

The Economic Costs of Early Vulnerability in Canada

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ABSTRACT

Objective: The study estimates the economic costs of early vulnerability in the light of population-level data showing that between 25% and 30% of Canadian children do not arrive at kindergarten meeting all of the developmental benchmarks they need to thrive both now and into the future.

Methods: The study examines Early Development Instrument (EDI) data across Canada as of 2008/09, and across time within British Columbia since 2001. We then link the BC EDI data with school achievement results on standardized tests in grades four and seven, along with graduation records and criminal justice information.

Results: The result is a synthetic cohort with which we can simulate the impact on economic growth of reducing early vulnerability in BC from its current rate of 29% to 10%, a threshold above which child vulnerability is biologically unnecessary.

Discussion: Nearly three times what it should be, a rate of early vulnerability that approaches 30% signals that the country now tolerates an unnecessary brain drain that will dramatically deplete our future stock of human capital. Economic analyses reveal that this depletion will cause Canada to forgo 20% in GDP (gross domestic product) growth over the next 60 years. The economic value of this loss is equivalent to investing \$2.2 trillion to \$3.4 trillion today at a rate of 3.5% interest, even after paying for the social investment required to reduce vulnerability.

Key words: Child development; population health; public policy

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The key to a society's long-term economic success lies in its ability to optimize human development: its ability to promote "a state of minds", to borrow a phrase from economist Tom Courchene,¹ who recommends a human capital future for Canadians. Since globalization requires countries with developed economies to compete with the less expensive labour available in other regions, our governments must compensate by generating labour that will thrive in technological-based information and knowledge industries. Thus, countries with developed economies need more than "all hands on deck" to exploit resource advantages; they also need all "heads": healthy, well-educated, innovative and productively employed adults with strong social and intercultural competencies.

The link between human development and human capital provides Canadians with much reason to pause, because population-level data in our country reveal that citizens now entering our formal school system endure a level of developmental vulnerability that too few acknowledge. Teacher evaluations of students in almost all kindergarten classes in British Columbia, Saskatchewan, Manitoba, Ontario and New Brunswick reveal that when children start school more than 27% are vulnerable, as measured by one or more of the five scales of the Early Development Instrument (EDI): physical health, social competence, emotional maturity, language and cognitive development, and communication skills and general knowledge in the majority language and culture.² These province-wide findings are consistent with vulnerability levels

reported for select regions in Alberta, Nova Scotia, Newfoundland and Quebec. Such levels of vulnerability at school entry are at least five times higher than the rates of biological vulnerability that are detectable in the postnatal period.³

Optimal development, as measured by the EDI, does not imply that children must be rocket scientists or the next Mozart by the time they reach kindergarten. Rather, it implies that children come to school appropriately dressed, nourished and rested; able to hold a pen, climb stairs and use the washroom independently; able to follow instructions and get along with peers (demonstrating that they can moderate their physical and relational aggression); know at least 10 letters of the alphabet, can write simple words and can tell a story about their day in the language of instruction in the classroom (English or French). More than 25% of Canadian children arrive at kindergarten struggling with these and other age-appropriate competencies. When these struggles affect one or more scales of the EDI sufficiently, the child is deemed to be "vulnerable" in his or her development. The early vulnerability rate is a canary in the coal mine predicting the future quality of our country's labour supply. It signals that we are now tolerating an unnecessary

