

## The case for using administrative data to examine a population-based parenting intervention

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### Abstract

This study aims to use community level, archived, population-based, administrative data sources to examine associations of the Positive Parenting Program (Triple P) with children's and mothers' outcomes. A non-randomized quasi-experimental design is used drawing on secondary data sources including anonymized administrative data from the two Ministries in British Columbia, Canada: Health and Education, as well as publicly available Census data from Statistics Canada, and Triple P administrative data from the Vancouver Island Health Authority. The population under study will consist of geographic areas with children younger than 16 years of age, and mothers from 14 "treatment" sites and 14 comparison sites matched on community characteristics from publicly available Canadian Census data. Hierarchical linear modeling will be used to examine differences for communities that participated in Triple P compared with the communities that did not. Outcomes measures from administrative data sources will include child: (a) school readiness; (b) educational outcomes (numeracy, reading, and writing skills); (c) behavior problems; (d) mental health conditions, and parent mental health. This population, area-based comparison of communities based on secondary analyses of administrative data will provide valuable information about outcomes associated with a universally implemented parenting program on Vancouver Island, British Columbia. This study protocol can encourage others to explore the potential of secondary and particularly administrative data to address research questions and make a contribution to public health outcomes.

**Keywords:** Parenting intervention, positive parenting program, triple P, administrative data, population-based comparisons, public health, school readiness, child mental health, maternal mental health

### Introduction

Evidence of the malleability of the parental role in fostering children's healthy development has been demonstrated by numerous intervention programs that

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incorporate a specific focus on parenting (1). There is substantive evidence from an international study base that parenting intervention programs produce significant positive effects across a range of outcomes for both parents and children (2). Such programs are designed to improve a range of children's outcomes including social-emotional and cognitive skills as well as academic achievement and decreasing rates of juvenile delinquency by strengthening parenting behaviors (3-5). Additional benefits such as improved maternal mental health and well-being have also been found. Several studies have also reported decreases in maternal depression associated with participation in family-based interventions (6-8). Research findings have suggested that both child factors, such as better school readiness, and parental factors, such as improved parenting skills and reduced parenting stress contributed to the decrease in maternal depression (9). However, intervention programs are resource and time-intensive and often inaccessible to many parents (10,11). Therefore, a widespread focus on prevention is a critical first step in a public health approach for fostering children's mental health and other positive outcomes (11).

Preventive interventions are commonly divided into 'targeted' and 'universal' interventions. Targeted interventions are offered to individuals or groups who are at above average risk for developing a condition because of exposure to known risk factors (e.g., children in families with parental substance abuse) or identified as showing early signs of the disorder (e.g., children with detectable but mild behavior problems) (12,13). Targeted programs are often considered a more efficient use of resources because the focus is on those who are at greater risk. However, their delivery relies on accurate identification of those most at risk and, therein, lies the challenge as screening may be expensive and/or not comprehensive. Also, population data show that far more cases of a disorder arise from the general population rather than those identified as "high risk", due to the smaller size of the latter group (14,15). Hiscock et al (11) estimated that targeted programs aimed at those at high risk are able to identify, at most, only 50% of children who will later develop mental health problems. Finally, those who are identified for a targeted program may decline to participate if they feel stigmatized. In contrast, universal programs (often labeled as primary

prevention) avoid excluding and stigmatizing participants by offering services to all, without targeting particular children or families (12). In some situations, the majority of a population may receive the service (e.g., milk programs delivered to all children within the school setting), but more commonly, universal programs are simply offered to the population, and uptake or participation remains an individual decision. Although universal programs have been criticized for their impersonal nature which may discourage participant engagement and for yielding only small benefits to individual participants (13), Offord et al have argued that "a small effect on almost all members of the population ... translates into a large effect on the population as a whole" (12). Thus, despite the paucity of evidence, universal parenting programs could be a useful public or population health strategy for fostering positive parenting behaviors that increase the likelihood of positive outcomes for children including schooling and mental health (16).

