NIAAA: State of the Science

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American Society of Clinical Psychopharmacology (ASCP)
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No Disclosures
### Relative Scope of the Problem: Opioids versus Alcohol

<table>
<thead>
<tr>
<th>Opioids</th>
<th>Alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Misuse</strong>*</td>
<td>Use</td>
</tr>
<tr>
<td>% of population</td>
<td>% of population</td>
</tr>
<tr>
<td><strong>OUD</strong></td>
<td><strong>AUD</strong></td>
</tr>
<tr>
<td>% of population</td>
<td>% of population</td>
</tr>
<tr>
<td><strong>ED visits</strong></td>
<td><strong>ED visits</strong></td>
</tr>
<tr>
<td>Primary reason</td>
<td>Primary reason</td>
</tr>
<tr>
<td><strong>Deaths</strong></td>
<td><strong>Deaths</strong></td>
</tr>
<tr>
<td>Total overdoses</td>
<td>Total deaths</td>
</tr>
<tr>
<td>Prescription opioids</td>
<td>Acute – overdose, injury</td>
</tr>
<tr>
<td>Fentanyl and similar</td>
<td>Chronic – liver, cancer</td>
</tr>
<tr>
<td>Heroin</td>
<td><strong>Opioid + alcohol overdose deaths</strong></td>
</tr>
<tr>
<td>11,401,000</td>
<td>178,736,000</td>
</tr>
<tr>
<td>4.2</td>
<td>65.7</td>
</tr>
<tr>
<td>2,110,000</td>
<td>14,500,000</td>
</tr>
<tr>
<td>0.8</td>
<td>5.3</td>
</tr>
<tr>
<td>408,079</td>
<td>1,714,757</td>
</tr>
<tr>
<td>1,461,770</td>
<td>All opioid-related</td>
</tr>
<tr>
<td>47,600</td>
<td>Total deaths</td>
</tr>
<tr>
<td>17,029</td>
<td>49,544</td>
</tr>
<tr>
<td>28,400</td>
<td>Acute – overdose, injury</td>
</tr>
<tr>
<td>15,482</td>
<td>Chronic – liver, cancer</td>
</tr>
<tr>
<td>7,270</td>
<td>(15% of all opioid overdose deaths involved alcohol in 2017)</td>
</tr>
</tbody>
</table>

*Any past year heroin use or prescription opioid use other than as prescribed*

**Sources:** NSDUH, 2017 people aged 12+; Nationwide Emergency Department Sample, 2016; CDC Overdose Death Data, 2017; CDC Alcohol Related Death Inventory, 2006-2010; White et al, 2018

**Courtesy of Dr. Aaron White, NIAAA**
Alcohol Involvement in Opioid Overdose Deaths

- Opioid deaths, 1999-2017: 399,230 (per CDC WONDER database)
  - Alcohol co-involvement for all opioid overdose deaths increased nonlinearly from 12.4% in 1999 to 14.7% in 2017
  - Alcohol co-involvement persisted near 15% for all opioid overdoses since 2008

- State-level rates of binge drinking were significantly correlated with alcohol co-involvement in all opioid overdose deaths

- Alcohol use is a modifiable risk factor for opioid overdose

Citation: Tori ME, Larochelle MR, and Naimi TS. *JAMA Netw Open*. 2020 Apr 1;3(4):e202361.
Alcohol-Related Mortality: A Series of Reports

- Alcohol-related deaths, 1999-2017: **944,880** (per CDC WONDER database)
  - Alcohol-related mortality doubled from 1999 to 2017
  - Death rates were highest among men and middle-aged and older adults (ages 45-74)
  - Increase in death rate over time was greater in women than men

Age-standardized rates of alcohol-induced death among non-Latino white individuals 2000-2003

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Deaths of despair contribute to the decreasing life expectancy in the U.S. observed since 2014 (Woolf et al., 2019).

Alcohol plays a prominent role in deaths of despair, contributing to:
- ~20% of all drug overdoses (Warner et al., 2016)
- ~26% of all suicides (Ertl et al., 2019)
- ~50% of liver disease deaths (Yoon and Chen, 2018)

Since 2015, these patterns of increased mortality are now observed across many racial/ethnic groups and age groups (Woolf et al., 2018).
Impact of alcohol use on COVID pandemic

Biological effects: Alcohol effects on immune function

Chronic alcohol consumption increases the risk for Acute Respiratory Distress Syndrome (ARDS), with increased need for mechanical ventilation, prolonged intensive care unit stay, and higher incidence of mortality.
Impact of COVID pandemic on alcohol use and treatment

**Isolation:** Physical distancing can lead to social isolation or loss of social support, which can lead to stress

**Stress:** Drinking to cope with the stress of the pandemic

**Treatment and Recovery:** Physical distancing poses challenges for those with alcohol use disorder and emphasizes the need for telehealth and virtual meeting options for individuals seeking treatment or in recovery from AUD
Alcohol and Mental Health – The Elephant in the Room

Alcohol misuse correlates with poor mental health

• Often precedes diagnoses of mental health conditions
• Commonly used in an effort to cope with symptoms
• In the end it makes the prognoses worse
• Similarly, mental health conditions complicate treatment for AUD

Conceptual Framework for Neurobiological Bases Driving Substance Alcohol Use Disorder
Addictions Neuroclinical Assessment: A Framework for Improved Diagnosis, Prevention and Treatment


Adapted from Koob. Curr Top Behav Neurosci. 2011
The negative emotionality domain demonstrated concurrent associations with more frequent and heavier drinking and drinking to regulate negative affect.