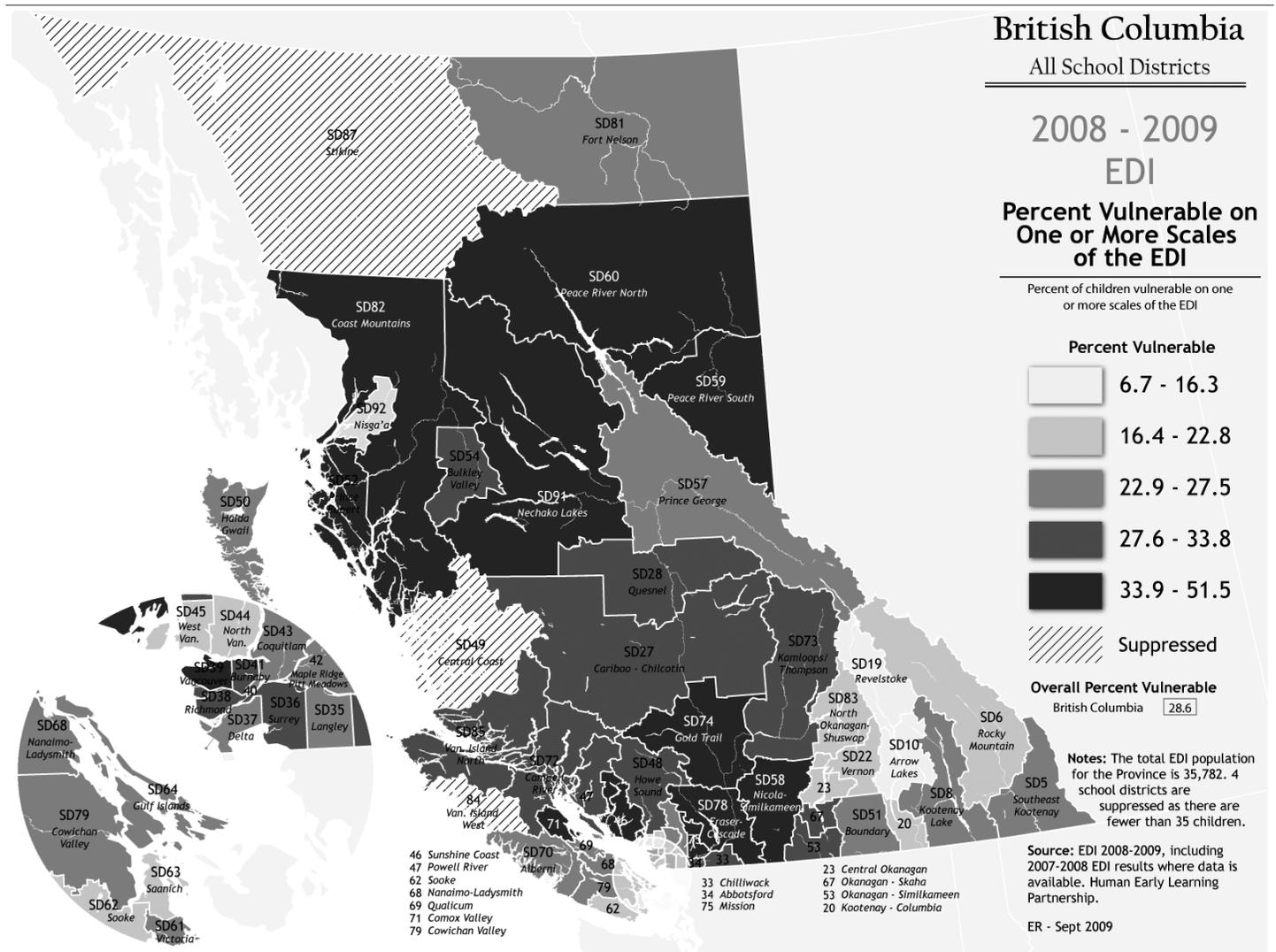
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Figure 1. The rate of early vulnerability in BC, by school district



“brain drain”,⁴ which will dramatically deplete our future stock of human capital because early physical, social/emotional and cognitive vulnerability in a population will influence the quality of its labour market participation later in life.

Such high rates of early vulnerability caution against relying on Canadian results in the Programme for International Student Assessment (PISA) to evaluate child development trajectories in Canada. Although PISA reports that Canadian high school students are historically strong achievers by international standards, we know that children who are vulnerable on the EDI are significantly less likely to even write standardized examinations later in school. This trajectory information warns that standardized tests like PISA may reflect a sample bias, because children who were vulnerable in their early years are disproportionately excluded.⁵ Population-level linkages between medical service birth records and standardized test achievement in Manitoba schools reinforce this sample bias concern. For instance, our calculations based on data published by Brownell, Roos et al.⁶ show that 84% of Manitoba grade twelve students pass the standard language arts test in that province. But this impressive pass rate obfuscates the story illuminated by population-wide data: that just 54% of the children who should have written the standardized test in that year actually passed the examination.

As we reconsider school test scores in the light of data that are virtually population-wide, provided by sources like the EDI, it is imperative to recognize that high rates of early vulnerability in Canada are not just a one-time finding. The Human Early Learning Partnership has collected BC-wide EDI data on three different occasions over the last decade: the vulnerability rate was 26.1% in 2004, 29.6% in 2007 and has since leveled off at 28.6% in 2008/09. The rise in vulnerability between 2004 and 2007 is particularly noteworthy, because this was a period of impressive economic growth in the province, which pushed BC unemployment down to levels unseen in decades and generated substantial surpluses for provincial and federal governments.⁷ Yet the public policy strategies, including the priority given to income tax cuts in 2001, which aimed to generate this strong economic growth did not simultaneously grow strong families with children. In this article, we show that economic stimulus strategies are short-sighted if they tolerate unnecessary child vulnerability. The population-level human development data on which we report reveal that the more children are not ready for kindergarten, the more high schools will graduate students who are not job ready for the knowledge economy.

