

IHE Report

**Return on Investment for Mental Health
Promotion: Parenting Programs and Early
Childhood Development**

Revised, January 2012

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INSTITUTE OF HEALTH ECONOMICS

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EXECUTIVE SUMMARY

Mental health problems in later life have their roots in early childhood. Researchers have established considerable evidence regarding the effectiveness of parental and early childhood interventions in reducing problems that children face in school and later in life. There is now evidence that early childhood interventions reduce mental health problems (and associated mental health service use), the use of social services, and criminal behavior (and the use of the justice system). The Alberta government, through programs funded by the Department of Child and Youth Services (e.g., Parent Link Centers), has begun to offer such services. One such program is the Triple P, positive parenting, program, developed in Australia.

In this study, prepared with the support of the Public Health Agency of Canada, the authors reviewed the economic evidence regarding early childhood interventions. Using this data, and information supplied by the Triple P program, we developed an economic model to determine the return on investment if Alberta introduced the program to a birth cohort of 52,000 children.

Over a time span of 25 years, we measured the likely impact of introducing Triple P reductions in special education, social services, mental health services, and criminal justice services. Our results, shown in the accompanying table, indicate that if the Triple P program reduced conduct disorder cases by 6%, then there would be a positive return on investment. Current evidence shows that the actual return is much greater than 6%.

		Without Triple P	With Triple P				
		No reduction in conduct disorder incidence	1% reduction	5% reduction	10% reduction	25% reduction	48% reduction
Justice system	Arrested convicted (non-traffic)	\$1,089,537	\$ 1,078,642	\$ 1,035,060	\$ 980,583	\$ 817,153	\$ 566,559
	Ever imprisoned (adult)	\$2,898,220	\$ 2,867,436	\$ 2,751,580	\$ 2,606,760	\$ 2,172,300	\$ 1,506,128
Mental health	Diagnosed with Major depression/ anxiety	\$4,983,903	\$ 4,934,064	\$ 4,734,708	\$ 4,485,513	\$ 3,737,927	\$ 2,591,629
Education	Supplement for children with emotional difficulty	\$10,505,392	\$10,400,338	\$ 9,980,112	\$ 9,454,8532	\$ 7,879,044	\$ 5,462,804
Social Services	Foster Care	\$9,031,757	\$ 8,941,439	\$ 8,580,169	\$ 8,128,581	\$ 6,773,818	\$ 4,696,514
	Income Support	\$27,440,775	\$27,166,368	\$26,068,737	\$24,696,698	\$20,580,581	\$14,269,203
Total costs of adverse events		\$55,949,584	\$55,388,287	\$53,150,376	\$50,352,988	\$41,960,823	\$29,092,837
Cost savings (Cost with Triple P-Cost without Triple P)		\$0	\$ 561,297	\$ 2,799,208	\$ 5,596,596	\$13,988,761	\$26,856,747
Net benefit (cost savings-cost of Triple P)		(\$3,784,732)	(\$3,223,435)	(\$ 985,524)	\$ 1,811,864	\$10,204,029	\$23,072,015

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RETURN ON INVESTMENT FOR PARENT/EARLY CHILDHOOD TRAINING

Positive mental health refers to individual well-being, including positive emotion, cognition, social functioning, and coherence (Friedli, 2007). The Public Health Agency of Canada defines positive mental health in terms of the ability to enjoy life, dealing with life's challenges, emotional well-being, spiritual well-being, social connections, and respect for culture, equity, social justice, and personal dignity (Canadian Institute for Health Information (CIHI), 2009).

The idea of positive mental health has garnered international attention, with measures being incorporated in population surveys in the United States, The European Union, and the United Kingdom (CIHI, 2009). In the United States, a positive mental health measure has been developed using "symptoms" to determine whether a population is flourishing or languishing (Keyes, 2006). While positive mental health can be considered worthy as a public health goal itself, it can also have a direct effect on economic measures such as employment, health, and longevity (Wilkinson, 2003).

Poor mental health, in contrast, represents an economic burden. Many public sector agencies share this burden throughout the lifespan. Throughout childhood, dysfunctional or abusive families use social services to a greater degree, and educating children with behavioural problems is more costly (Scott, 2001). Both children and adults with mental illness are more likely to engage in crime. In addition to this drain on social services and the criminal justice system, poor mental health results in output losses, in terms of reduced employment and lifetime education level (Fergusson, 2005). Adults with mental illness tend to work less effectively, are absent more, and have a greater amount of unemployment (Friedli, 2007). Investment in mental health has the potential to greatly reduce the societal burden of public sector costs, as well as the broader human costs.

Social learning theory focuses on the parent-child relationship as shaping the child's development. Interactions between the parent and child can result in either positive or antisocial behaviour in the adult child (Sanders, 2003) (Friedli, 2009). A negative home environment can follow children throughout life, resulting in outcomes such as crime, poor health, and lowered cognitive and emotional abilities (Heckman, 2008). Behavioural patterns found as young as the age of three have been found to predict psychiatric disorders in adulthood (Caspi, 1996). Acute childhood experiences such as abuse, neglect, and extreme household dysfunction can also have a devastating effect on adult mental health (Lupien, 2009).