Positive and Negative Reinforcement are Differentially Associated with Alcohol Consumption as a Function of Alcohol Dependence

- Researchers used longitudinal data in young adults (ages 18-30) to test whether positive and negative reinforcement associated with alcohol consumption differed as a function of alcohol dependence (AD; DSM-III)
- The association between positive reinforcement and alcohol consumption did not significantly vary as a function of AD diagnosis
- In contrast, the association between negative reinforcement and alcohol consumption increased in the presence of AD diagnosis

• FASD prevalence: as high as 1.1 – 5% among four U.S. communities (May et al., 2018)

• Current research to improve screening, diagnosis, prevention, and treatment of FASD:
  – Refining 3D facial imaging to improve diagnosis
  – Adapting a neurobehavioral screening tool (Decision Tree) for mobile use
  – Developing culturally-appropriate approaches for the prevention of alcohol-exposed pregnancies
  – Exploring maternal immune profiles as biomarkers of prenatal alcohol exposure and risk of neurodevelopmental delay
  – Testing choline supplementation to mitigate adverse effects of prenatal alcohol exposure

• NIAAA has established working groups of researchers to reach consensus and harmonize classification systems for research on FASD
Frontal Lobe Changes During Adolescence

- Planning, decision-making, impulse control, memory, language, processing social cues
- Gray matter goes down, white matter goes up, overall size stays about the same

Update: Longitudinal Brain Development Studies

National Consortium on Alcohol and Neurodevelopment in Adolescence (N-CANDA)

• Ongoing multisite longitudinal study of youth (ages 12-21) to elucidate the effects of alcohol exposure on the developing brain

• Recent results include evidence that youth who initiate heavy drinking have accelerated declines in gray matter volume and slower expansion of white matter at later time points

• N-CANDA laid the methodological foundation for the ABCD study

Adolescent Brain Cognitive Development (ABCD) Study

• Ongoing multisite study tracking the biological, cognitive, and behavioral development of youth (ages 9-10) over a 10 year period

• Enrollment is now complete! (N=11,875)

• Baseline curated data released in April 2019, available through the NIMH Data Archive

Photo credit: Dr. Richard Watts and Dr. Hugh Garavan

MRI of adolescent brains activated during a memory task in ABCD study.
Success in Reducing Binge Drinking in Underage and College-Aged Individuals

FIVE OR MORE DRINKS IN A ROW: Trends in 2-Week Prevalence

**Middle and High Schoolers**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>8th</th>
<th>10th</th>
<th>12th</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>25</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>06</td>
<td>20</td>
<td>15</td>
<td>10</td>
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<tr>
<td>07</td>
<td>15</td>
<td>10</td>
<td>5</td>
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<tr>
<td>08</td>
<td>10</td>
<td>5</td>
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</tr>
<tr>
<td>09</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- **8th grade**: 3.8%
- **10th grade**: 14.4%
- **12th grade**: 25%

**College-Aged Individuals**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Full-Time College Students</th>
<th>Noncollege Youth</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>06</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>07</td>
<td>30</td>
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<td>08</td>
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<td>09</td>
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<td>11</td>
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<tr>
<td>12</td>
<td>5</td>
<td>30</td>
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<tr>
<td>13</td>
<td>0</td>
<td>30</td>
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<tr>
<td>14</td>
<td>0</td>
<td>30</td>
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<tr>
<td>15</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>

- **Full-Time College Students**: 28%
- **Noncollege Youth**: 25%

*This is an all-time low for college students!*

Source: Monitoring the Future 2018 and 2019
Emerging Issue: But…It’s Not All Good News For Young People

High Intensity Drinking

Disappearance of Gender Gaps and Reversal of Gender Patterns

Peak Number of Drinks (past 2 weeks)

Recent Alcohol Use (past 30 days)

 Been Intoxicated (past 30 days)

Source: Monitoring the Future 2018 and 2019
Emerging Issue: Alcohol and Women’s Health

- Gaps between women and men are narrowing for prevalence, early onset drinking, frequency and intensity of drinking, having AUD, drunk driving, and self-reported consequences (Grucza et al., 2018; Slade et al., 2016; White et al., 2015)

- Women more likely to experience blackouts, liver inflammation, brain atrophy, cognitive deficits, certain cancers, negative affect during withdrawal and stress, and anxiety-induced relapse (Becker and Koob, 2016)

- Only 26% of 230 structural neuroimaging studies on substance use over 23 years evaluated sex differences (Lind et al., 2017)

- More research is needed to better understand sex differences in alcohol use and consequences
Emerging Issue: Rising Alcohol Use Among Older Adults (Aged 65+)

From 2002-2018, past-month alcohol use increased for men and women aged 65 and older, with a greater increase observed in women.