Figure 1 disaggregates the 28.6% vulnerability rate for British Columbia in 2008/09 by the province’s 59 geographically contiguous school districts. The map uses a grey-scale colour scheme to

convey the alarming range in vulnerability across the province, as measured by one or more scales of the EDI. The darkest, almost black, school districts are places where all Canadians need to stop and take notice, because they endure vulnerability rates that are very high by national standards – some above 50%. Grey districts have mid-range vulnerability levels, and light, almost white, districts enjoy low vulnerability rates by national standards. However, among the latter, only Revelstoke and Arrow Lakes report vulnerability rates at or below 10%, as do a select few other, not necessarily privileged, communities across Canada.⁸ If 10% or less is possible in some communities, it is possible anywhere, provided there is the political will to make it so. We therefore propose this target as an objective for all regions in the country.

While the summary map illuminates the range in overall vulnerability by school district, it overlooks diverging trends that are apparent when we attend to EDI scales individually. Between 2003/04 and 2008/09, there were particular increases in physical, social and emotional vulnerability, along with a rise in vulnerability on the communication and general knowledge scale. In contrast, the language and cognitive vulnerability rate reported for kindergarten children over this period declined somewhat.

Although the latter trend provides reason for hope, we must be cautious about the “tyranny of cognitive seduction”,⁹ since these results suggest that efforts to address the early years have focused selectively on language and cognitive development at the expense of other developmental domains. Yet BC data confirm that population vulnerability on one or more of *any* of the five EDI scales predicts less school success and more criminal activity at the population level. We know this because building on EDI data for the population of kindergarten children we can follow individuals as they progress through the school system to reach grade four, when children write standardized Foundations Skills Assessment (FSA) tests. These anonymized, person-specific trajectories from kindergarten to grade four can then be linked with population-level data for children in grade four for whom we have FSA data and who have since gone on to write standardized FSA exams in grade seven. The latter trajectories can, in turn, be connected to population-level information about children who have worked their way from grade seven through to high school graduation and/or the criminal justice system.

METHOD

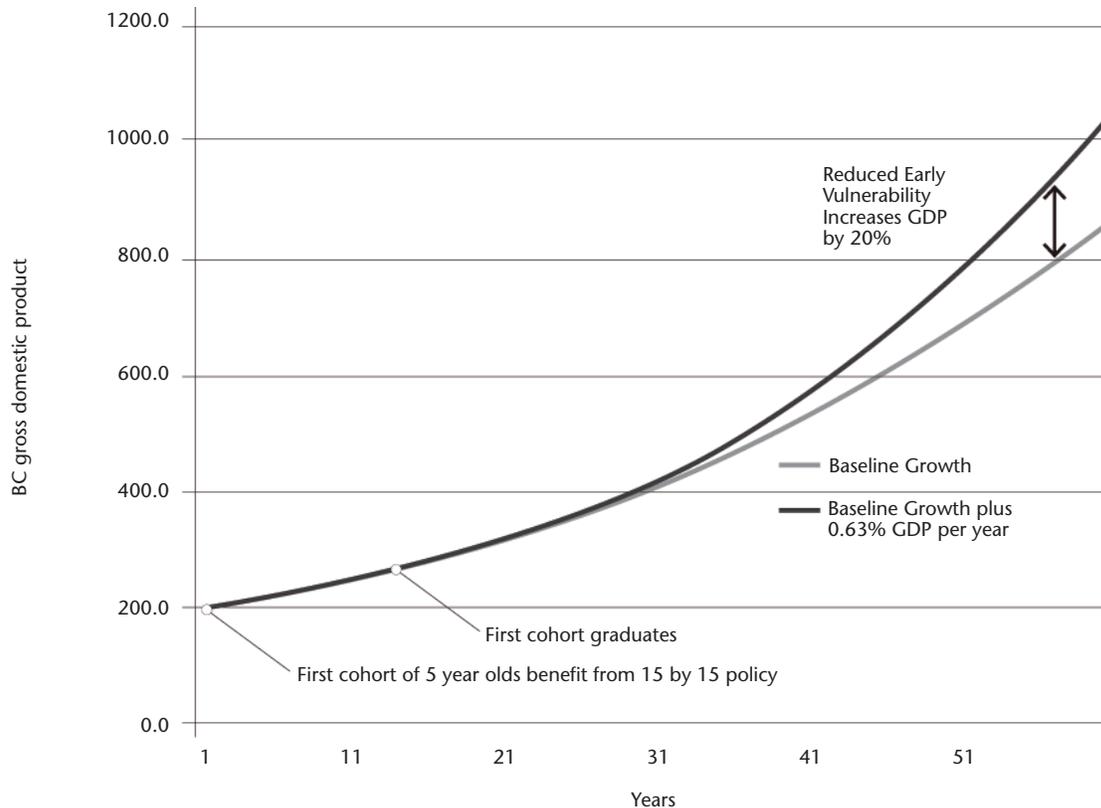
We make these linkages using three sets of regression analyses. The first identifies the characteristics of grade seven students that predict high school graduation and/or criminal activity, drawing on data from the grade seven to twelve cohort. Data about student characteristics in grade seven include their numeracy FSA score; reading FSA score; writing FSA five-point score; whether the students wrote each of these FSA tests; the reason for not writing a test, when relevant; special needs classification; age; language spoken at home; Aboriginal status; English as a second language (ESL) status; participation in French immersion; and sex. We combine these student variables into two composite measures based on their importance in predicting i) educational attainment in grade twelve (measured as grade point average, which is treated as censored if the individual did not graduate) and ii) the likelihood of being incarcerated. We run regression analyses separately for boys and girls to determine what weight to assign each of the student