Remarkably, even children with these disadvantages can be responsive to positive early intervention (Waddell, 2007). Programs for very young children can be successful in promoting good outcomes (Domitrovich, 2003) such as positive mental health and reducing negative behaviours later in life (Sanders, 2003). As well, these positive mental health outcomes can have positive spinoffs regarding resource use, but the improved economic outcomes do themselves require resources.

Economic evaluation is defined as the evaluation of costs and consequences of different policy choices, programs, or interventions (Drummond, 2008). This method of decision-making goes further than asking whether or not a policy or intervention is effective; and it goes farther than asking whether a policy or intervention can be afforded in the budget. Rather, it asks whether it is *worth* investing in a policy; that is, it compares the costs and outcomes together, between interventions (Barton, 2004). It is becoming increasingly common to incorporate economic

evaluation in policy analysis; so much so that the World Health Organization established guidelines for economic analysis of disease and injury in 2009 (Tan-Torres Edejer, 2003).

The Public Health Agency of Canada has partnered with the Institute of Health Economics (IHE), a not-for-profit organization based in Edmonton, Alberta, to produce an economic model of a mental health promotion intervention. The IHE produces policy research using health economics, health technology assessment, and comparative effectiveness. This paper, as part of this partnership, seeks to address the cost effectiveness of early childhood interventions in mental health and the implications for Canadian health policy.

We address the following questions:

- What is the economic burden of mental disorders?
- What are the long range implications of childhood mental illness on resources?
- What very early preventive interventions have been tested for effectiveness and cost – effectiveness?
- What preventive policies are currently undertaken in Alberta?
- What are the costs and benefits of early intervention in an Alberta context?

We chose Alberta as a subject province because of the availability of data and policy information.

What is the economic burden of mental disorders?

Recent work by Friedli in the United Kingdom frames mental illness in terms of an “economic case for investment.” In Canada, the *Economic Burden of Illness in Canada* (EBIC) analyzes the comparative burden of disease groups in economic terms (Health Canada, 1998). Economic analysis incorporates the clinical aspects of a disease into healthcare costs, the loss in productivity, the impact on families, and other direct and indirect costs. In doing so, economic evaluation provides a comprehensive picture of the societal burden of illness and mental illness.

In terms of direct healthcare costs, mental illness ranked second among all major disease groups in 1998, the last year for which data was published (Health Canada, 1998). Cardiovascular diseases lead in terms of annual direct (i.e., medical care) costs of \$6.8 billion in 1998, but mental disorders followed closely behind, with direct costs of \$5.6 billion. With total direct costs amounting to \$159 billion, mental disorders amounted to 4.9% of Canadian healthcare spending (Health Canada, 2000). Indirect mental health costs (i.e., lost employment) accounted for 4.7% of all short term disability and 7% of all long term disability. In dollar terms for this year, these losses amounted to \$463 million and \$2.2 billion, out of illness-wide totals of \$9.8 and \$32.1 billion (Health Canada, 2000).

The years of productive life lost due to mental illness are three times that of cancer, measured in terms of lost Disability Adjusted Life Years (DALYs), a combined measure of disability and mortality. Over a lifetime, the disability of major depression is equivalent to that of paraplegia or blindness (World Health Organization, 2008).

Neither of the above studies presents any information on the longer term burden of childhood mental illness or poor mental health, such as its impact on the criminal justice, social welfare, or education systems. From a societal viewpoint, these remain unmeasured.

What are the long range implications of childhood mental illness on resources?

Interventions in early childhood have a greater rate of return than interventions introduced later in life (Heckman, 2008). In one calculation, a preschool intervention has three times the rate of return than those introduced later (Cunha, 2006). In the Alberta premier’s economic strategy, early childhood was emphasized as an investment in the province’s “prosperity and quality of life” (Premier’s Council for Economic Strategy, 2011). Investing in early childhood to reduce childhood mental disorders can be considered a “best buy,” in terms of mental health promotion (Friedli, 2009).

Childhood mental disorders have broad and long-lasting consequences into adulthood (Fergusson, 2005) (Scott, 2001). Much of the literature in early childhood mental health promotion focuses on conduct disorder, as the subsequent adult outcomes such as substance abuse, unemployment, crime, are particularly onerous. Conduct disorder has a childhood onset and is characterized by a cluster of destructive, aggressive, deceitful, and defiant behaviors (Werry, 1997). It is unique in that the severity of the mental disorder not only depends on a characteristic behavior of the individual, but also on the degree of harm inflicted on others (American Psychiatric Association, 2000).

According to one estimate, the prevalence of conduct disorders ranges from 1% in girls (6-12) to 4.8% in boys, and 3.8% in adolescent males (Sawyer, 2001). Another estimate indicates that 45% of all boys could have mild or moderate conditions (Friedli, 2007). An Alberta study indicates that about 9.5% of boys (0-17) and 12% of girls were diagnosed during the year with conduct disorder, but these diagnosis codes do not indicate the degree of severity (Spady, 2001). Two long term studies, a New Zealand longitudinal study and a London inner city study, measured conduct disorder prevalence at approximately 5% for children aged 7 to 9 years (Fergusson, 2005) (Scott, 2001).