• 1 in 10 older adults in the U.S. engage in binge drinking (Han et al., 2019)
• Alcohol misuse among this population contributes to:
  – Accelerated aging in some brain regions, including the frontal cortex (Sullivan et al., 2018)
  – Pronounced reductions in brain volume in multiple cortical regions (Sullivan et al., 2018)
  – Impaired cognitive function, learning, memory, and motor function (Woods et al., 2016)

• In collaboration with the National Institute on Aging, NIAAA supports research investigating mechanisms by which alcohol affects brain aging processes to produce dementias and influences development of Alzheimer's disease

Source: NSDUH, 2018
Priority: Integrating Treatment of Alcohol Use Disorder and Alcohol-Associated Liver Disease

- Nearly half of liver disease deaths are related to alcohol misuse
- ALD is the most common alcohol-related cause of death and the leading cause of liver transplantation
- ALD-related deaths have increased by 40.6% since 1999 (Woolf et al., 2019)
- Greatest increase in deaths driven by alcoholic cirrhosis seen in young adults ages 25-34 (Tapper and Parikh, 2018)

**Average yearly increase in mortality due to liver disease, 2009-2016**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34</td>
<td>16</td>
</tr>
<tr>
<td>35-44</td>
<td>8</td>
</tr>
<tr>
<td>45-54</td>
<td>5</td>
</tr>
<tr>
<td>55-64</td>
<td>7</td>
</tr>
<tr>
<td>65-74</td>
<td>5</td>
</tr>
<tr>
<td>75-84</td>
<td>4</td>
</tr>
<tr>
<td>≥85</td>
<td>3</td>
</tr>
</tbody>
</table>

Paradigm shift: “Whole person” treatment approach

- **Integrated treatment** of ALD and AUD may improve patient outcomes
- A recent study of patients recovering from alcoholic hepatitis found that participation in alcohol rehabilitation shortly after hospital discharge was associated with improved outcomes, including reduced hospital readmission rates, alcohol relapse, and mortality (Peeraphatdit et al., 2019)

*From: Tapper and Parikh BMJ 2018;362:k2817*
Priority: Resources for Clinicians

Updates to Alcohol Treatment Navigator

New portal to help healthcare professionals build or expand their referral lists to include providers offering science-backed AUD treatments, including telehealth options, that meet the varied needs of their patients. [https://alcoholtreatment.niaaa.nih.gov/healthcare-professionals](https://alcoholtreatment.niaaa.nih.gov/healthcare-professionals)

In Development: Clinician’s Core Resource

Modules include:

- Presentation in primary care
- Role in common co-occurring conditions
- Neuroscience
- Diagnostic criteria, recommended drinking limits
- Evidence-based therapies/medications
- Addressing stigma
- Interactions with commonly used medications
U.S. Dietary Guidelines for Alcohol Consumption

• For adults 21 and older:
  – No more than 2 drinks per day for men
  – No more than 1 drink per day for women

• For individuals under age 21:
  – No alcohol*

• Others should avoid alcohol completely, including those who:
  – Plan to drive or operate machinery, or participate in activities that require skill, coordination, and alertness
  – Have certain medical conditions or take certain medications
  – Are recovering from alcohol use disorder or are unable to control the amount that they drink
  – Are pregnant or trying to become pregnant

*The National Minimum Legal Drinking Age Act requires that States prohibit persons under 21 years of age from purchasing or publicly possessing alcoholic beverages as a condition of receiving State highway funds.
Are we experiencing a cultural shift in attitudes about alcohol use?

- Observance of sober months (Dry January, Sober October, etc) is gaining popularity

- Sober Curious movement is also receiving a lot of attention: Practicing mindfulness versus going along with the dominant drinking culture

- These trends, largely driven by millennials, encourage a focus on wellness
Supporting the Next Generation of Alcohol Researchers: Increases in NIAAA Training and Career Development Awards

![Graph showing the total number of positions or awards from 2014 to 2019.]

- **Training positions (F and T):**
  - 2014: 269
  - 2015: 274
  - 2016: 289
  - 2017: 283
  - 2018: 305
  - 2019: 325

- **Career development awards:**
  - 2014: 93
  - 2015: 88
  - 2016: 95
  - 2017: 107
  - 2018: 120
  - 2019: 124

The graph illustrates the increase in training positions and career development awards from 2014 to 2019.
NIAAA

Your source for credible, evidence-based information about alcohol and health.

www.niaaa.nih.gov

Special thanks to Rachel Anderson