characteristics in the composite indices. We then repeat this line of analysis a second and third time. The second set of regressions is used to produce indices of grade four educational achievement and likely incarceration, and with these indices we can link the grade four to grade seven cohort with the population that has transitioned from grades seven to twelve. For this analysis, we rely on the student characteristics available in the sample of children moving from grade four to grade seven, and treat the grade seven indices of educational attainment and potential incarceration as the dependent variables. We conduct a third set of regressions to produce indices of kindergarten educational achievement and likely criminal activity. In these latter analyses, we use the kindergarten to grade four sample to identify children’s characteristics and use the grade four indices of educational attainment and potential incarceration as the dependent variables. (The output from these various regressions are available in Forer et al.¹⁰) We then link the three population-level samples of children on the basis of the grade four and grade seven composite indices of achievement/incarceration to produce a synthetic population-level cohort, which moves from kindergarten through to grade twelve.

RESULTS

The synthetic cohort provides important insights. Not all children who start out behind their classmates end up behind, and not all children who start out ahead continue to thrive (see also D’Angiulli et al.¹¹). Life events, parents, teachers, friends, schools and communities can all affect children’s progress after kindergarten. But the synthetic cohort also shows that a strong start in kindergarten goes a long way towards diverting the population from criminal activity and ensuring that high school is completed successfully without delaying a year or more and with grades conferring eligibility for university and other post-secondary institutions.

To demonstrate this finding, we use the cohort to simulate the population-level outcomes if vulnerability at kindergarten in BC were reduced from 29% to 10%. We do so by identifying the normalized EDI score at the 29th percentile and shifting the distribution to the right until the normalized score is at the 10th percentile. The curve is shifted by increasing the weight for students with high values on the educational index at kindergarten and decreasing the weights for those with low values, until the new distribution is one in which just 10% of children are vulnerable. These weights are calculated as the ratio of children in the new distribution at each value of the educational/incarceration indices relative to the number of children in the old distribution at the same value of the indices. The revised weightings in the kindergarten indices are then applied to the grade four outcomes. The simulated grade four outcomes were analyzed to construct revised weightings to apply to the grade four to grade seven cohort, and we repeated this two-part process a third time to adjust the distribution of children at school completion and incarceration (for the revised weightings, see Forer et al.¹⁰). As a result of this simulation, reducing the proportion of children who are vulnerable on entering kindergarten to 10% is projected to reduce crime in BC by one third and to increase on-time graduation rates. Of those graduating, the cohort achieving university-eligible grades would rise by more than one third, from 41.5% to 55.6%.¹² Research on population trajectories in Ontario support these findings.¹³

Figure 2. BC gains in GDP from early vulnerability reduction strategy

DISCUSSION

A substantial economic literature makes clear that improving the population's school achievement by reducing early vulnerability of children to 10% will yield substantial long-term economic gains for private individuals, businesses and the economy in general, as well as for governments specifically. Research by Hanushek is particularly insightful about the economic gains generated for jurisdictions by population-level school achievement. He and colleagues^{14,15} use international test score data for children aged 9 to 15 to analyze the relation between population-level cognitive skills and per capita GDP growth across countries. Their analyses show that jurisdictions that report higher average test scores in school also enjoy far higher growth rates.