One example of a population-based intervention designed to be universal is the Triple P-Positive Parenting Program (Triple P) (17) that has been implemented internationally, and is rapidly gaining popularity in Canada. The Triple P (18) is one of a few parenting programs that are universal, aimed at a broad range of child outcomes, and prevention oriented. Triple P is an evidence-based, multilevel family support program for parents of children and youth from birth to age 16 developed by Sanders and colleagues at The University of Queensland in Brisbane, Australia and designed to reduce risks associated with child behavior problems and common developmental issues (17-19). Triple P aims to enhance the knowledge, skills, and confidence of parents and prevent negative parenting practices, thereby reducing rates of maltreatment and child foster care placement, and reducing behavioral, emotional, and developmental problems in children (20). Triple P is unique in that it uses a population health approach to change the broader ecological context of parenting (19) and, rather than being a single program, it is based on a system of supports on a continuum of increasing intensity with five levels of intervention (18). At Level 1, there is a universal strategy a community-wide media campaign that aims to provide information about parenting and child

development to interested parents, whereas at Level 5, the strategy includes an individually tailored intensive family intervention for parents of children with behavior problems (21).

In Canada, different levels of this universal program have been implemented on a community-basis in six provinces, and there has been expressed interest from the four other provinces and three territories (22). To our knowledge, one of the earliest Canadian implementations of the Triple P was on Vancouver Island offered by the Vancouver Island Health Authority (VIHA) and Ministry of Child and Family Development (MCFD), beginning in 2004, with the program ‘phased in’ across the various communities over a 5-year period until all communities were reached by the end of 2008. This implementation strategy together with the availability of administrative data allows for the examination of short-term as well as “lagged” program effects (up to 6 years later for some communities). In addition, a strength of the implementation, in Vancouver Island, was the collection of program information about the dose, reach, and intensity of the program (e.g., number of practitioners trained, number of sessions and participants, by program intensity level). These measures will allow for an assessment of various program components.

A public health implementation strategy for widespread parenting support includes delivering and evaluating universal interventions with a focus on population-level outcomes (20). The challenge to examination, however, is the need for baseline and follow-up outcome data for entire populations (23) using a community matched case control design. For the present study, this will be met through the use of administrative data that were collected for service purposes by persons “blind” to the Triple P intervention program. There are several advantages of using administrative data. First, as mentioned previously, the data are collected independent of study information or scope, by persons objective to the study. Second, the use of administrative data allows a low-cost data collection method to reconstruct retrospective historic information of quality equal to that gathered prospectively. Third, the data are continuously updated and capture the entire population including those at risk and those who are the least likely to participate in surveys or other

studies. Fourth, there is relatively low respondent burden as compared to survey or interview methods for data collection. Fifth, there are fewer problems related to non-response, more common to survey data (e.g., mental health) and there is adequate sample size and power for robust analyses even with small effect sizes. Finally, as we focus on area-based data, there are no issues around confidentiality and identification of individuals.

To date, several international evaluation studies have been conducted on Triple P, including 3 meta-analyses of the effectiveness of the program on child outcomes (24-26). These meta-analytic studies revealed “moderate to large” (25) or “small to moderate” (26) positive effects for the Triple P intervention including reduced child behavior and parenting problems and positive changes in parental well-being with effects varying by program length, intensity, components offered, and sources of outcome data. However, these studies only examined children’s behavioral outcomes, did not examine outcomes later than 3 years post program implementation, used small (and not community-based) samples, and found that the largest effects were for parent reported outcomes. Finally, in the meta-analysis conducted by Thomas and Zimmer-Gembeck (25), 11 of the 16 evaluation studies were based on evaluations conducted by the program developer.

The proposed study addresses these limitations by considering community level maternal outcomes as well as multiple child outcomes (mental health, behavior, school readiness, and academic skills) measured up to 6 years post implementation, using administrative data from various sources collected independently of the intervention and research study. More specifically, this proposed study will compare communities that have implemented Triple P with those that have not on population-level outcome for children and mothers using archived, population-based, administrative data sources. Furthermore, the effects of program features and community characteristics that may influence, or moderate these associations will be explored using a community matched case control design.

## Methods

A non-randomized quasi-experimental design with comparison (“control”) communities will be used to investigate the associations of the Triple P programming at the community level, drawing on administrative data collected between 2000 and 2010 (most recent available administrative data). The design and analysis will take into account the phased-in implementation of Triple P programming across VIHA (2004-2008), drawing on a minimum of 2-year pre- and post-implementation data for all communities, with up to 6-year post-implementation data for some communities. The health governance structure in British Columbia (BC) consists of six health authorities: a Provincial Health Services Authority and five geographic authorities, under the umbrella of VIHA, Northern, Interior, Vancouver Coastal, and Fraser Health authorities. Despite our interest in making comparisons between VIHA and other health authorities (e.g., Fraser) where Triple P has not been implemented, analyses will also be conducted for smaller community units, such as the Local Health Areas (LHAs) or their equivalent School Districts, within each of the two health authorities (e.g., VIHA and Fraser) after accounting for program features and community characteristics that vary across communities. The final population under study will consist of aggregate level data for children less than 16 years, and mothers from 14 treatment communities in VIHA and 14 matched comparison communities in BC. (In 2009, there were approximately 103,000 children under 15 years living in VIHA (27)).