In a longitudinal study following school-aged children to young adulthood, those with behavioral problems, including conduct disorder, had poor adult outcomes in crime, substance abuse, general mental health, relationships, education, and employment (Fergusson, 2005). Subsequent costs to the public sector for individuals with conduct disorder were ten times higher than those with no conduct disorder, by the age of 28. Crime represented the greatest cost, only in terms of direct public sector costs, not including costs to victims (Scott, 2001). Costs to the individual with conduct disorder are also great, as they are more likely to have a lower level of education and employment, a lower quality of relationships, and poor mental health, including a greater risk of suicide (Fergusson, 2005).

What very early preventive interventions have been tested for effectiveness and cost – effectiveness?

Early childhood represents the greatest time of opportunity, in terms of public investment in mental health (Roberts, 2011; Morris, 2005). We define early intervention as mental health promotion programs from prebirth to age three, before the start of preschool. Early interventions such as parenting programs have a higher economic rate of return to society than interventions offered later in life such as remedial education, prisoner rehabilitation, and public job training programs (Heckman, 2008). The relative impact of interventions for very young children is greater than programs started later in life, and the effects can last into adulthood (Heckman, 2008) (Nelson, 2003).

We performed a literature review using MEDLINE, CINAHL, and EconLit, using an existing search strategy (McDaid, 2006). Articles were also culled from meta-analyses of preschool programs (Aos, 2004) (Nelson, 2003). In our scan, the target group for all of these programs is at-risk families, the definition of which varies slightly with each program.

The following criteria were used to identify relevant program evaluations:

1. Families had children aged 0-3 (or preschool) or pregnant mothers.
2. Programs focused on primary prevention or promotion rather than treatment for children with existing mental health problems.
3. Mental health outcomes were measured.
4. Resources and cost data were included.

Our search terms in MEDLINE, CINAHL, and Econlit, following McDaid and Needle's strategy, included "health promotion" or "health education" or "mental health," which led to hundreds of thousands of results. Including "cost and cost analysis" narrowed it down to less than 2000 articles, and restricting the studies in age group from prenatal to preschool-aged children (0-5) resulted in

less than 50 articles. After combining it with the meta-analyses of preschool programs (Aos, 2004) (Nelson, 2003) and restricting it to the age group 0 to 3 years, the result was six studies.

There are very few programs for families with young children (from age 0-3 years) with the specific aim of promoting mental health. Because of this, preschool programs (from age 3-5 years) were included in our review, though we excluded these from the later cost-benefit analysis.

These programs included several types (Domitrovich, 2003):

1. Parent-focused programs provide skill training in discipline, improving the parent-child relationship, and supporting the child's learning environment.
2. Child-focused programs consist of social skill training or an enriched learning environment. (Excluded in our later analysis, as these programs begin at 3 years).
3. Multi-component programs integrate both group child and individual parent interventions.

In a Canadian review, two early childhood strategies were found to be effective in preventing conduct disorder in children, a parent-focused parenting skills training program, and child-focused social skill training for preschool-aged children aged 3-5 years (Waddell, 2007).

In general, because there were very few Canadian studies, the analysis was expanded to include international Triple P and Better Beginnings, Better Futures. These were deemed to be especially relevant, having either been developed in Canada or commonly used throughout Canada.

Results

Six programs met our criteria and an additional two programs, which did not totally meet our criteria but were especially relevant to Canada, were included (Table 1). Five program evaluations were based in the United States, one was based in several countries in Europe, one in Australia, and one in Canada. The European program was the only intervention with the single, specific goal of improving mental health outcomes in children. Costs were calculated using the direct costs of the program. Benefits were calculated using cost savings from savings to the criminal justice system, healthcare, and future earnings. Studies on the European program only included the cost differential between the intervention and comparison groups.

The usefulness of an average rate of return, compared across studies, is limited as a policy analysis tool, as each program evaluation has different methods of calculating costs and benefits. Different costs are included in different evaluations, with varying methods of calculation, and have a varying age range of lifetime benefits.

With this caveat, combination programs, programs with a preschool component in addition to parent training, rather than a solely parent-focused program appear to have a greater rate of return. This is consistent with a meta-analysis of early intervention programs indicating that interventions including both child and parent are more effective (Nelson, 2003). Coupled with the findings that programs for age 0 to 3 years to prevent behavioural problems have good short-term effectiveness (Barlow, 2010), it suggests that maintaining gains over time requires a longer-term strategy, as well as expanding the intervention into the school and community.

What preventive policies are currently undertaken in Alberta?

Programs operated either by the government or non-profit organizations with a stated goal of preventing later mental health problems are scarce (Waddell, 2007). Rather, early childhood interventions in mental health tend to have broad developmental goals such as improving parenting skills and reducing behavioural problems. For children aged 0 to 3 years, interventions are always focused on parents, as interventions directed at children begin at preschool. We performed a scan of parenting programs throughout Alberta, both governmental and nonprofit organizations.