Specifically, if one country's test score performance was 0.5 standard deviations higher than another country's during the 1960s, the first country's growth rate was, on average, 0.63 of one percentage point higher annually over the following 40-year period than the growth rate in the second country.^{14,15} Hanushek and colleagues have found that higher cognitive skills accelerate GDP by this value even after controls are in place for the security of a country's property rights, its openness to international trade, fertility patterns and geographic characteristics. While an additional 0.63 of a percentage point of GDP growth per year may not sound like much and the figure is indeed a conservative projection relative to other estimates of the economic growth generated by increased human capital,¹⁶ over time this additional growth functions like compound interest to multiply GDP dramatically.

The question is: How do we achieve a half standard deviation improvement in school achievement in the population of children aged 9 to 15? The synthetic cohort data in BC provide the answer.

A reduction in early vulnerability from 29% to 10% for the population entering kindergarten will yield slightly more than the half standard deviation improvement in cognitive skills on which Hanushek and colleagues focus during the middle school years. As these children complete high school and enter the labour market, their improved human capital will begin to improve the quality of the total labour supply. Over the working lives of the first cohort of children to benefit from reduced early vulnerability at school entry, the BC simulation shows that the province can conservatively anticipate an increase in GDP by more than 20% (Figure 2).

In BC, the net present value of this 20% acceleration in GDP growth is equivalent to an investment of \$401.5 billion along with the interest this capital would earn at 3.5% for 60 years, even after covering the social investment costs required to achieve the necessary improvement to early child development. This enormous dollar figure signals that the cost of biologically unnecessary vulnerability is 10 times greater than the total debt load carried by the Government of British Columbia.¹⁷ Given BC's share of the national population and GDP, we extrapolate that unnecessary early vulnerability across Canada is equivalent to throwing away today between \$2.2 trillion and \$3.4 trillion from the economy.¹⁸ The implication is clear: governments, businesses, bankers and citizens have far more reason to worry now about the early child vulnerability debt as they have reason to worry about the fiscal debt. But they don't. Despite mounting evidence attesting to the influence of early experience on brain development¹⁹ and the salubrious effect of smart family policy for population health and human capital, Canada still resists acting on this knowledge. The result is that the Organisation for Economic Co-operation and Development (OECD)²⁰ and the United Nations Children's Fund²¹ both rank

Canada last among rich Western countries in international evaluations of family policy and country support for early child development.

This poor ranking imposes social injustices on our nation's children, condemning members of the next generation to unequal starting points over which they have no control. But the social justice argument has not proven decisive to Canadian public policy. This article aims to make clear the relation between human development and human capital in the expectation that an economic argument may prove more powerful at the decisive venues, such as the provincial and federal treasury boards. Research about the early stages of population health in BC make clear that our society requires a paradigm shift in how we think about strong economies. We tolerate the status quo in terms of child development at the expense of economic development, because it is clear that we will promote stronger long-term economic growth only if we implement strong family policy now that reduces early vulnerability to below 10%.

Over the last decade, Quebec has led the way in Canada by introducing family policy that has improved parental leave for both mothers and fathers, enriched income support for low-income parents with children and launched full-day child care programs that are particularly popular after the parental leave period. While implementation of the early learning services remains incomplete and there is room to further improve Quebec leave and income-support policy, comparative policy research confirms the value of these new policy trajectories for child development, gender equality and economic growth.^{12,21,22}

Guided by this evidence, Kershaw and colleagues have recently published a comprehensive human capital and family policy framework to reduce child vulnerability from 29% to 10% in BC¹² and have adapted the costing of the policy recommendations for all 10 provinces.¹⁸ The framework requires an investment of 1.4% of GDP in smart family policy that supports parents in three ways: i) *time* for fathers and mothers to care personally; ii) *resources* to lift working-poor families and those on welfare above the low-income cut-off; and iii) *community services*, coordinated by local planning tables, which provide caregivers with monthly (para)professional expertise to monitor their children's development* and access to early learning and care services for all families that want or need them as the parental leave period ends.†

Recently, the Ontario government signaled its intention, with the release of the Pascal Report,²⁵ to join Quebec by innovating in all three policy areas. Simultaneously, the government of BC has made a commitment to reduce the provincial rate of child vulnerability to 15% by 2015/16, beginning with the implementation of full-day kindergarten for 5-year-olds.²⁶ This '15 by 15' goal is an ambitious, but reasonable, medium-term target to establish across the country as we work towards reducing vulnerability to 10% by 2020. It is time for Canada to adopt this target – and the smart family policy required to achieve it – as a population health benchmark, a social justice objective and an economic priority.

* For a review of the benefits of these programs, see, for example, Sweet and Appelbaum.²³

† For a review of the benefits of these services, see Barnett.²⁴

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