Population-level SES and child development: Using Latent Profile Analysis to identify “off-diagonal” neighbourhoods

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BACKGROUND

There is a growing body of evidence indicating a gradient between child development outcomes and socioeconomic status (SES) at the individual level. Even though the association between indicators of development and neighbourhood SES is less well studied, it also shows a similar gradient. However, there is some evidence that some communities, labelled “off-diagonal”, diverge from this trend (Tanton et al., 2017). Some “high” SES neighbourhoods have poorer than expected child outcomes, whereas some “low” SES neighbourhoods have better than expected child outcomes.

One of the primary objectives of the Canadian Neighbourhoods Early Child Development (CanNECD, Guhn et al, 2016) study was to identify and characterize such “off-diagonal” neighbourhoods. This was done using data from the Canadian Census and Taxfiler databases for custom-defined neighbourhoods across Canada that were linked to child development outcomes collected with the Early Development Instrument (EDI; Janus & Offord, 2007).

OBJECTIVES

Building on earlier approaches (Kershaw et al., 2009; Hertzman, 2011; Tanton et al., 2017), we

- investigated the existence and frequency of possible homogenous groups based on neighbourhood-level child development outcomes (EDI) and SES index.
- used the derived groups to identify and describe “off-diagonal” neighbourhoods.

METHODS

Data:

- EDI data for 2038 neighbourhoods collected between 2008 and 2013 (Webb et al., 2016)

Measures:

- Five indicators of child development (vulnerability on the EDI domains) were derived from the data (see Figure 1).
- Ten CanNECD SES indicators derived from the 2006 Census and the 2005 Taxfiler database (Forer et al., in prep; see Figure 2).

Analysis Plan:

- Use Exploratory Latent Profile Analysis (LPA) in a structural equation model framework with Mplus software (Muthén & Muthén, 1998-2015) to
  - Identify possible homogeneous groups of neighbourhoods, separately using the SES indicators and then using the child development (EDI vulnerability) indicators.
  - Selection Criteria: (a) parsimony, (b) the Lo-Mendell-Rubin Test and (c) other criteria (e.g. average posterior probability) and fit indices to determine the final number of groups.
- Examine characteristics of identified groups of neighbourhood using available data and use contingency tables analysis to identify the “off-diagonal” group(s) of neighbourhoods.

FINDINGS

- We derived three child development outcome groups based on level of vulnerability: Low (A, 57.2%), Medium (B, 35.6%), and High (C, 7.3%) shown in Figure 1. We also derived four meaningful SES groups: Low (1, 31.6%), Low-moderate (2, 12.7%), High-moderate (3, 38.4%) and High (4, 17.4%) shown in Figure 2.
- There is a linear relation between child development groups and level of overall vulnerability (R²=0.68) as well as between SES group and overall SES using the CanNECD index (R²=0.683).
- Using EDI data, the neighbourhoods in the Low-moderate SES group had the highest mean proportion of children (31.8%) classified as English/French as a Second Language compared to the other 3 groups (7.7-11.9%).
- There is a gradient in EDI vulnerability across SES groups. There is more variability in EDI vulnerability in the Low SES group than in the High SES group.
- Examination of the characteristics of the identified groups, showed “off-diagonal” neighbourhoods exist in almost all provinces with the exception of NT.

CONCLUSIONS

The goal of this study was to use a methodologically sound approach to help identify and characterize possible “off-diagonal” neighbourhoods.

The identification of “off-diagonal” neighbourhoods contributes to our understanding of modifiable and moderating factors influencing child development at the neighbourhood level.

Our next steps will include detailed analyses of demographic and geographic differences between the identified “off-diagonal” and on-diagonal neighbourhoods.

Table 1. Distribution of neighbourhoods by CanNECD SES group and by Child Development group

<table>
<thead>
<tr>
<th>Child Development Group</th>
<th>CanNECD SES Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>209</td>
</tr>
<tr>
<td>Medium</td>
<td>326</td>
</tr>
<tr>
<td>High</td>
<td>108</td>
</tr>
</tbody>
</table>

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REFERENCES