Included in the Alberta scan were programs for pregnant women and children 0 to 3 years of age and their families, not including child care. The programs we included focused on parent skill training to prevent childhood behavioural problems. We excluded preschools, as the start age was after 3 years of age, and excluded programs where parenting skill training was secondary to providing supplies such as diapers and food, as well as early literacy programs. As we were looking at mental health promotion and prevention, we also excluded programs for children with existing, diagnosed mental health problems.

Parenting programs are separated into two types – group and individual parent training. Group training consists of small classes on parenting skills and techniques, usually taking place at a central location. Parent Link Centres or Parent Link Networks funded by the provincial government are the main providers of group parent training, although other programs exist (Table 2). The main parenting program implemented by Parent Link Centres is the Triple P program (see below).

Parent Link Centres are a province-wide network of family resource centres that support Alberta's parents as their children's first and most influential teacher. The Parent Link Centres are funded by Alberta Child and Youth Services. They provide the following services: childhood development and care, parent education, including Triple P, family support, developmental screening and information and referral services for children, youth and families. Parent Link Centres support primary prevention at the community level by helping parents access child development programs, learn about positive parenting strategies, form informal support networks and locate other community programs (see <http://www.parentlinkalberta.ca>).

Triple P is a parenting skill program based on social learning theory. This model holds that dysfunctional interactions between parent and child can lead to conduct disorder and later antisocial behaviour in the adult child. The program seeks to break these patterns with five intensity levels of parent skill training, outlined in Table 5. The first is a universal public marketing campaign, which consists of media and pamphlets. Levels 2 to 4 are brief interventions to all parents in a community or primary care setting for parents seeking help for a specific behavioural problem. The fifth level is more intensive and targeted, aimed at problematic behaviour in the child or a systemic family dysfunction (Sanders, 2003).

Triple P provides parents a guideline of five Principles of Positive Parenting. These include: ensuring the safety of the child's environment, creating a positive learning environment, assertive discipline, knowledge of child development and behaviour, and self-care for the parent (Sanders, 2003). Triple P, provided through Parent Link Centres in Edmonton, Alberta, served 3538 families at primary care seminars, 941 families in Level 3, and 540 families in Level 4. The number of parenting tip sheets distributed totaled 7587 in 2011. There is a total of 361 staff in Parent Link Centres trained in

the Triple P program, though they have other functions (Alberta Child and Youth Services (ACYS), personal communication, 2011).

Individual parent training can take place as home visitations or one-on-one sessions with trained facilitators at a central location such as a Parent Link Centre. Home visitation programs funded by Alberta Child and Youth Services (ACYS) served over 3100 families in 2009 and are provided by individual agencies. Visits average every 2 to 3 weeks, with an average program length of 1 year (ACYS, personal communication, 2011). Because of the relatively high cost, ACYS has to deem the family at-risk and is referred to the program. In a report evaluating the Community Action Program for Children, the Public Health Agency of Canada defined at-risk families as having any or all of these conditions: low-income, single/teenaged parent, low education, Aboriginal/born outside Canada, rural or isolated, or having children with special needs (Public Health Agency of Canada, 2009).

What are the costs and benefits of early intervention in an Alberta context? An economic model

We developed an economic model for the establishment of an early childhood intervention for mental health promotion in Alberta. Alberta was chosen as a case study for Canada because of the availability of data on existing programs and on the societal costs of childhood mental health disorders. In addition, there is a plan to expand a Triple P early childhood intervention program, making it available to every parent of young children in the province. Data on Triple P operations were obtained from the Triple P coordinator in Canada. Though this case study is based in Alberta, the existing model can be adapted to other Canadian provinces, including their own societal costs and costs for their early childhood education programs.

Our model is based on an Australian study by Milhalopoulos which projected the benefits and costs of the Triple P program (Milhalopoulos, 2007). We adapted this cost benefit analysis using our knowledge of provincial and national costs.

In our analysis, we calculate the downstream costs of conduct disorder from a government perspective, taking into account the impact of conduct disorder on government expenditure in education, income support, the criminal justice system, and health care. This is not an exhaustive list of all possible relevant services, and we only included costs for which quality information was available for Alberta. We also truncated the lifetime costs of conduct disorder to age 25 years, remaining consistent with previous longitudinal research calculating the costs of conduct disorder up to the subject's mid-twenties (Fergusson, 2005) (Scott, 2001).

Estimates of the prevalence of conduct disorder range from 1% to 12% of the birth cohort by age 7 years to 9 years, in a study using administrative data in Alberta (Spady, 2001). For the model, we use a rate of 5%, as both the New Zealand longitudinal study and the London inner city study measured conduct disorder prevalence at approximately 5% for children aged 7 to 9 years (Fergusson, 2005) (Scott, 2001).

