

Neighbourhood Socioeconomic Status and Early Childhood Development

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Introduction

Background

Evidence shows that census-based socioeconomic indices are reliable neighbourhood-level correlates of Canadians' mental and physical health. Less is known about the extent to which these indices are associated with child development.

Objectives

This study examines the relationship between four frequently used Canadian indices of socioeconomic status (SES) and early child development.

Methods

We replicated the derivation of four established Canadian SES indices. Association of each index with early child development was examined using developmental health data from the Early Development Instrument (EDI). The strength of association was analyzed by comparing adjusted R² values of regressions using the indices as the independent variables and the EDI as the dependent variable (Tables 1 and 2). Effect sizes are also examined using the beta coefficients from these same regressions (Table 3).

SES Indices

Canadian Deprivation (CanDep) Index (Pampalon et al. 2009)

- Six variables from Canadian Census
- Two components - Material and Social

Socioeconomic Factor Index (SEFI) (Chateau et al. 2012)

- Four variables from Canadian Census
- One number index

Canadian Marginalization (CanMarg) Index (Matheson et al. 2012)

- 18 variables from Canadian Census
- Four components – residential instability, material deprivation, dependency, ethnic concentration

Early Childhood Mapping Project (ECMap) Index (Krishnan 2010)

- 26 variables from Canadian Census
- Five components – material, social and cultural systems and two unnamed ones.

Early Development Instrument

- A 103 item teacher-rating questionnaire developed in Canada to measure developmental health of children in 5 domains physical health & wellbeing, social competence, emotional maturity, language & cognitive development, and communication & general knowledge (Janus & Offord, 2007)
- Defines children as vulnerable if they fall below the 10th percentile of Canadian children on any of the five EDI domains in the EDI. Summary measure used is overall vulnerability defined as being vulnerable on one or more EDI domains
- Data aggregated to custom defined geographic neighbourhood-level for 2038 areas across Canada (from 12 out of the 13 provinces)

Table 1: Adjusted R-squared values of regressions on the overall percent vulnerability on the EDI in a neighbourhood for the four largest provinces and for Canada overall (N=2038)

Province	SES Index			
	CanDep	SEFI	CanMarg	ECMap
Ontario	0.31	0.31	0.30	0.33
Alberta	0.40	0.41	0.46	0.48
British Columbia	0.28	0.30	0.35	0.38
Quebec	0.17	0.14	0.15	0.17
Canada	0.17	0.16	0.17	0.25

Note: Regressions included all components of a respective index as regressors, separate from each other.

Table 2: Adjusted R² values for regressions using in the five EDI domains and overall vulnerability as dependent variables and the components of the four indices as independent variables (each domain/index combination was a separate regression).

Index	EDI Outcomes					
	Physical Health and Well-Being	Social Competence	Emotional Maturity	Language and Cognitive Development	Communication Skills and General Knowledge	One or More Domains
CanDep	0.12	0.10	0.15	0.19	0.07	0.17
SEFI	0.09	0.09	0.10	0.19	0.08	0.16
CanMarg	0.08	0.09	0.13	0.18	0.20	0.17
ECMap	0.24	0.13	0.17	0.25	0.27	0.25

Table 3: Effect sizes of 24 separate regressions using vulnerability in the five EDI domains and overall vulnerability as dependent variables and the components of the four indices as independent variables (each domain/index combination was a separate regression).

Index	Domain:	EDI Outcomes (Standard Deviations)					
		Physical Health and Well-Being	Social Competence	Emotional Maturity	Language and Cognitive Development	Communication Skills and General Knowledge	One or More Domains
CanDep	Material	1.42	1.23	1.18	1.92	1.45	2.83
	Social	1.86	1.14	1.76	1.26	1.00	2.57
SEFI	General	1.96	1.59	1.66	2.26	1.86	3.62
CanMarg	Residential Instability	0.75	0.11 ^{ns}	1.17	0.18 ^{ns}	-0.64	0.43 ^{ns}
	Ethnic Concentration	-0.02 ^{ns}	0.85	-0.34	0.46	2.78	1.76
	Material Dependency	1.56	1.17	1.26	2.05	1.36	2.90
ECMap [~]	Material	-0.15 ^{ns}	0.26 ^{ns}	-0.15 ^{ns}	-0.15 ^{ns}	0.36 ^{ns}	0.02 ^{ns}
	Cultural	.71	.81	1.21	1.82	.78	2.12
	Social	-.10 ^{ns}	.65	-.22 ^{ns}	.67	2.51	1.70
		1.91	1.02	1.77	1.30	.79	2.53

The largest effect size in each regression is shown in bold

^{ns} Regression coefficients are not significant at p<0.01

[~] Two undefined components of the ECMap index were also included in these regressions but were not reported in this table since they were not interpretable.

Results

- The indices explain the highest amount of variation in vulnerability rates in Alberta and the lowest in Quebec
- The indices tend to have the highest level of fit with vulnerability rates on the language and cognitive development domain and the lowest level of fit with the social competence domain
- The material components of indices have the largest effect sizes on the language and cognitive development domain
- The language/immigration components have the largest effect sizes on the communication skills and general knowledge domain (representing children's ability to communicate in English/French)
- The relative sizes of components' effects for the other domains are less clear
- Of the four indices, the ECMap index appears to explain the highest amount of variation in EDI vulnerability across provinces and domains

Discussion/Conclusions

Neighbourhood SES and its impact on early childhood development

The different amounts of variation explained between provinces indicate that 1) a clearer social gradient exists in some provinces than others, and 2) the degree of the association between SES and child development varies among jurisdictions. Nevertheless, the indices explained substantial amounts of variation in some domains. The patterns of differences between the strengths of association between material and social index components and specific EDI domains may point towards promising areas for improvement to decrease inequalities in early childhood outcomes. Further research refining the SES index will help to identify specific pathways and mechanisms through which the SES of a neighbourhood impacts aspects of child development.

Which attributes of SES make them better suited to analyze developmental outcomes?

There is a trade-off between explanatory power over the EDI and the simplicity/interpretability of the index. We also found that material, social and cultural (language/immigration) constructs were all necessary to include in an SES index because these three types of constructs all affect the domains of the EDI in different, but significant ways.

Future Research

Results from this study are informing ongoing work to construct a new SES index, specifically designed to analyze neighbourhood EDI vulnerability. The new SES index will be used to examine the mechanisms behind the differences in gradients observed between the provinces and domains. The new index will also be used in the analyses of changing gradients over time as well as differences in gradients between sub-populations in Canada.

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