Food insecurity and substance use in the Women’s Interagency HIV Study

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Background and aims
Substance use in the US

- Nearly **25 million people** using **illicit substances** other than marijuana in 2015
  - **6.5 million** using **stimulants** (crack, cocaine, methamphetamine)
  - **1 million** using **heroin**
  - **36 million** using **marijuana**
  - **12.5 million** abusing **prescription narcotics**
“War on Drugs”
Food insecurity

• “The limited or uncertain availability of nutritionally adequate, safe foods, or the inability to acquire personally acceptable foods in socially acceptable ways”

• Inadequate quantity of food

• Poor quality diet

• Feelings of stress or anxiety around access to food

• Personally or socially unacceptable food procurement strategies
Food insecurity in the US

- Affects over 40 million people
- Measured via the USDA Household Food Security Survey Module (HFSSM)
- Women disproportionately affected
Food insecurity and health

- Food insecurity
  - Nutrition
  - Mental health
  - Behaviour

- Poor HIV clinical outcomes
  - Higher viral transmission

- Morbidity and mortality
Substance abuse, violence, and HIV/AIDS (SAVA) syndemic
Aims and hypotheses

- We aimed to investigate the relationship between food insecurity and substance use in a cohort of women with or at risk for HIV using longitudinal data.

- Hypotheses:
  - (1) Food insecurity associated with substance use over time
  - (2) Dose-response relationship
  - (3) Strongest associations with stimulant and opioid use
  - (4) HIV as effect modifier
Methods
Study design and population

- **2,553 women** in the Women’s Interagency HIV Study (WIHS)
  - **Prospective cohort study** of women living with HIV and demographically similar HIV-negative women
  - Running since 1993

- **Food Insecurity Sub-Study** started in 2013
  - Semi-annual data on food security, nutrition, and other key socio-economic variables
  - Data collection 2013-2016 (visits 38-43) from **nine sites**
Primary predictor

- **Food security (FS)**, measured with HFSSM:
  - **High FS** since last visit
  - **Marginal FS** since last visit
  - **Low FS** since last visit
  - **Very Low FS** since last visit
Outcomes

- **Any illicit substance use** (not including marijuana or hashish) since last visit
- **Cannabis use** (marijuana or hashish)
- **Stimulant use** (crack, cocaine, speedball, methamphetamine)
- **Opioid use** (heroin, speedball, methadone in a non-prescribed way)
- **Prescription drug abuse** (narcotics, amphetamines, or tranquilizers in a non-prescribed way)
Statistical analysis (1)

- Multivariable logistic regression with random effects to examine longitudinal associations between FS and outcomes

- Adjusted for age, race/ethnicity, annual income, education, child dependents, housing, HIV status, baseline physical health, health insurance

- Examined associations of both current FS and previous FS with outcomes in same model
Statistical analysis (2)

- Calculated associations of **persistent food insecurity**
- Additional model including interaction term between FS and HIV status
- Additional sensitivity analyses adding prescription amphetamine and narcotic abuse to stimulant and opioid abuse, respectively
Results
Descriptive statistics

<table>
<thead>
<tr>
<th>Table 1: Sociodemographic characteristics of sample at first visit in FIS sub-study (n=2,553)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
</tr>
<tr>
<td><strong>Food Security</strong></td>
</tr>
<tr>
<td>High FS</td>
</tr>
<tr>
<td>Marginal FS</td>
</tr>
<tr>
<td>Low FS</td>
</tr>
<tr>
<td>Very low FS</td>
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<tr>
<td>HIV positive</td>
</tr>
<tr>
<td><strong>Age at Visit (median, IQR)</strong></td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Hispanic</td>
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<tr>
<td>African American/Black</td>
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<tr>
<td>Other</td>
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<tr>
<td><strong>Income</strong></td>
</tr>
<tr>
<td>&lt;$12,000</td>
</tr>
<tr>
<td>$12,001-24,000</td>
</tr>
<tr>
<td>≥$24,001</td>
</tr>
<tr>
<td>&lt;High School Education</td>
</tr>
<tr>
<td>Homeless/shelter</td>
</tr>
<tr>
<td>Child Dependents</td>
</tr>
<tr>
<td><strong>Baseline physical health score (median, IQR)</strong></td>
</tr>
<tr>
<td><strong>Insured</strong></td>
</tr>
<tr>
<td><strong>Drug use</strong></td>
</tr>
<tr>
<td>Any illicit substance use (not including cannabis)&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Cannabis use&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Stimulant use&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Opiate use&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>Prescription drug abuse&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Person-Visits</strong></td>
</tr>
<tr>
<td><strong>Unique WIHS women</strong></td>
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</tbody>
</table>
# Adjusted concurrent associations

