Monitoring and Contextualizing Population-Level Early Child Development in Canada, With a BC Focus
Outline of Today’s Presentation

1. Brief introduction to our measure of early developmental health, the Early Development Instrument (EDI)
2. History of the development of the pan-Canadian SES Index
3. Composition and characteristics of the pan-Canadian SES Index
4. How the pan-Canadian SES Index has been used in the literature
5. Deep dive into one “off-diagonal” community in BC
6. Questions
The EDI information collected for five-year-old children in Canada since 2004

12 of 13

Canadian provinces and territories

EDI has been implemented in

27%

Of children vulnerable

The number of children vulnerable in at least one developmental domain

34%

Males vulnerable

The number of children vulnerable in at least one developmental domain by gender

20%

Females vulnerable
Important first summary of regional variations in early childhood development at Kindergarten
• In absolute terms, and
• In the context of social determinants of health

• Based on first provincial “wave” of EDI results and 2001 Census variables, both aggregated to HELP NHs
• 19 variables were important predictors across domains, including variables specific to gender (employment, occupation) and/or to young families (employment)
• Demonstrated the importance of considering intersectionality
History of the Development of a Pan-Canadian SES Index (2)

Phase 2 (starting after 2006 Census variables were available)

• Added neighbourhood-level Taxfiler variables to the mix of potentially important SES/demographic factors

• Used these variables to expand scope for intersectionality (e.g., economic markers for families with/without young children, or lone/couple families, gender division of earnings, income inequality, child-related benefits/expenses)

• For each Census time period and neighbourhood, calculated one composite SES Index score that combines the important predictors from all EDI domains

• Used the SES Index scores to calculate each neighbourhood’s predicted overall vulnerability rate
  • By comparing the actual vulnerability rate with the Index-derived predicted vulnerability rate, can identify neighbourhoods that are consistently “off-diagonal”
History of the Development of a Pan-Canadian SES Index (3)

Phase 3 (starting in 2011)

• Presented results of our BC EDI-SES analyses to the pan-Canadian EDI research network (McMaster, Manitoba, Saskatchewan)

• Successfully applied (second attempt) to CIHR to conduct a five-year pan-Canadian research study on the social determinants of early childhood development

• Study acronym is CanNECD = Canadian Neighbourhoods and Early Child Development
What is the CanNECD SES Index?

• Neighbourhood-level composite of 10 SES/demographic variables
• Created from 2006 Census and 2005 Income Tax (Taxfiler) data
• Aggregated to 2,058 custom neighbourhoods covering all of Canada
• Updated every five years
• Currently three time points (almost four)

Methodology to Create the CanNECD SES Index

**DATA REDUCTION**
- 18 topics
- 262 variables
  - Exploratory Factor Analysis
- 47 factors
- 262 variables
  - Variable in factor with highest correlation with any EDI domain
- 47 factors
  - 47 variables

**SELECTING VARIABLES FOR THE INDEX**
- Statistically significant ($p<0.05$) in forward or backward regressions of EDI
- 19 variables
  - Explains minimum 5% of variance (variable importance with Pratt statistic
- 15 variables
- Statistically significant ($p<0.05$) in final stepwise regression of EDI
- 10 variables
What are the 10 variables in the CanNECD SES Index?

1. **Poverty**: % below Low Income Measure (TF: lone parents, kids <6)
2. **Marital Status**: % separated or divorced (Census)
3. **High Income**: % with incomes twice the provincial median (TF: kids <6)
4. **Unionized Work**: % with union/association dues (TF: kids <6)
5. **Wealth**: % with investment income (TF: kids < 6)
6. **Residential Stability**: % non-migrant movers in the past year (Census)
7. **Social Capital**: % with charitable donations (TF: kids < 6)
8. **Education**: % without a high school diploma (Census)
9. **Language/Immigration**: % not speaking English or French at home (Census)
10. **Income Inequality**: GINI coefficient (TF: lone female families, kids < 6)
CanNECD SES Index vs. Other Canadian SES Indices

