Intergenerational effects of residential schooling on obesity risk among Indigenous Canadians:
Exploratory analysis

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Outline

- Background
- Obesity rates
- Residential schooling and obesity
- Research questions
- Methods
- Results
- Conclusions
Adult obesity rates

Obesity Rates: Adults 18 Year and Older

<table>
<thead>
<tr>
<th>Group</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-reserve Aboriginal adults</td>
<td>25.7</td>
</tr>
<tr>
<td>Aboriginal adults off-reserve</td>
<td>26.0</td>
</tr>
<tr>
<td>First Nations off-reserve</td>
<td>26.1</td>
</tr>
<tr>
<td>Métis (2006 APS)</td>
<td>26.4</td>
</tr>
<tr>
<td>Inuit (2006 APS)</td>
<td>23.9</td>
</tr>
<tr>
<td>First Nations on reserve</td>
<td>36.0</td>
</tr>
<tr>
<td>Canada (2007/08 CCHS)</td>
<td>17.4</td>
</tr>
</tbody>
</table>

Source: PHAC, 2011.
Factors affecting adult obesity

- Socio-economic status (social determinants)
  - Income
  - Food security
  - Transportation
  - Education

- Psychological factors
  - Stress processes
  - Food as coping
  - Impulse control

- Cultural preferences including loss of traditional foodways

- Community and built environment
  - Walkability, access to recreation facilities
  - Cost of fresh food

- Diet

- Physical activity

- Knowledge and beliefs, physical literacy, food knowledge
Residential schooling and obesity

• *Historical trauma paradigm* (Brave Heart, 2003)
  • Focuses on *collectively experienced* trauma, unlike PTSD (Gone, 2013)

• Effects could include
  • Anxiety, guilt
  • Lack of effective coping strategies
  • Susceptibility to further trauma

• Effects can be transmitted intergenerationally
  • Stories, parenting practices, community characteristics
Residential schooling and obesity

- Residential schooling as historical trauma
- May have direct and indirect effects on obesity
- May act through psychological pathways, social determinants, parenting practices (Bombay, 2015)

Research questions

• Is adult obesity related to individual and family residential school attendance?

• How are these effects patterned intergenerationally?
  • Can intergenerational effects be observed in the data?
Methods: Data and sample

- **Data: 2012 Aboriginal Peoples Survey**
  - Nationally representative survey conducted by Statistics Canada
  - Those who indicated Aboriginal identity in the 2011 National Household Survey
  - Non-reserve communities only – 75% of 2012 population with Indigenous identity or ancestry

- **Sample: Respondents age 25 and over**
  - Intergenerational vs. overall effect
Methods: Measurement

- **Outcome variable**
  - Obesity (binary; BMI > 30 kg/m²)

- **Independent variables**
  - Respondent attended residential school (binary)
  - Parent attended residential school (binary)
  - Grandparent attended residential school (binary)

- **Control variable**
  - Respondent’s age (population centered)
Methods: Analysis

- Patterns of residential school attendance
  - Descriptive statistics
  - Cross-tabulations

- Effect of residential schooling on obesity
  - Logistic regression analysis
  - Unadjusted models – single predictor
  - Adjusted models – multivariate analysis
Methods: Statistical adjustment

• Role of age: age vs. cohort effects
• Sampling weights: Multi-stage sampling design and survey non-response
• Missing data
• RDC reporting requirements
  • To the nearest multiple of 10
  • Effects on small frequency counts
Results: Attendance

Residential School Attendance

<table>
<thead>
<tr>
<th></th>
<th>Respondent</th>
<th>Parent</th>
<th>Grandparent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage (%)</td>
<td>8.89%</td>
<td>23.89%</td>
<td>28.25%</td>
</tr>
</tbody>
</table>
Results: Intergenerational pattern

Intergenerational Pattern
Respondents vs. Parents and Grandparents

<table>
<thead>
<tr>
<th></th>
<th>Parent</th>
<th>Grandparent</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>61.02%</td>
<td>44.27%</td>
<td>39.15%</td>
</tr>
<tr>
<td>No</td>
<td>19.16%</td>
<td>26.42%</td>
<td>10.95%</td>
</tr>
</tbody>
</table>
Results: Intergenerational pattern

Intergenerational Pattern
Parents vs. Grandparents

<table>
<thead>
<tr>
<th>Grandparent</th>
<th>Percentage (%) Attended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>58.72%</td>
</tr>
<tr>
<td>No</td>
<td>18.88%</td>
</tr>
</tbody>
</table>
### Results: Effects on obesity

<table>
<thead>
<tr>
<th></th>
<th>Respondent</th>
<th>Parent</th>
<th>Grandparent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unadjusted</strong></td>
<td>1.17</td>
<td>1.25</td>
<td>1.21</td>
</tr>
<tr>
<td><strong>Adjusted</strong></td>
<td>1.02</td>
<td>1.23</td>
<td>1.19</td>
</tr>
</tbody>
</table>

**Logistic Regression**

**Unadjusted vs. Adjusted Models**
Missing Data: Scale of the problem

- Obesity – 8.22%
- Attendance by respondents – 2.57%
- Attendance by parents – 7.19%
- Attendance by grandparents – 25.24%
- Listwise deletion: From 13,630 to 9,440 (30.74%)
Missing Data: Solutions

• Assumptions on missing data
• Listwise/pairwise deletion
• Maximum likelihood
  • Exogenous variables with missing values
• Multiple imputations
  • Role of auxiliary variables – diabetes, residential school attendance by other family members
  • Effect of rounding – 14 vs. 15 or 10 vs. 20
## Results: Adjusted models

### Missing Data: Obesity

<table>
<thead>
<tr>
<th></th>
<th>Percentage (%) Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listwise</td>
<td>31,18%</td>
</tr>
<tr>
<td>Average</td>
<td>30,98%</td>
</tr>
<tr>
<td>Imputation #1</td>
<td>30,98%</td>
</tr>
<tr>
<td>Imputation #2</td>
<td>30,96%</td>
</tr>
<tr>
<td>Imputation #3</td>
<td>31,18%</td>
</tr>
<tr>
<td>Imputation #4</td>
<td>31,18%</td>
</tr>
<tr>
<td>Imputation #5</td>
<td>30,96%</td>
</tr>
</tbody>
</table>
**Missing Data: Attendance**

### Missing Data: Attendance by Grandparents

<table>
<thead>
<tr>
<th></th>
<th>Percentage (%) Attended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listwise</td>
<td>28.46%</td>
</tr>
<tr>
<td>Average</td>
<td>28.25%</td>
</tr>
<tr>
<td>Imputation #1</td>
<td>30.23%</td>
</tr>
<tr>
<td>Imputation #2</td>
<td>28.10%</td>
</tr>
<tr>
<td>Imputation #3</td>
<td>27.95%</td>
</tr>
<tr>
<td>Imputation #4</td>
<td>27.07%</td>
</tr>
<tr>
<td>Imputation #5</td>
<td>27.90%</td>
</tr>
</tbody>
</table>
**Discussion**

- **Substantive findings**
  - Evidence of effect of residential schooling on obesity
  - Evidence of intergenerational effect

- **Methodological issues**
  - Confounding of age and cohort effects
  - Consequences of imputation

- **Future research**
  - Understanding causal mechanisms
  - Subgroup analysis