### *Sources of data*

The study will draw on anonymized administrative data from the two Ministries: Health and Education, and publicly available Census data from Statistics Canada, as well as program administration data from VIHA.

Child health and development data will be accessed through Population Data BC. Population Data BC is a central data repository that brings together individual level data from multiple health databases including births, deaths, medical services,

hospital separations, and pharmacy prescriptions, for all British Columbians from the late 1980s onwards, as well as data on early child development-school readiness and community assets from Human Early Learning Partnership (HELP). Data are tied to communities by postal codes. Population Data BC provides remote data access through a central secured server for analysis and data storage, on a cost-recovery basis, ensuring compliance with data access and confidentiality requirements. Edudata Canada also functions as a data repository, providing researchers with administrative, assessment, examination, and survey data for all students in BC’s provincial education system (K-12). Publicly available Census data will also be used to identify community level characteristics. Finally, Triple P program administration data will be compiled and made available through collaborators at VIHA. Specifically, VIHA will provide community specific data on program implementation and program characteristics that may be associated with the outcomes. These data will be sourced from computerized and paper information systems of VIHA and local providers, and will include: date of implementation; levels of programming implemented (i.e., Levels 1 - 5, and specific modules); and intensity or ‘dose’ of program delivered (i.e., number of practitioners trained, parent sessions offered, parent participants and a measure of the media campaign).

### *Measures of child and maternal outcomes*

The following administrative and population-based measures of child and maternal outcomes will be obtained at the community level: (a) Early Development Instrument (EDI) –a measure of school readiness from HELP, (b) BC Foundation Skills Assessment (FSA) –numeracy, reading comprehension, and writing skills, and (c) behavior and mental health special needs from Edudata Canada, (d) child injuries due to maltreatment from the Ministry of Health, (e) child mental health, and (f) mothers’ mental health also from the Ministry of Health.

A more detailed description of children’s and mothers’ health outcomes is presented in table 1.

**Table 1. Measures of Health Outcomes and Community Characteristics from Administrative Data**

Measure	Description	Source of Data	Years
<i>Children's Health and Mental Health Outcomes</i>			
Child injuries	ICD9 diagnostic code beginning with E 800/900 code (except E849), indicating a cause of injury code due to maltreatment, abuse, or neglect.	POP Data BC: (1) Medical Services Plan; (2) Hospital Separations	2000- onwards
Child depression	ICD9 diagnostic code for depression (V79).	POP Data BC: (1) Medical Services Plan; (2) Hospital Separations	2000- onwards
Child anxiety	ICD9 diagnostic code for anxiety (300.0).	POP Data BC: (1) Medical Services Plan; (2) Hospital Separations	2000- onwards
<i>Mothers' Mental Health Outcomes</i>			
Mother depression	ICD9 diagnostic code for depression (V79).	POP Data BC: (1) Medical Services Plan; (2) Hospital Separations	2000- onwards
Mother anxiety	ICD9 diagnostic code for anxiety (300.0).	POP Data BC: (1) Medical Services Plan; (2) Hospital Separations	2000- onwards
Use of counseling services	Physician's specialty code indicating counsellor or fee service code indicating counseling psychotherapy or counseling.	POP Data BC: (1) Medical Services Plan	2000- onwards
<i>Community Characteristics</i>			
Unemployment rate	Percentage of people who are part of the labour force but who are not working.	Census	2001/ 2006
Income assistance	Subsidy code indicating actual rate of premium subsidy, based on family income.	POP Data BC: (1) Medical Services Plan	2000- onwards
School attendance	Information on percent of the population without high school.	Census	2001/ 2006
Aboriginal identity	Counts of persons who identify themselves as Aboriginal persons.	Census	2001/ 2006
Mother-tongue language	Indicates first language learned and still understood	Census	2001/ 2006
Non-movers over the last five years	People who have not changed dwellings during the specified period of 5 years	Census	2001/ 2006

**ICD9** = International Classification of Diseases, Ninth version. **POP DATA BC** = Population Data BC. **Medical Services Plan** of BC is the province's universal insurance program for medically required services provided by physicians and supplementary health care practitioners, laboratory services, and diagnostic procedures. **Hospital Separations** include information on discharges, transfers, and deaths of in-patients and day surgery patients from acute care hospitals in BC

### *Measures of community characteristics*

Table 1 also describes the aggregated socioeconomic data that will be drawn from publicly available data from the Canadian 2006 Census to select: 1) matching comparison communities in BC for the 14 Local Health Areas in VIHA, and 2) area level characteristics to be included as control variables and examined as possible moderators (variables that interact with each other to influence the population-level outcomes) in the analysis. For example, we will examine community differences in the presence and absence of socioeconomic variables that have been

demonstrated as being associated with parenting, and with the child and maternal outcomes of interest in this study (28-31).

