Psychiatric Symptoms of Young Adult Female Indoor Tanners

Carolyn J. Heckman, PhD,¹ Susan Darlow, PhD,¹ Jessye Cohen-Filipic, MS,² Jacqueline D. Kloss, PhD,³ Teja Munshi, BDS, MPH,¹ and Sharon L. Manne, PhD⁴

1. Fox Chase Cancer Center, PA
2. Portland VAMC, OR
3. Drexel University, PA
4. Cancer Institute of New Jersey
New Cases of Skin Cancer
Per 100,000 people age 15 to 39

Source: Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute
By Elliot B. Postell — The Washington Post
Indoor Tanning Industry

Tanning Salons Revenue ($millions)

- $1,500 to $3,300
- 1989 to 2014

Graph shows the revenue trend from 1989 to 2014, indicating a general increase with minor fluctuations.
Prevalence of indoor tanning in young adults

- 2005 National Health Interview Survey (NHIS) Data
- $N = 29,394$ US adults
- 20% in last year among 18-29 year olds
  - 27% among women, 13% among men

Heckman, Coups, Manne. 2008. JAAD.
What motivates people to tan?

- US public is aware of dangers of UV
  - Still high levels of exposure
  - Minimal protective behaviors
- Appearance is the primary motivation
- Social influence factors
- May also impact anxiety, mood, or addictive symptoms
Psychosocial correlates of indoor tanning

- Tanning for mood or relaxation purposes
  (e.g., Hillhouse et al., 2007; Stapleton et al., 2010)

- Sensation-seeking, smoking, binge drinking, drugs
  (Bagdasarov et al. 2008; Ibrahim & Brown, 2008)

- 2005 NHIS Data, N=29,394 US adults
  (Heckman, Coups, & Manne, JAAD, 2008)
  - Health behaviors among indoor tanners under age 50
    - Current smoking, risky drinking
    - No physical activity, less than 5 servings of F/V per day
    - Not being overweight/obese
    - Other skin cancer risk behaviors (e.g., sunburns)

- Also see Coups & Phillips, JEADV, 2011 for a systematic review of correlates
Why do some people tan so frequently?

• **Tanning Dependence**
  ◦ “Tanorexia”
  ◦ Warthan et al. (2005)
    ◦ mCAGE
      • Cut down, annoyed, guilty, eye-opener
    ◦ mDSM-IV-TR
      • Tolerance, withdrawal, out of control behavior, impairment

• **Tanning Pathology Scale (TAPAS)**
  ◦ Focus groups and psychometric testing
  ◦ *Dissatisfaction with Skin Color*
  ◦ *Indoor Tanning as a Problem*
  ◦ *Opiate–like Reactions to Tanning*
  ◦ *Tolerance to the Physiological Effects of Tanning*
  ◦ (Longacre et al., 2006; Hillhouse et al., 2007)
Prevalence of Tanning Dependence

- Beachgoers
- College Indoor Tanners
- Tanning Salon Patrons
- College Students

e.g., Heckman, Egleston et al., AJHB, 2008
Proposed mechanisms of tanning dependence
(Oren & Bartek, Cell, 2007)
Evidence for these mechanisms

1. Release of endogenous opioids during UV exposure
2. UV (vs. non UV) bed preference among blinded frequent tanners
   - Reasons were relaxation and decreased tension (Feldman et al., 2004)
3. Opioid blockade (antagonist naltrexone) reduced preference
   - Withdrawal-like symptoms such as nausea, fatigue, and low concentration in frequent tanners at higher doses (Kaur et al., 2006)
4. Decreased fibromyalgia pain after exposure to UV vs. non-UV (Taylor et al., 2009)
5. Increased striatal activation & decreased tanning desire
   - Single photon emission tomography (SPECT) imaging
   - Tanning dependent indoor tanners in UV vs. sham (non-UV) (Harrington et al., 2011)
Psychosocial correlates of tanning dependence

- Online survey of 400 college students
  - 38% tanned indoors, 27% TD
  - TD associated with smoking, anaerobic exercise, not being obese
  - (Heckman, Egleston, et al., AJHB, 2008)

- Survey of 421 college students
  - 56% tanned indoors
  - 39% met DSM, 31% CAGE criteria
  - TD associated with anxiety, alcohol, marijuana, other substances
  - Depression not associated with TD
  - (Mosher & Danoff-Burg, 2010)
Identifying Novel Correlates of Indoor Tanning Experiences: Project INCITE R03CA136007
Purpose of the Study

- To identify psychosocial correlates of indoor tanning and tanning dependence and characterize subgroups of participants
- Few studies have comprehensively assessed psychological and addictive symptoms among tanners
- No study has previously used a standardized clinical interview
- Results could inform development of interventions to address relevant psychological and addictive problems
Participants and Methods

- **Sample (n = 518)**
  - Drexel University
    - SONA online psych research subject pool
  - 18-25 year old females
  - Any tanning history, 67% Caucasian
  - Fall/winter/spring recruitment

- **Design**
  - Cross-sectional
  - Online survey about tanning
  - eMINI International Neuropsychiatric Interview conducted by phone
Results: Axis I Correlates of IT