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Variance in overall vulnerability explained by Canadian SES indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Adjusted R²</strong></td>
</tr>
<tr>
<td>Index (# variables within)</td>
<td></td>
</tr>
<tr>
<td>CanNECD SES Index (10)</td>
<td>32%</td>
</tr>
<tr>
<td>Canadian Deprivation Index (6)</td>
<td>17%</td>
</tr>
<tr>
<td>Socioeconomic Factor Index (4)</td>
<td>16%</td>
</tr>
<tr>
<td>Canadian Marginalization Index (18)</td>
<td>13%</td>
</tr>
<tr>
<td>Early Childhood Mapping Project (26)</td>
<td>17%</td>
</tr>
</tbody>
</table>
EDI-SES Gradients, for Four Canadian Provinces, 2005/06
Proportionate Universality
Universal access at a scale and intensity that addresses barriers at every level

Hertzman 2007
## Trends Over Time: CanNECD SES Index

<table>
<thead>
<tr>
<th></th>
<th>Canada</th>
<th>Ontario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Score and Range</td>
<td>Mean Score and Range</td>
</tr>
<tr>
<td></td>
<td>• 2006 – 100 (50 to 153)</td>
<td>• 2006 – 103 (60 to 153)</td>
</tr>
<tr>
<td></td>
<td>• 2011 – 104 (56 to 155)</td>
<td>• 2011 – 105 (58 to 155)</td>
</tr>
<tr>
<td></td>
<td>• 2016 – 105 (63 to 155)</td>
<td>• 2016 – 105 (63 to 148)</td>
</tr>
<tr>
<td></td>
<td>Variance Accounted For</td>
<td>Variance Accounted For</td>
</tr>
<tr>
<td></td>
<td>• 2006 – 31.6%</td>
<td>• 2006 – 39.2%</td>
</tr>
<tr>
<td></td>
<td>• 2011 – 33.1%</td>
<td>• 2011 – 38.2%</td>
</tr>
<tr>
<td></td>
<td>• 2016 – 29.9%</td>
<td>• 2016 – 32.8%</td>
</tr>
</tbody>
</table>
Summary of CanNECD Index Consistency Over 3 Time Points

• The explanatory power of the Index across the different domains of child development has diminished very little
  • Possible exception: Emotional domain of the EDI

• Each of the 10 Index components have also maintained their associations with child development
  • Possible exception: Language/immigration component

• There was good consistency in terms of the Index quintiles of the 2,058 neighbourhoods over time, and the factor membership of components
CanNECD SES Index in the Peer-Reviewed Literature

   https://doi.org/10.1007/s12187-019-09666-y

   A Canadian Neighbourhood Index for Socioeconomic Status Associated with Early Child Development

   Barry Forer, et al. [full author details at the end of the article]

2. International Journal of Environmental Research and Public Health
   https://doi.org/10.3390/ijerph18073397

   Population-Level Data on Child Development at School Entry Reflecting Social Determinants of Health: A Narrative Review of Studies Using the Early Development Instrument

   Magdalena Janus 1,2,*, Caroline Reid-Westoby 1, Noam Raiter 3, Barry Forer 2 and Martin Guhn 2
Teacher-Reported Prevalence of FASD in Kindergarten in Canada: Association with Child Development and Problems at Home

Jacqueline Pei1 ♦ Caroline Reid-Westoby2 ♦ Ayesha Siddiqua3 ♦ Yomna Elshamy1 ♦ Devyn Rorem1 ♦ Teresa Bennett2 ♦ Catherine Birken4,5 ♦ Rob Coplan6 ♦ Eric Duku2 ♦ Mark A. Ferro7 ♦ Barry Forer8 ♦ Stelios Georgiades2 ♦ Jan Willem Gorter9,10 ♦ Martin Guhn8 ♦ Jonathon Maguire4,11 ♦ Heather Manson12 ♦ Rob Santos13 ♦ Marni Brownell14 ♦ Magdalena Janus2
Sex differences in the socioeconomic gradient of children’s early development