### *Treatment and comparison communities*

As previously mentioned, community structural or socio-demographic features such as the percentage of the community residents who have high or low income, are unemployed, or have low levels of education have been shown to have an impact on young children's outcomes as well as parental mental

health, family functioning, and parenting behaviors (32,33). Therefore, community differences need to be considered and examined as possible moderators of the program's effect. To this end, for comparison purposes, our first task was to match 14 Vancouver Island communities where Triple P had been implemented (treatment communities) with 14 communities from BC (comparison communities) based on community structural or socio-demographic characteristics using Census data.

Publicly available data from Statistics Canada 2006 Census were used to match treatment and comparison communities at the LHA level. There were seven criteria that were used for matching: 1) LHAs number of aggregated individuals (LHA population size), 2) LHAs proportion of Census families with children aged less than 15, 3) LHAs proportion of individuals with an Aboriginal identity, 4) LHAs unemployment rate, population aged 15+ years, 5) LHAs proportion of individuals aged 25-54 years without high school, 6) LHAs proportion of individuals with a mother tongue other than English or French, and 7) LHAs proportion of individuals who have not moved during the previous 5-year period.

Two researchers independently reviewed Census characteristics for 89 communities to determine matches. There was a 100% agreement between the two researchers on the matched communities. Two communities (Nanaimo and Ladysmith; Lake Cowichan and Cowichan) were combined since they were combined in the other administrative datasets. Thus, in total, there were 12 treatment communities from Vancouver Island and 12 matched comparison communities from greater BC. This list was then validated by an expert advisory group from VIHA and MCFD. Based on the expert advisory group feedback, one of the matched communities was changed and another treatment community did not have a best available match. This community was not included in subsequent analyses. The final list is presented in table 2, along with community characteristics drawn from the 2006 Census.

### *Data analysis*

Hierarchical linear modeling (HLM) will be the primary analytic technique used in this study as it will allow us to account for the 'dose' of Triple P

programming that is delivered to each community and shared by families (Levels 1-5) living within each of the communities, as well as to control for community level socioeconomic conditions that may be associated with child and maternal outcomes. Separate models will be analyzed for each of the outcomes, and estimation methods will be selected according to the level of measurement of the outcome variable. Although the focus of this study is on the examination of between-community differences that may be associated with the delivery of Triple P programming, adjusted for other characteristics of the community, the HLM analysis will be informed by a two-level model representing both individual (e.g., child gender) and community-level (e.g., unemployment rate) effects.

## **Discussion**

This study will be, to our knowledge, the first Canadian population-based examination of Triple P using administrative data and is particularly timely and important given the opportunity to inform program decisions being made in other Canadian jurisdictions that have recently begun or are planning an implementation of Triple P (e.g., Quebec). Advantages include an interdisciplinary project team including researchers in the areas of education, developmental psychology, and nursing, methodologists, analysts, social workers, and program managers. This is made possible via a strong collaboration and commitment among stakeholders in two provincial and one federal ministries and academics based on prior networks and strong relationships built over time. Notably, the stakeholders' involvement occurred at the initial stages and will continue throughout the study to ensure that this study yields relevant and useful information. Overall, this unique collaboration highlights administrative data resources, methodological expertise, knowledge of administrative data, and various opportunities for knowledge transfer as key stakeholders are part of the research team. It also uses an examination strategy based on multiple existing data sources obtained from sources independent of program developers and program administrators.