- 40% indoor tanners (IT)
- Chi square analyses

<table>
<thead>
<tr>
<th>Variables</th>
<th>IT (n = 146)</th>
<th>No IT (n = 174)</th>
<th>Overall (N = 320)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance abuse or dependence</td>
<td>32 (21.9%)</td>
<td>15 (8.6)</td>
<td>47 (14.7)</td>
<td>.001</td>
</tr>
<tr>
<td>Smoked in past 30 days</td>
<td>32 (21.9)</td>
<td>19 (10.9)</td>
<td>51 (15.9)</td>
<td>.007</td>
</tr>
<tr>
<td>Alcohol use sx</td>
<td>104 (71.2)</td>
<td>82 (47.1)</td>
<td>186 (58.1)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Social anxiety sx</td>
<td>5 (3.4)</td>
<td>16 (9.2)</td>
<td>21 (6.6)</td>
<td>.032</td>
</tr>
<tr>
<td>Generalized anxiety sx</td>
<td>33 (22.6)</td>
<td>14 (8.1)</td>
<td>47 (14.7)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

- NS = any mental disorder, illicit drug use, SAD, MDD, ED, OCD, PTSD
Results: Axis I Correlates of IT

- Multivariable logistic regression (N = 320)

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol use sx</td>
<td>2.72 (1.67-4.44)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Social anxiety sx</td>
<td>0.22 (0.07-0.75)</td>
<td>.015</td>
</tr>
<tr>
<td>Generalized anxiety sx</td>
<td>3.42 (1.69-6.92)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

- Smoking no longer significant
Results: Axis I Correlates of TD

- 25% tanning dependent (TD)
  - based on mCAGE or mDSM-IV criteria
- Chi square analyses

<table>
<thead>
<tr>
<th>Variables</th>
<th>TD (n = 76)</th>
<th>Not TD (n = 230)</th>
<th>Overall (N = 306)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any psych diagnosis</td>
<td>47 (61.8%)</td>
<td>107 (46.5)</td>
<td>154 (49.7)</td>
<td>.020</td>
</tr>
<tr>
<td>Alcohol use sx</td>
<td>58 (76.3)</td>
<td>121 (52.6)</td>
<td>179 (58.5)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Seasonal affective sx</td>
<td>45 (59.2)</td>
<td>104 (45.2)</td>
<td>149 (48.7)</td>
<td>.034</td>
</tr>
</tbody>
</table>

- None of the other psych or substance variables were significant.
Results: Axis I Correlates of TD

- Multivariable logistic regression (N = 306)

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol use sx</td>
<td>3.26 (1.72-6.17)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Seasonal affective sx</td>
<td>1.67 (0.95-2.94)</td>
<td>.075</td>
</tr>
<tr>
<td>Major depression sx</td>
<td>0.52 (0.26-1.04)</td>
<td>.064</td>
</tr>
</tbody>
</table>
Results: Emotions Pre-Post Tanning

- Retrospective mood (PANAS) before and after last indoor tanning episode
- Factor analysis
  - Self-assurance
    - strong, proud, alert, inspired, determined, attentive, active
  - Arousal
    - interested, excited, enthusiastic
  - Anxiety
    - guilty, scared, ashamed, nervous, jittery, afraid
  - Anger
    - upset, hostile, irritable
Results: Emotions Pre-Post Tanning (N = 230)

<table>
<thead>
<tr>
<th>Category</th>
<th>Before or After Tanning</th>
<th>M(SD)</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-assurance</td>
<td>Before</td>
<td>2.3 (0.9)</td>
<td>2.05</td>
<td>.042</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>2.2 (1.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arousal</td>
<td>Before</td>
<td>2.9 (1.0)</td>
<td>3.77</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>2.7 (1.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>Before</td>
<td>1.7 (0.8)</td>
<td>4.93</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>1.5 (0.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger</td>
<td>Before</td>
<td>1.4 (0.7)</td>
<td>4.11</td>
<td>&lt; .001</td>
</tr>
<tr>
<td></td>
<td>After</td>
<td>1.3 (0.7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Planned Analyses

- Association of skin protection behavior with psychosocial variables
- Latent profile analyses to characterize subgroups
- Intervention design to reduce tanning and related psychosocial problems
Conclusions about IT and TD

- Associated with anxiety, mood, and substance use

- + and - mood states decrease after tanning
  - Suggests possible numbing effect

- More than just appearance
  - Psychological, behavioral, addictive factors

- Concern for (female) children and young adults
Shedding Light on Indoor Tanning
Heckman & Manne (Eds) 2011

1. Introduction
2. History and Culture of Tanning in the United States
3. Prevalence and Correlates of Indoor Tanning (Coups)
4. Motivations for Indoor Tanning: Theoretical Models
5. How Ultraviolet Radiation Tans Skin
6. Skin Cancer and Other Health Effects of Indoor Tanning
7. Tanning Dependence: Is tanning an addiction?
8. Selected Indoor Tanning Myths and Controversies
9. A Systematic Review of Interventions Reduce Indoor Tanning
10. Indoor Tanning Regulation, Enforcement, Taxation, and Policy
11. Sunless Tanning
12. International Perspectives on Indoor Tanning (Hay)
13. Indoor Tanning: Past, Present, and Future