Simon Webb\textsuperscript{a,⁎}, Eric Duku\textsuperscript{a}, Marni Brownell\textsuperscript{b}, Jennifer Enns\textsuperscript{b}, Barry Forer\textsuperscript{c}, Martin Guhn\textsuperscript{c}, Anita Minh\textsuperscript{c}, Nazeem Muhajarine\textsuperscript{d}, Magdalena Janus\textsuperscript{a}

https://doi.org/10.1016/j.ssmph.2019.100512
CanNECD SES Index in the Peer-Reviewed Literature

BMJ Open  Socioeconomic gradient in the developmental health of Canadian children with disabilities at school entry: a cross-sectional study

Dena Zeraatkar, Eric Duku, Teresa Bennett, Martin Guhn, Barry Forer, Marni Brownell, Magdalena Janus

http://dx.doi.org/10.1136/bmjopen-2019-032396
Does social capital flatten the social gradient in early childhood development? An ecological study of two provinces in Canada

Anita Minh¹,², Lisa Ritland¹ · Simon Webb⁴ · Barry Forer¹ · Marni Brownell⁵ · Eric Duku⁴ · Monique Gagné¹ · Magdalena Janus¹,⁴ · Nazeem Muhajarine³ · Martin Guhn¹
Back to British Columbia: Studying Off-Diagonal Communities

• CanNECD SES Index methodology applied to BC-only data (298 neighbourhoods)
• Time 1: Wave 2 neighbourhood-level EDI scores matched to neighbourhood-level 2006 Census and 2005 Taxfiler variables
• Mean SES Index score set to 100 in Time 1
• Trend in mean SES Index score:
  • 2006: 100
  • 2011: 104
  • 2016: 107
• Variance in overall vulnerability accounted for by SES Index: 40% to 45%
SES Index Variables: British Columbia (298 NHs)

1. **Education**: % with no high school diploma
2. **Language/Immigration**: % not speaking either official language at home
3. **Lone parents**: % lone parent families
4. **Poverty**: % with low income, families with children under 6
5. **Wealth**: % with investment income, families with children under 18
6. **High Income**: % with incomes twice or higher than the provincial median, families with children under 18
7. **Poverty**: % with low income, lone parent families with children under 6
HELP SES Index 2016, by BC School District
EDI-SES Index Gradient, Wave 6 (2013-16) to Wave 8 (2020-22)

<table>
<thead>
<tr>
<th></th>
<th>Lowest</th>
<th>Second lowest</th>
<th>Middle</th>
<th>Second highest</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wave 6</strong></td>
<td>40.96</td>
<td>34.96</td>
<td>32.21</td>
<td>27.81</td>
<td>24.73</td>
</tr>
<tr>
<td><strong>Wave 7</strong></td>
<td>42.83</td>
<td>35.76</td>
<td>33.55</td>
<td>29.85</td>
<td>26.48</td>
</tr>
<tr>
<td><strong>Wave 8</strong></td>
<td>42.64</td>
<td>34.86</td>
<td>32.97</td>
<td>29.57</td>
<td>27.01</td>
</tr>
</tbody>
</table>

Overall Vulnerability Rate (%)

[Graph showing the trend of overall vulnerability rates across different waves and categories.]
<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revelstoke</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual vulnerability rate, one or more scales</td>
<td>9.3</td>
<td>10.6</td>
<td>11.1</td>
</tr>
<tr>
<td>Predicted vulnerability rate, one or more scales</td>
<td>25.3</td>
<td>28.3</td>
<td>29.2</td>
</tr>
<tr>
<td>SES Index</td>
<td>108</td>
<td>112</td>
<td>117</td>
</tr>
</tbody>
</table>
## Better Than Predicted, Overall Vulnerability

