

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)

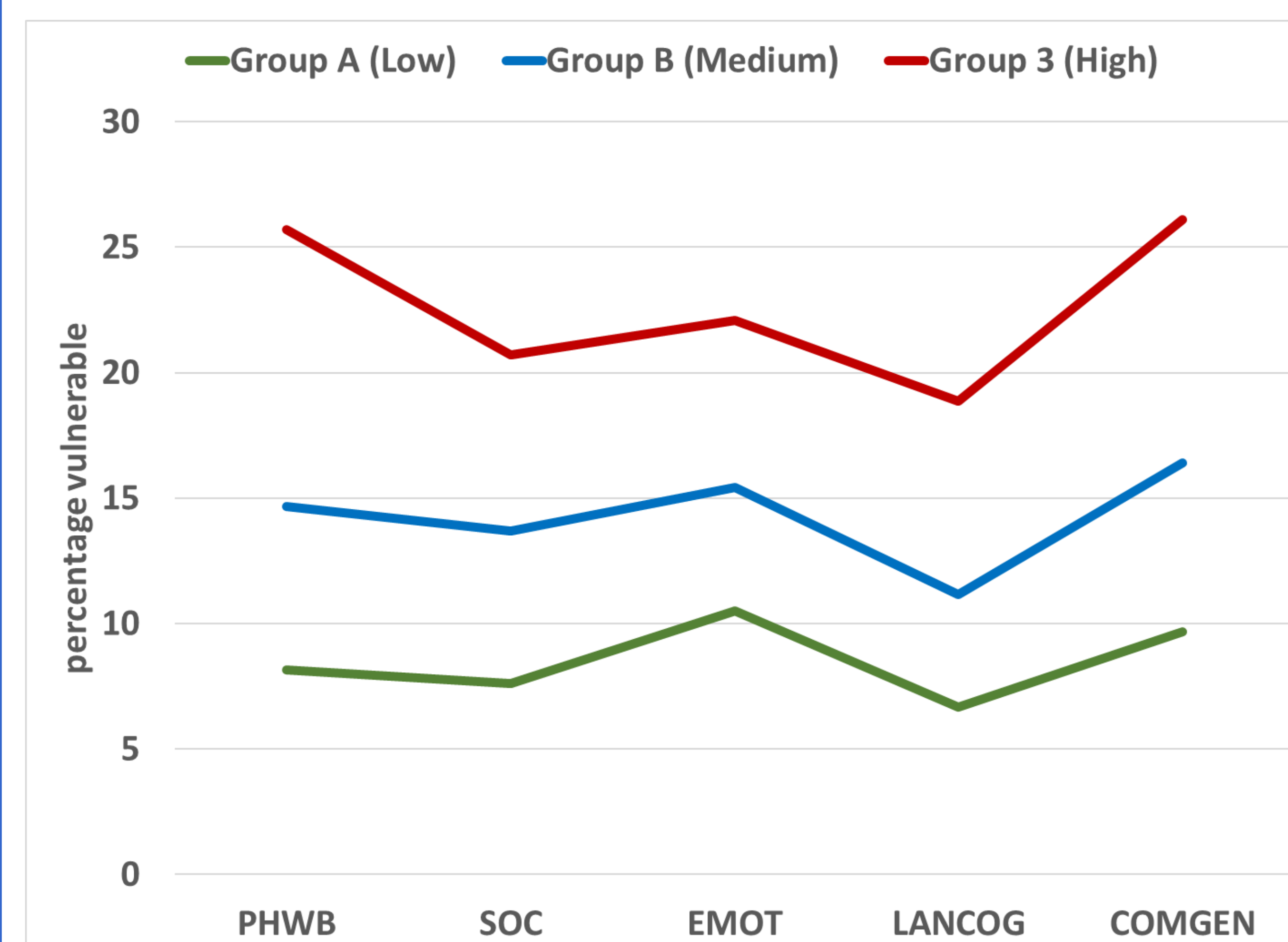
Measures:

- Five indicators of child development (vulnerability on the EDI domains) were derived from these 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:

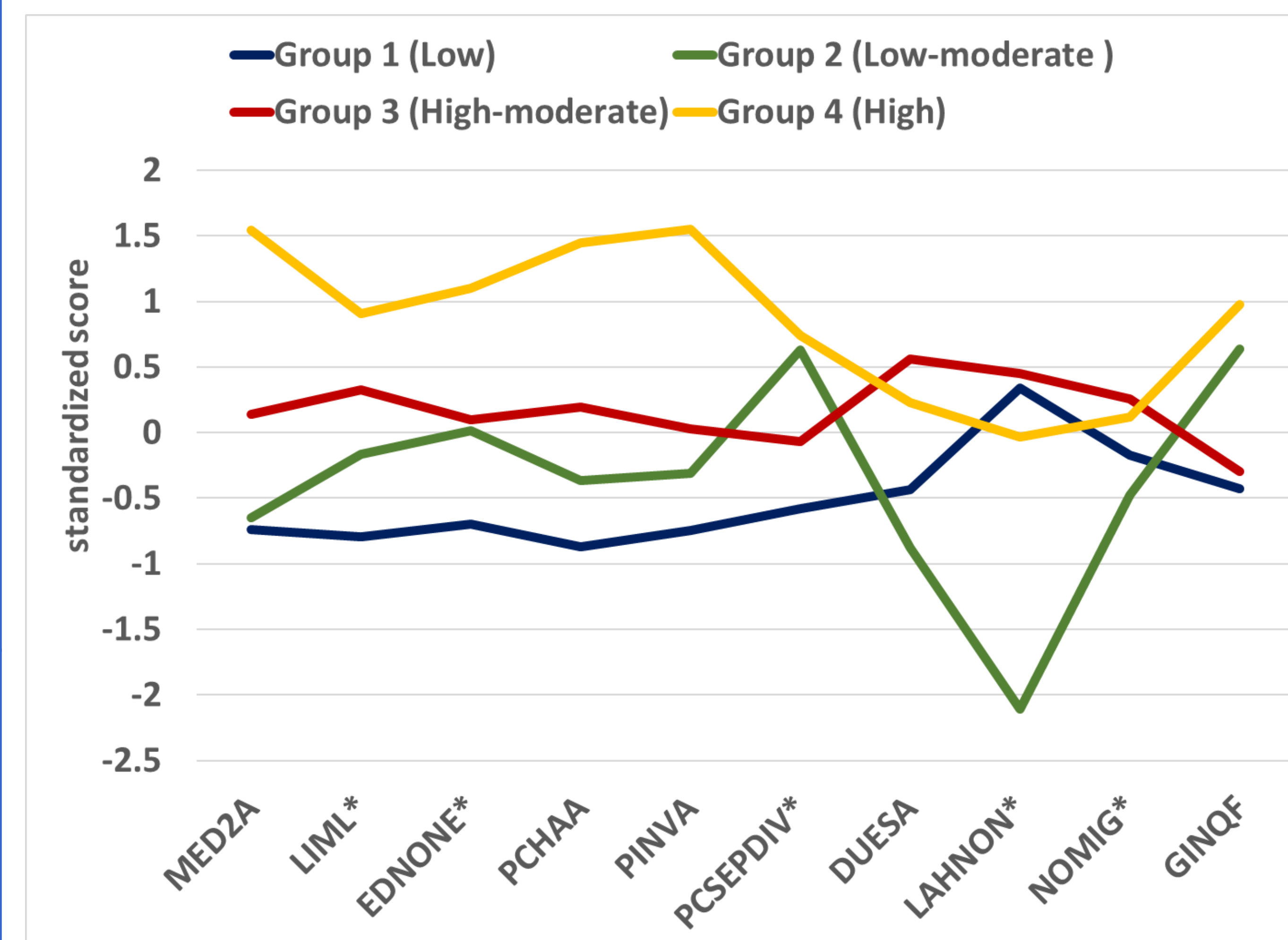
- Use Exploratory Latent Profile Analysis (LPA) in a structural equation model framework with Mplus software (Muthén & Muthén, 1998-2015) to
 - Identify possible homogeneous groups of neighbourhoods, separately using the SES indicators and then using the child development (EDI vulnerability) indicators.
 - 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.

Figure 1. Child Development (vulnerability on EDI domains) group profiles



EDI DOMAINS: PHWB = Physical Health & Wellbeing; SOC = Social Competence; EMOT = Emotional Maturity; LANGCOG = Language and Cognitive Development; COMGEN = Communication Skills and General Knowledge

Figure 2. CanNECD SES (SES indicators) group profiles



SES INDICATORS:

MED2A = Percent at or exceeding twice the median provincial income, families with children under 6, 2005; LIML* = Percent below Low Income Measure, lone parents with children under 6, 2005; EDNONE* = Percent of those 25 to 64 with no high school diploma, 2006; PCHAA = Percent families declaring charitable donations, families with children under 6, 2005; PINVA = Percent families with investment income or capital gains, families with children under 6, 2005; PCSEPDIV* = Percent separated or divorced 2006; DUESA = Percent deducting dues, families with children under 6, 2005; LAHNON* = Percent whose home language is a non-official language, 2006; NOMIG* = Percent of individuals, non-migrant movers in the past year, 2006; GINQF = GINI coefficient quintiles, lone female parents with children under 6, 2005

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

Child Development Group	CanNECD SES Group			
	Low	Low-moderate	High-moderate	High
Low	209	103	544	309
Medium	326	133	220	46
High	108	22	18	0

red circles indicate “off-diagonal”

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 ($R^2=0.68$) as well as between SES group and overall SES using the CanNECD index ($R^2=0.683$).
- 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.

References

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