<table>
<thead>
<tr>
<th></th>
<th>Any illicit substance use</th>
<th>Cannabis use</th>
<th>Stimulant use</th>
<th>Opioid use</th>
<th>Prescription drug abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current FS</strong></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(High ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginal FS</td>
<td>1.5</td>
<td>(0.94 - 2.3)</td>
<td>1.6*</td>
<td>1.4</td>
<td>1.5</td>
</tr>
<tr>
<td>Low FS</td>
<td>1.6*</td>
<td>(1.0 - 2.5)</td>
<td>1.7**</td>
<td>1.7*</td>
<td>2.7*</td>
</tr>
<tr>
<td>Very Low FS</td>
<td>2.5***</td>
<td>(1.5 - 4.0)</td>
<td>2.0**</td>
<td>3.3***</td>
<td>5.3***</td>
</tr>
<tr>
<td>HIV status</td>
<td>0.31***</td>
<td>(0.19 - 0.50)</td>
<td>0.27***</td>
<td>0.40***</td>
<td>0.55</td>
</tr>
<tr>
<td>(neg. ref.)</td>
<td></td>
<td></td>
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</tbody>
</table>

AOR (95% CI)

* p<0.05
** p<0.01
*** p<0.001

Models adjusted for age, race/ethnicity, annual income, education, child dependents, housing, HIV status, baseline physical health, health insurance
## Adjusted lagged associations

<table>
<thead>
<tr>
<th></th>
<th>Any illicit substance use</th>
<th>Cannabis use</th>
<th>Stimulant use</th>
<th>Opioid use</th>
<th>Prescription drug abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Previous FS (High ref.)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Marginal FS</strong></td>
<td>1.7*</td>
<td>(1.1 - 2.5)</td>
<td>0.80</td>
<td>1.4</td>
<td>(0.88 - 2.2)</td>
</tr>
<tr>
<td><strong>Low FS</strong></td>
<td>1.8*</td>
<td>(1.1 - 2.7)</td>
<td>1.5*</td>
<td>1.7*</td>
<td>(1.1 - 2.7)</td>
</tr>
<tr>
<td><strong>Very Low FS</strong></td>
<td>2.3***</td>
<td>(1.4 - 3.6)</td>
<td>1.4</td>
<td>1.8*</td>
<td>(1.1 - 3.0)</td>
</tr>
</tbody>
</table>

*A* *p*<0.05  
**p*<0.01  
*** *p*<0.001

Models adjusted for age, race/ethnicity, annual income, education, child dependents, housing, HIV status, baseline physical health, health insurance
# Additional models

<table>
<thead>
<tr>
<th>Current + previous FS (High ref.)</th>
<th>Any illicit substance use</th>
<th>Cannabis use</th>
<th>Stimulant use</th>
<th>Opioid use</th>
<th>Prescription drug abuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal FS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.4** (1.3, 4.5)</td>
<td>1.3</td>
<td>2.0* (1.0, 3.9)</td>
<td>2.1</td>
<td>(0.60, 7.7)</td>
</tr>
<tr>
<td>Low FS</td>
<td>2.8** (1.5, 5.1)</td>
<td>2.5** (1.4, 4.3)</td>
<td>2.8** (1.5, 5.3)</td>
<td>4.0* (1.2, 13)</td>
<td>2.4</td>
</tr>
<tr>
<td>Very Low FS</td>
<td>5.6*** (3.1, 10)</td>
<td>2.8** (1.5, 5.2)</td>
<td>6.0*** (3.2, 11)</td>
<td>10*** (3.0, 34)</td>
<td>2.1</td>
</tr>
</tbody>
</table>

AOR (95% CI)

* p<0.05  
** p<0.01  
*** p<0.001

- **HIV status not an effect modifier**
- **Adding prescription amphetamine abuse had no effect on association with stimulants**
- **Adding prescription narcotic abuse attenuated association with opioids**
Conclusions
Novel findings

- Food insecurity longitudinally associated with substance use in this cohort of women
  - Clear dose-response relationship
  - Associated with illicit substance use overall, plus cannabis, stimulant, and opioid use individually
  - Temporality consistent with food insecurity driving substance use
- HIV seropositivity associated with lower odds of substance use
Directionality & mechanisms?
Limitations

- We did not measure frequency of substance use, therefore unable to differentiate between habitual and occasional use.

- Unclear if findings apply to younger women or those living in more rural settings.

- We did not differentiate between legal recreational/medical and illicit cannabis use, and did not account for legislative changes.
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