<table>
<thead>
<tr>
<th>Nisga’a</th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual vulnerability rate, one or more scales</td>
<td>32.4</td>
<td>33.9</td>
<td>23.7</td>
</tr>
<tr>
<td>Predicted vulnerability rate, one or more scales</td>
<td>44.5</td>
<td>47.1</td>
<td>47.5</td>
</tr>
<tr>
<td>SES Index</td>
<td>64</td>
<td>65</td>
<td>68</td>
</tr>
</tbody>
</table>
HELP’S Child Development Monitoring System

**Toddler Development Instrument (TDI)**
- 12 - 24 months
- Parent & caregiver questionnaire

**Childhood Experiences Questionnaire (CHEQ)**
- Start of Kindergarten
- Parent & caregiver questionnaire

**Early Development Instrument (EDI)**
- Mid-Kindergarten
- Teacher questionnaire

**Middle Years Development Instrument (MDI)**
- Grades 4 - 8
- Student questionnaire

**Youth Development Instrument (YDI)**
- Grade 11
- Student questionnaire
How would you rate the overall access to child/family resources in your community?

1=Poor  
2=Fair  
3=Good  
4=Very Good  
5=Excellent

<table>
<thead>
<tr>
<th>Community</th>
<th>Rating</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campbell River</td>
<td>4.0</td>
<td>N=279</td>
</tr>
<tr>
<td>Castlegar</td>
<td>3.4</td>
<td>N=52</td>
</tr>
<tr>
<td>Comox Valley</td>
<td>4.0</td>
<td>N=142</td>
</tr>
<tr>
<td>Powell River</td>
<td>3.6</td>
<td>N=39</td>
</tr>
<tr>
<td>Revelstoke</td>
<td>4.6</td>
<td>N=96</td>
</tr>
<tr>
<td>Richmond</td>
<td>3.8</td>
<td>N=290</td>
</tr>
<tr>
<td>Trail</td>
<td>4.0</td>
<td>N=102</td>
</tr>
</tbody>
</table>

Revelstoke Data 2019-2020
Activities the Child Participated in Age 3-5

Revelstoke Data 2020
Exploring Connectedness in Revelstoke

Adults at School

$p = .001$

$p < .001$

<table>
<thead>
<tr>
<th>Grade 4</th>
<th>Grade 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Represents % High Connectedness</td>
<td></td>
</tr>
<tr>
<td>Revelstoke</td>
<td>Elsewhere in region</td>
</tr>
<tr>
<td>78.8</td>
<td>73.3</td>
</tr>
<tr>
<td>73.4</td>
<td>61.0</td>
</tr>
</tbody>
</table>
Exploring Connectedness in Revelstoke

Adults in Neighbourhood

% High Connectedness

Grade 4
- Revelstoke: 70.9
- Elsewhere in region: 66.3

Grade 7
- Revelstoke: 64.4
- Elsewhere in region: 52.7

$p = .010$ for Grade 4
$p < .001$ for Grade 7
Exploring Connectedness in Revelstoke

Adults at Home

% High Connectedness

<table>
<thead>
<tr>
<th>Grade 4</th>
<th>Revelstoke</th>
<th>Elsewhere in region</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>88.6</td>
<td>83.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade 7</th>
<th>Revelstoke</th>
<th>Elsewhere in region</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>85.7</td>
<td>80.8</td>
</tr>
</tbody>
</table>

*p < .001

MDI Exploring Connectedness in Revelstoke
Exploring Connectedness in Revelstoke

Adults at school, Grade 4

Grade 4, not vulnerable

Grade 4, vulnerable one or more scales

Revelstoke
Elsewhere in region
Time for Questions, Hopefully

- Thank you for coming!

- If you have any further questions, please email me at barry.forer@ubc.ca