Spatial dynamics of alcohol misuse among emerging adults: Alcohol Outlet and Crime Density

Manya Newton, MD
Department of Emergency Medicine
University of Michigan Injury Center
Hurley Medical Center
Study Team

- Manya Newton, MD
- Jason Goldstick, PhD
- Rob Lipton, PhD
- Sarah Stoddard, PhD
- Maureen Walton, M.P.H.
- Marc Zimmerman, Ph.D.
- Rebecca Cunningham, MD

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Emerging Adulthood

- Emerging adulthood is the developmental period between adolescence and adulthood.
  - Inner city youth may start this process as early as 12

- Dramatic increase in risky activities during this stage
When is an individual not individual?

- Individual risk factors for alcohol misuse in this age group are well known
  - Age, gender, race, SES, school performance, many others

- Individuals do not exist in a vacuum.

- Individual factors are not enough to fully explain individual behaviors
Place-based Effects

• Spatial features within a neighborhood which alter the behavior of individuals

• SES, broken window index

• Built environment features
  – Walkability
  – Green spaces
  – Alcohol outlets
Place-based Effects and EAs

- Uniquely vulnerable to neighborhood effects of home address.
  - NSES and disorganized spaces with low social control and high community disconnectedness.
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    Unhappiness with living situation, family conflict
  - Living in socially disorganized spaces

- Exacerbated by inability to alter dwelling space
Overarching Aim

- Evaluate three relative risk levels for alcohol misuse in inner city EAs
  - Individual
  - Neighborhood SES
  - Place based

- Apply analytical methods that allow us to control for spatial autocorrelation.
  - Degree of dependency among observations in space
Objectives

1. Determine if dwelling in geospatial proximity to alcohol outlets is correlated with increased alcohol consumption in EA
   - May vary with respect to outlet type
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   – May vary with respect to outlet type,

2. Determine if dwelling in neighborhoods with poor social control correlates with increased alcohol consumption in EAs
   – May differ based on type of crime
Methods

- **Flint Youth Injury Survey**
- **2 Year Longitudinal Study Of Assault Injured Youth**
  - Ongoing study of drug and alcohol using youth in Flint, MI
  - Individuals 14-24 screened in Hurley ED after presentation for medical or violence related care
Methods

- Self-administered computerized screening survey

  - Demographics
    - age, gender, race, educational status, lives with parents, receives public assistance

- Alcohol use (AUDIT - C)

- Home addresses were geocoded
Methods

- Community level variables from 2010 census at block group level
  - % African-American
  - % of vacant houses
  - % Female-headed households
  - % Under 18
Methods

- Alcohol outlet data from Michigan Liquor Control Commission
  - Alcohol license types and addresses for all alcohol outlets in Genesee County
Methods

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  – Alcohol license types and addresses for all alcohol outlets in Genesee County

• Addresses were geocoded and converted to latitude/longitude coordinates
  – Outlet density calculated by number of outlets within ¼ and ½ mile of each home address
  – Outlets allowing consumption on-premises and those which do not were separated
2010 Crime data were acquired from Flint Police Department
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- Geolocated nearest street corner of each crime incident to lat/long coordinates
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- Geolocated nearest street corner of each crime incident to lat/long coordinates
- Crime categorized into drug, property, or violent based on NIBRS
- Density conversion performed for each type of crime
  - ½ and ¼ mile from home address
Model Math

- Modeled individual’s AM by the corresponding individual-level predictor vector and spatial location including corresponding spatially indexed predictors

- Produces uncorrelated residuals
Modeling

- We built the model in four stages:
  - **M1**: A constant model containing only the spatial trend term
  - **M2**: Add all individual-level features to **M1**
  - **M3**: Add all community-level demographic features to **M2**
  - **M4**: Add place-based features sequentially to **M3**
## Bivariate Comparison