**Table 2. The List of Treatment and their Comparison Communities, along with Community Characteristics Based on 2006 Census Data**

	Treatment Community	Matching Criteria based on 2006 Census Data							Comparison Community	Matching Criteria based on 2006 Census Data						
		1	2	3	4	5	6	7		1	2	3	4	5	6	7
1.	Vancouver Island West	967	36.08	24.67	8.62	20.69	6.85	59.43	North Thompson	748	33.74	11.48	7.76	17.34	7.68	62.25
2.	Gulf Islands	2806	24.70	2.54	4.14	8.73	8.67	60.53	Trail	3827	31.31	5.24	6.24	9.55	10	66.41
3.	Vancouver Island North	3953	38.25	24.20	11.20	26.71	8.25	57.46	Merritt	2984	36.92	24.17	8.73	21.18	13.32	54.53
4.	Alberni	7701	32.78	16.23	8.02	20.11	10.54	59.43	Cariboo-Chilcotin	7802	36.91	19.15	9.46	22.76	12.09	60.99
5.	Qualicum	8932	22.42	3.28	7.24	13.17	8.56	51.05	Penticton	8583	28.13	4.08	6.71	15.21	12.57	52.40
6.	Campbell River	9273	32.91	9.96	9.14	15.15	7.30	53.57	Mission	8700	38.63	6.65	5.77	16.43	12.88	50.71
7.	Sooke	12168	37.39	4.37	3.26	10.28	7.42	53.23	N/A							
8.	Courtenay	12192	31.72	4.45	6.12	11.84	7.28	54.07	Vernon	13918	31.10	6.36	6.11	12.93	10.28	51.86
9.	Cowichan/Lake Cowichan	14289	32.72	9.33	6.39	15.14	8.82	57.98	Chilliwack	17182	38.18	6.61	5.53	14.83	12.93	49.94
10.	Saanich	14439	25.85	3.76	3.73	7.51	10.76	62.62	South Surrey	16370	29.47	1.55	4.39	5.66	16.48	52.71
11.	Nanaimo/Ladysmith	25004	30.66	6.50	6.93	12.67	10.33	50.54	Kamloops	22805	32.59	8.16	6.37	12.51	9.31	54.55
12.	Greater Victoria	46024	30.94	2.99	4.71	8.01	14.85	50.25	North Vancouver	26336	36.95	1.85	4.84	3.80	25.83	57.53

**Data Source:** 2006 Census Community Profiles

1. LHAs number of aggregated individuals (LHA population size)
2. LHAs proportion of Census families with children aged less than 15
3. LHAs proportion of individuals with an Aboriginal identity
4. LHAs unemployment rate, population aged 15+
5. LHAs proportion of individuals aged 25-54 without high school
6. LHAs proportion of individuals with a mother tongue other than English or French
7. LHAs proportion of individuals who have not moved during 5-year period

An important outcome of this project will be dissemination and knowledge transfer. Knowledge transfer will be facilitated by researchers' active collaboration with public health groups and government departments from across Canada in regard to the development and evaluation of family screening programs, as well as their contacts with the BC Council for Families and BC Parenting Vision Group which have established ties with policy makers in the BC Ministry of Health and MCFD. Additionally, researchers are affiliates of the HELP in BC [34], which has established mechanisms and a precedent of communicating in non-traditional ways with health and education service providers, policy makers, and community members. Researchers will also work collaboratively with knowledge users to develop appropriate dissemination tools such as briefs, newsletters, and fact sheets and will disseminate findings in publications and outlets that have high visibility to policy makers. Knowledge users will work collaboratively to identify information that is useful for decision making and disseminate information through appropriate channels at VIHA and MCFD ensuring that information is obtained by appropriate parties and that uptake occurs at the appropriate level (i.e., program implementation, data collection etc.). Results of the study will be shared with the broader academic community through traditional academic venues such as national/international conferences and publications in nursing, medical, and public health academic and professional journals.

This study will demonstrate the feasibility and utility of using existing population-based administrative data as an efficient and cost-effective research tool. Such data are often under-utilized, but can contribute to research in meaningful ways. In addition, this study will highlight some of the important program features that should be collected prior to and during program implementation. Findings from this study can have implications for the implementation of Triple P across Canada. Results will provide insight into Triple P impacts on children and mothers at a population level. Our study may also identify program characteristics that influence program effectiveness or contextual factors that interact with program characteristics to influence population outcomes. Findings suggesting that

communities with particular characteristics are likely to differentially benefit from the implementation of this parenting intervention have the potential to inform more effective decisions and planning.

### *Limitations*

One of the limitations of the proposed study is that parenting behaviors are not directly assessed; however, indicators of maladaptive parenting have been included (injury due to maltreatment) as in other studies [20,35]. Also, many community level differences cannot be empirically controlled, but there are members of our collaborative team who will provide input about community differences. Finally, very small program effects may go undetected as they may not be captured by the administrative data outcomes that we will be examining. Despite these limitations, this study will provide valuable information about outcomes associated with a universally implemented parenting program and will highlight the benefits of using population-based administrative data from multiple sources. Future studies could make use of similar methods.

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