To cost each outcome of conduct disorder, we used longitudinal studies of outcome prevalence from New Zealand and London (Fergusson, 2005) (Scott, 2001), tracking children from birth to age 28 years. Children with conduct disorder were more likely to have more adverse societal outcomes, as listed in Table 4. For example, if a child had conduct disorder at age 6 years, the probability of

being arrested or convicted by age 25 years is 19.2%. By comparison, the probability of being arrested or convicted would be 4.2% for a child without conduct disorder. By calculating the cost of these adverse outcomes in children with conduct disorder we were able to calculate the downstream (i.e. subsequent) societal cost of conduct disorder.

We assume that the early childhood intervention is introduced to an entire cohort of Alberta births, starting in 2010, up to the cohort age of 25 years, in 2035. In 2010, there were about 52,000 births in Alberta (Statistics Canada, 2011). Using provincial or national data, we calculated the lifetime cost per individual of each outcome. The cost of conduct disorder for each adverse outcome is calculated as follows.

Costs of Conduct Disorder

Justice system

As they grow older, children with severe emotional problems engage in criminal activities to a greater degree, resulting in increased costs for policing, prosecutions, court services and prison or community sentencing (Scott, 2001). A non-traffic conviction in adulthood can result in a suspended sentence, a community sentence, or a prison sentence. Based on non-traffic charges in the Canadian Justice System, there is a 25% chance of a prison sentence, a 35% chance of a community sentence, and a 40% chance of a suspended sentence. The costs of each event are \$34,000, \$25,000, and \$6,000, including police, prosecution, and court costs. Based on these statistics, the average cost of an arrest and conviction was \$5987, which excludes the cost of corrections. The cost of a single incarceration is \$34,875 (Boe, 2004) (Correctional Service Canada, 2010) (Statistics Canada, 2011).

Mental health costs

Children with conduct disorder have a greater need for mental health services, including hospitalization (Gyllenberg, 2010). If not prevented, these needs extend well into adulthood. For our purposes, we used depression costs as a proxy for mental health service costs. The annual cost for all persons who had a diagnosis of depression for Alberta provincially provided mental health services, including physician services, hospital services, clinical services, and emergency visits was \$734 (under 18 years) and \$495 (18 to 65 years) (Alberta Health Services, personal communication, 2011). We assume the earliest diagnosis of depression is at age 10 years.

Education

The government of Alberta provides supplemental funding to schools for children with moderate and severe emotional problems. This funding continues to the end of high school. The annual supplement from Alberta Education to the schools is \$15,751 for children with a severe emotional difficulty (Calder, 2008). Two thirds of funded students with emotional disability in Alberta are severe (Alberta Education, 2011). In 2010, the number of children in this group over all grades (1 to 12) with diagnosed conduct disorder was 1100 (Alberta Education, personal communication, 2011). Thus, there are about 91 children who are funded for conduct disorder for each age, out of about 2600 children with severe conduct disorder. This is a rate of about 3.5% of the children with conduct disorder within the school system.

Foster care

Children with conduct disorder are more likely to be in foster care (Scott, 2001). In 2007, there were 4790 children in foster care, with an average annual cost of \$33,515 to the provincial government (Alberta Children and Youth Services (ACYS), 2008) (ACYS, 2010). We assume 1 year of foster care before the age of 18 years for children with conduct disorder who are in foster care, based on foster care statistics from the United States (Child Welfare Information Gateway, 2011).

Income support

Children with conduct disorder are more likely to be dependent on income support as adults (Fergusson, 2005). The average annual cost of income support in Alberta is \$13,465 per client (Alberta Office of Employment and Immigration, 2011) (Alberta Office of Statistics and Information, 2011).

Aggregated cost of conduct disorder

For the entire conduct disorder group, we used the rate of conduct disorder from the London and New Zealand longitudinal studies, or approximately 5% of the population. We multiplied the percentage of children experiencing this outcome by the individual cost of this outcome. The summation of the costs of these outcomes for children with conduct disorder gave us the societal, lifetime cost of conduct disorder for this group, as shown in Table 5.

Costs of the Triple P program

Triple P has been shown to be effective in reducing disruptive behaviour associated with conduct disorder (Sanders, 2003). It is also the most commonly used parenting program in Parent Link Centres, the universal early childhood resource centres established in 2007 by Alberta Child and Youth Services, making it especially relevant to Alberta.

The resources needed at each phase of the Triple P intervention and their costs for the 52,000 families in our 1-year cohort are briefly summarized in the Table 3. They fall into three categories: (1) training and accreditation of the providers, (2) materials costs for providing Triple P to the cohort of 52,000 families, and (3) labor costs for the cohort. Data were obtained from the Canadian Triple P coordinator, and applied to Alberta. We determined the start-up costs for one cohort of providers. Numbers of providers and their time were based on Triple P standards. We assume that there is 20% attrition rate of Triple P providers each year, which is the same as assuming that training costs would be spread out over 5 years. We also ignored trainee travel and space costs. We used Triple P standard data on materials handed out and, on the time used to provide Triple P sessions to the families, in individual or group formats. We also made the following assumptions about labour costs – that they are delivered by a trained facilitator receiving an hourly rate of \$23. This rate is about the same as the Alberta average for child mental health workers.