<table>
<thead>
<tr>
<th></th>
<th>Alcohol misuse N=106 (12.07%)</th>
<th>No Alcohol Misuse N=772 (87.92%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age : Mean (SD)</strong></td>
<td>20.7 (0.2)</td>
<td>19.6 (0.1)**</td>
</tr>
<tr>
<td><strong>Male: Percent (SE)</strong></td>
<td>59.4% (4.8)</td>
<td>47.9% (1.8)*</td>
</tr>
<tr>
<td><strong>African American Percent (SE)</strong></td>
<td>56.6% (4.8)</td>
<td>73.7% (1.6)**</td>
</tr>
<tr>
<td><strong>Live with Parents: Percent (SE)</strong></td>
<td>33.0% (4.6)</td>
<td>52.6% (1.8)**</td>
</tr>
</tbody>
</table>
### M2 + M3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 2: Including individual variables</th>
<th>Model 3: Including individual and community demographic variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.10(0.05)</td>
<td>0.09(0.05)</td>
</tr>
<tr>
<td>Male</td>
<td>0.55(0.23)</td>
<td>0.59(0.23)</td>
</tr>
<tr>
<td>Live with parents</td>
<td>-0.61(0.25)</td>
<td>-0.62(0.26)</td>
</tr>
<tr>
<td>African American</td>
<td>-0.65(0.23)</td>
<td>-0.35(0.26)</td>
</tr>
<tr>
<td>High school dropout</td>
<td>0.48(0.22)</td>
<td>0.45(0.23)</td>
</tr>
<tr>
<td>Government Aid</td>
<td>0.11(0.26)</td>
<td>0.08(0.26)</td>
</tr>
<tr>
<td>% African American</td>
<td>-</td>
<td>-1.87(0.67)</td>
</tr>
<tr>
<td>% Vacant housing</td>
<td>-</td>
<td>-1.72(1.26)</td>
</tr>
<tr>
<td>% Female head of household</td>
<td>-</td>
<td>1.87(2.73)</td>
</tr>
<tr>
<td>% Population Under 18</td>
<td>-</td>
<td>0.50(4.04)</td>
</tr>
</tbody>
</table>
## Summary $M2 + M3$

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 2 (with individual variables)</th>
<th>Model 3 (with individual &amp; community variables)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degrees of freedom</td>
<td>2.56</td>
<td>4.00</td>
</tr>
<tr>
<td>Chi-sq</td>
<td>27.75</td>
<td>11.68</td>
</tr>
<tr>
<td>p-value*</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
## Final Model Summary

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\chi^2$</th>
<th>Degrees of freedom</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquor stores $\frac{1}{4}$mi</td>
<td>1.18</td>
<td>1</td>
<td>0.28</td>
</tr>
<tr>
<td>Liquor stores $\frac{1}{2}$mi</td>
<td>1.36</td>
<td>1</td>
<td>0.24</td>
</tr>
<tr>
<td>Bars – $\frac{1}{4}$ mi</td>
<td>5.78</td>
<td>1</td>
<td>0.01**</td>
</tr>
<tr>
<td>Bars – $\frac{1}{2}$ mi</td>
<td>4.10</td>
<td>1</td>
<td>0.04*</td>
</tr>
<tr>
<td>Drug $\frac{1}{4}$ mi</td>
<td>0.20</td>
<td>1</td>
<td>0.65</td>
</tr>
<tr>
<td>Drug $\frac{1}{2}$ mi</td>
<td>7.75</td>
<td>2.72</td>
<td>0.04*</td>
</tr>
<tr>
<td>Violent $\frac{1}{4}$ mi</td>
<td>0.01</td>
<td>1</td>
<td>0.93</td>
</tr>
<tr>
<td>Violent $\frac{1}{2}$ mi</td>
<td>0.18</td>
<td>1</td>
<td>0.67</td>
</tr>
<tr>
<td>Property $\frac{1}{4}$ mi</td>
<td>0.62</td>
<td>1</td>
<td>0.43</td>
</tr>
<tr>
<td>Property $\frac{1}{2}$ mi</td>
<td>1.99</td>
<td>1</td>
<td>0.16</td>
</tr>
</tbody>
</table>
Conclusion

- Hazardous alcohol consumption among inner city EAs is related to drug crime and bar density near their home address
  - Drug crimes not related linearly
- These place based features were associated with alcohol misuse after including individual and community level measures and taking into account autocorrelation.
Limitations

• Single site
  – Preponderantly African American, few Hispanic or Asian
  – Inner city

• Coarse granularity of alcohol outlet types
  – On vs. off premises

• Unable to get <18 without parental consent

• Measured home, not activity space
THANK YOU