerland

- Low pre-existing trauma load?

- Advanced rescue and health care system in Switzerland?

- Social support in the aftermath of trauma?

- Low PTSD symptom levels in spite of “trauma physiology“?

- High “resilience“ in the Swiss population?
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What is Resilience?

- Resilience is a personality trait that moderates the negative effects of stress, and promotes adaptation.
- Resilient individuals have been described as possessing self-esteem, self-confidence, curiosity, and control over the environment.
- They have satisfying interpersonal relationships and a repertoire of problem-solving skills.
- They tend to show adaptive behavior in the areas of social functioning, morale, and somatic health.
Resilience

Role models

Positive emotions: Optimism, Humor, Gratitude

Personal integrity

Reciprocal altruism

Religion and spirituality

Signature strengths: match of skills with challenges

Social support

Active coping facing fear

Properly functioning reward circuitry

Meaning and purpose in life

Cognitive flexibility posttraumatic growth acceptance

Powerful extinction process

Neuroendocrine factors

Southwick, Vythilingham et al. 2005; McCullough et al., 2002
Casada & Roache, 2005; Guyer et al., 2006; Haglund et al., 2007
(Jovanovic and Ressler 2010)
Lower plasma DHEA concentration in the long-term after severe accidental injury

_Oe et al. (2012) Psychother Psychosom 81: 121-123_

**Remitted PTSD (n=13):** severe accidental injuries 10 years ago, PTSD or sub-threshold PTSD according to DSM-IV in the year following the accident 10 years ago, no current PTSD diagnosis.

**Trauma-control (n=14):** severe accidental injuries 10 years ago, no life-time diagnosis of PTSD, no previous or current psychiatric or neurologic condition.

**No Trauma (n=16):** matched for age and gender, no life-time traumatic events, no previous or current psychiatric or neurologic condition.

Figure 1: Plots of plasma DHEA / DHEAS concentration and DHEA-cortisol ratio. (* p<0.05)
Discriminative conditioning: valence ratings

*Kuehlen et al. in preparation*

Significant group x time x CS type interaction (F2,52 = 4.89, p< 0.01) expressed by a significant decrease of the valence of the CS associated with an aversive US after conditioning (CS+av) in the trauma controls only.

![Graph showing valence ratings](image-url)
Reward Task

Response: YES
Feedback: Wrong answer

Response: NO
Feedback: Correct answer
+ 0.5 CHF
Reaction times are faster in the reinforced conditions in all three groups.

Mood ratings are higher during reinforced conditions for the trauma-controls and the non-trauma-controls, but not for the remitted PTSD participants.
Startle response of trauma-controls, remitted PTSD patients, and no trauma controls. ANOVA showed a time effect (F=27.06, p<0.001), but no significant group effect (F=3.03, p=0.06). Covariant-Analysis with State Anxiety showed a significant group effect (F=3.75, p=0.034).
150 survivors of recent acts of non-sexual, non-domestic physical assault will be recruited from the Department of Trauma Surgery at the University Hospital Zurich, and assessed within 2 nights to 2 weeks after the assault, as well as 1 month, 3 months, 6 months, and 12 months after the assault.

A subsample of 25 resistant subjects (CAPS total score <20) and 50 highly symptomatic patients (CAPS total score >50) will undergo neuroimaging in conjunction with the conditioning experiments.
Hypothesized course of PTSD symptoms following traumatic exposure
„Mariam ... thought of her entry into this world, the *harami* child of a lowly villager, an unintended thing, pitiable, regrettable accident. A weed. And yet she was leaving the world as a woman who had loved and been loved back. She was leaving it as a friend, a companion, a guardian. A mother. A person of consequence at last."

A Thousand Splendid Suns, 2007
Tohoku Earthquake March 2011
Thank you for your attention!

Pablo Picasso: Le Bouquet