As seen in Table 3, 1 year's worth of training costs (one-fifth of the total) was about \$192 thousand. Labor costs for the provision of Triple P to the entire cohort of families was just over \$3 million and materials costs about one-half million dollars. In total, it costs about \$3.8 million to provide Triple P to the entire cohort of 52,000 families.

The cost – benefit calculation

In the cost-benefit analysis, the benefits of the Triple P program are the reduction of child conduct disorder and, in the longer term, the reduction in youth and adult sequelae of mental health (conduct disorder) problems (e.g., reduced incarceration) as a result of the early childhood intervention.

We consider the percentage reduction in conduct disorder – reduction benefits as the percentage of conduct disorder cases moving to (and achieving the same outcomes as) those in the normal population. The Triple P program has been shown to result in a reduction of between 25.8% and 48% in the prevalence in conduct disorder (Milhalopoulos, 2007) (Sanders, 2000) (Turner, 2003).

We assume that, in the base case of our model, there are no resources currently used in early childhood development. The impact of the program, the increase in program benefits, is the difference between the social costs (education, mental health services, crime, social services) with and without the program. The program is evaluated at a specific time, when the Triple P program is initiated. All future benefits are discounted at a rate of 5%, in accordance with CADTH economic evaluation guidelines. Cost savings are calculated as the reduction in the societal costs of crime, education, child services, and mental health services as a result of the intervention. The net benefit is the difference between this reduction (i.e., the savings) and the cost of operating the Triple P program.

Results of the Economic Model

We calculate the total longitudinal (to age 25 years) cost of conduct disorder at about \$56 million for this group (if there were no Triple P) or \$21,519 per person diagnosed with conduct disorder. As shown in Table 5 (repeated in Table 6), nearly half (49%) of the burden of conduct disorder falls on income support and 19% comes from the additional educational supplement for children with severe behavioural disorder.

As stated above, we estimated the cost of the implementation of the Triple P program at \$3.78 million, including training, material, and labour costs for one cohort of families (52,000). Based on these calculations, each 1% reduction in conduct disorder results in a total of \$561,297 reduction in the lifetime costs of adverse events. Given that each 1% population reduction in conduct disorder saves \$561,297 over a lifetime, the program would pay for itself if conduct disorder was reduced by about 6.5%. Some estimates suggest that Triple P can reduce the prevalence from 25% to 48% (Milhalopoulos, 2007). If this 48% reduction is achieved, it is possible for the intervention to save up to \$23 million, paying for the Triple P intervention eight times over. In Table 6 we show estimates for reductions in conduct disorder of 1%, 5%, 10%, 25%, and 48%.

Conclusions

The burden of mental illness in Canada is significant, accounting for 4% of short term disability and 7% of long term disability. Mental illness is also associated with an increase in many social services, including education, police and court services, as well as direct mental health services. There is evidence that early intervention – the earlier the better – can reduce conditions such as conduct disorder. A key question is, is the increase in early intervention “worth” the cost.

We developed a model for the introduction of Triple P for the entire Alberta population. Because of these provincial differences in spending and utilization patterns, our financial results could only be obtained for Alberta. Future analyses could include financial and service data from other provinces.

We maximized the cost of the intervention, assuming that it was going to reach every target child in the cohort, and that all costs were additional, when in fact there may well be considerable doubling up of efforts. Our results show that if a population wide effort reduced conduct disorder by about 6.5% the program would “pay for itself.” There is evidence that the actual reduction in conduct disorder is in the range of 25% to 46%.

As in other public health interventions, benefits from Triple P have an effect on more than conduct disorder. Conduct disorder tends to occur with other mental health disorders, which are likely to be helped by the intervention. Benefits also trickle down to others, such as parents and siblings, not to mention those benefiting from the reduction of crime. We have also confined our analysis to a small number of benefits which had direct, quantifiable ties to conduct disorder and to those for which we were able to obtain accurate financial data. We omitted most health and social service costs, for example, as well as benefits such as improved familial relationships.

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Appendix A: Tables

Table 1: Studies in the cost benefit of early childhood intervention programs

PROGRAM	PROGRAM TYPE	STARTING AGE	DATA COLLECTED UNTIL CHILD AGED	LOCATION OF DATA COLLECTION	TARGET POPULATION	CHILD MENTAL HEALTH OUTCOMES MEASURED	COST	BENEFIT	RATE OF RETURN	REFERENCES
Perry Preschool Program	Group child intervention/ individual parent intervention	3-5 years old	Age 40	Ypsilanti, MI, USA	Children selected randomly: Daily enriched classroom sessions, and weekly home visits.	Crime, teenage pregnancy, abuse/neglect	\$9785 (2004) per child/year	\$50,000 per child	9.11:1	(Cunha, 2006); (Karoly, 2001)
Abecedarian Project	Group child intervention/ individual parent intervention	~ 4 months old	Age 21	Chapel Hill, NC, USA	High-Risk Index families: Daily enriched preschool sessions. Home-visiting teacher supervising curriculum for each child & assisting with family issues.	Crime, smoking	\$13,000 (2002) per child	\$48,000	3.69:1	(Cunha, 2006) (Masse, 2002)
Chicago Child-Parent Center (CPC)	Group child intervention	3-5 years old	Age 20	Chicago, IL, USA	Children selected by family socioeconomic status: school-based, provided health/social services, promoted parental involvement.	Abuse/neglect, crime	\$10,000 per participant	\$35,000 per participant	7.77:1	(Karoly, 2001) (Cunha, 2006)
Nurse Family Partnership	Individual parent intervention	Pre-birth	Age 15	Elmira, NY, Memphis, TN, Denver, CO, USA	Young, poor, unmarried pregnant women: home visits, improving health behavior, focused on parents' personal development & parenting skills	Abuse/neglect, crime, sexual behavior, smoking/drugs/alcohol	\$6083 (1996) per child	\$24,694	5.1:1 (high risk) 1.1:1 (low risk)	(Karoly, 2001) (Karoly, 1998)
European Early Promotion Project (EPPP)	Individual parent intervention	4-6 weeks old	Age 2	England, Finland, Greece, Serbia, Cyprus	Families chosen based on need: home visits, establishing partnership with healthcare system and parents, specifically to prevent mental health problems in children	Mother-child interaction; Behavioral Screening Questionnaire; Bayley Scale (psychomotor measure)	£1574 per trainee	£ 218 difference between intervention and control	N/A	(Knapp, 2005) (Puura, 2002)

PROGRAM	PROGRAM TYPE	STARTING AGE	DATA COLLECTED UNTIL CHILD AGED	LOCATION OF DATA COLLECTION	TARGET POPULATION	CHILD MENTAL HEALTH OUTCOMES MEASURED	COST	BENEFIT	RATE OF RETURN	REFERENCES
Healthy Families America	Individual parent intervention	Pregnant mothers	Age 2	Alaska, USA	At risk mothers: home visits by "paraprofessionals" providing parenting education and case management	Mother-child interaction; Child Behavior Checklist (problem behavior); Bayley Scale	\$3314	\$2,052	0.62:1	(Aos, Lieb, Mayfield, Miller, & Pennucci, 2004)(Caldera, 2007)
Triple P - Positive Parenting Program	Individual/group parent intervention	2 years	12 years	Queensland Australia	Program has different levels of intervention, ranging from universal "parent information strategy" to family intervention with children at high risk for conduct disorder, compounded with family conflict	Eyberg Child Behavior Inventory (ECBI) - measures conduct problems in children	A\$51 (2002) per child/ A\$9.6 million (2002)	Lifetime cost savings ranging from A\$14 million-A\$683 million)	N/A	(Mihalopoulos, 2007) (deGraaf, 2008)
Better Beginnings, Better Futures	Group child/parent/community intervention	Pre-birth - Age 4	Age 8	Ontario	Neighborhoods with "socioeconomic disadvantage"	Ontario Child Health Study child behavior problem subscales, Social skills rating scales	\$1475/child/year	N/A	N/A	(DeV. Peters, 2003)

Table 2: Early intervention programs in Alberta

Intervention Type	Name	Area	Program	Intake/Target Population
PT (group/individual)	Aboriginal Parent Link Centre	Stony Plain	Parenting classes; individual training	Universal
PT (group/individual)	Airdrie and area Parent Link Centre	Airdrie	Parenting classes; individual training	Universal
PT (group)	Alberta Parenting for the Future Association	Edmonton	Parent training/early childhood classes	Universal/self-referral
PT (individual)	Aspen and Family Community Network Society	Calgary	Home visitation	Referred through Child and Youth Services
PT (group/individual)	Awo Taan Family Wellness Centre Parent Link	Calgary	Parenting classes; individual training	Universal
PT (individual/group)	Bent Arrow Traditional Healing Society	Edmonton	Health Families home visitation program; parenting classes	Aboriginal
PT (group)	Bissell Centre Early Childhood Development	Edmonton	Parenting classes/prenatal information	Low income
PT (group/individual)	Bow Valley Parent Link Centre	Banff	Parenting classes; individual training	Universal
PT (group/individual)	Bow Valley Parent Link Centre	Canmore	Parenting classes; individual training	Universal
PT (individual)	Boyle Street Community Services	Edmonton	Home visitation program/prenatal information	Low income (serves low income neighborhood)
PT (group/individual)	Calgary Immigrant Women's Association	Calgary	Parenting classes (hand in hand); home visitation	Immigrant/refugee families
PT (group)	Candora Society of Edmonton	Edmonton	Parenting classes/prenatal information/childcare	Low income (serves low income neighborhood)
Parent Training (PT) group/individual	CASA-Child, Adolescent, and Family Mental Health	Edmonton	Clinical services; Home visitation	Referred through Child and Youth Services
PT (group/individual)	Catholic Family Services	Calgary	Parenting classes; teen mother mentoring	"Focus on the poor and working poor"
PT (individual)	Catholic Social Services	Edmonton	Family Based interventions; play therapy	Referred through CYS
PT (group/individual)	CCIS- The New Family Place Parent Link Centre	Calgary	Parenting classes; individual training	Universal
PT (group/individual)	Children's Cottage Society	Calgary	Parenting classes; home visitation	"Preventing harm and neglect" for vulnerable families

Intervention Type	Name	Area	Program	Intake/Target Population
PT (group/individual)	Closer to Home	Calgary	In-home visitation; parenting classes	At-risk families
PT (group)	Dickinsfield Amity House	Edmonton	Parent support: family support working assisting parents; parenting group - 1, 2, 3, 4 Parents program for parenting preschoolers	Low income
PT (group/individual)	Families First Fort Saskatchewan/Sturgeon Parent Link Centre	Fort Saskatchewan	Parenting classes; individual training	Universal
PT (group)	Families Matter Calgary	Calgary	Parenting classes	Universal (has a small fee for services)
PT (group/individual)	Family Pride Parent Link Centre	Calgary	Parenting classes; individual training	Universal
PT (group)	Fort Saskatchewan Families First Society	Edmonton	Parenting classes	Universal/self-referral
PT (group/individual)	High Prairie & District Children's Resource Council	High Prairie	Parenting classes/one on one training (not in home)	Universal/self-referral
PT (group/individual)	High River and District Parent Link Centre	High River	Parenting classes; individual training	Universal
PT (group/individual)	KARA Family Resource Centre	Edmonton	Parenting classes: Nobody's Perfect, class for parents of children 0-3; COPEing with toddler behavior (24-36 months); in-home family support	Low income, single mothers; Parent Link Center
PT (group/individual)	KARA Family Resource Centre	Edmonton	Parenting classes; individual training	Universal
PT (group/individual)	Kidz 1st Parent Link Centre	Chestermere	Parenting classes; individual training	Universal
PT (group/individual)	Kidz 1st Parent Link Centre	Strathmore	Parenting classes; individual training	Universal
PT (group/individual)	Lakeland Parent Link Network	Bonnyville	Parenting classes; individual training	Universal
PT (group/individual)	Lakeland Parent Link Network	St. Paul	Parenting classes; individual training	Universal
PT (group/individual)	Leduc County Family and Community Support Services	Edmonton	Home visitation; parenting classes	Universal/self-referral
PT (group/individual)	Mill Woods Family Resource Centre	Edmonton	One-on-one parent training; parenting classes; home visitation	"Less advantaged" - Young, single, low income, limited formal education, or geographically, socially or linguistically isolated

Intervention Type	Name	Area	Program	Intake/Target Population
PT (group/individual)	Multicultural Health Brokers Cooperative	Edmonton	"Culturally responsive" parenting classes; home visitation	New immigrants and refugee families
PT (group/individual)	North Central Family Connections Parent Link Centre Calgary	Calgary	Parenting classes; individual training	Universal
PT (group/individual)	Northern Links Parent Link Network	Athabasca	Parenting classes; individual training	Universal
PT (group/individual)	Northern Links Parent Link Network	Slave Lake	Parenting classes; individual training	Universal
PT (group/individual)	Northern Links Parent Link Network	Wabasca	Parenting classes; individual training	Universal
PT (group/individual)	Norwood Child and Family Resource Centre	Edmonton	Parenting program; home visits	Assessed as "high risk" by RN; low income
PT (group)	Parent Link Centres	Edmonton	Parenting classes/prenatal information	Universal/self-referral
PT (group/individual)	Parent Link West Network	Edson	Parenting classes; individual training	Universal
PT (group/individual)	Parent Link West Network	Hinton	Parenting classes; individual training	Universal
PT (group/individual)	Parent Link West Network	Jasper	Parenting classes; individual training	Universal
PT (group/individual)	Parkland Parent Link Centre	Spruce Grove	Parenting classes; individual training	Universal
PT (group/individual)	Parkland Parent Link Centre	Stony Plain	Parenting classes; individual training	Universal
PT (individual)	Pathways CSA	Calgary	In-home visitation	Aboriginal
PT (group/individual)	Pembina Gateway Parent Link Network	Barrhead	Parenting classes; individual training	Universal
PT (group/individual)	Pembina Gateway Parent Link Network	Swan Hills	Parenting classes; individual training	Universal
PT (group/individual)	Pembina Gateway Parent Link Network	Westlock	Parenting classes; individual training	Universal
PT (group/individual)	Pembina Gateway Parent Link Network	Whitecourt	Parenting classes; individual training	Universal
PT (group/individual)	St. Albert Parents' Place Association	Edmonton	Home visitation/preschool; "preventative social services"; parent-child classes focusing on "interaction"	Universal/self-referral
PT (group)	Strathcona County Family and Community Services	Edmonton	Family parenting skills training	Universal/self-referral
PT (group/individual)	Strathcona County Parent Link	Sherwood Park	Parenting classes; individual training	Universal

Intervention Type	Name	Area	Program	Intake/Target Population
PT (group/individual)	Terra Centre for Pregnant and Parenting Teens	Edmonton	Parenting classes; home visitation	Pregnant girls/parents under 20
PT (group/individual)	The Native Network Parent Link Centre	Calgary	Parenting classes; individual training	Universal
PT (group/individual)	Unity Centre	Edmonton	Early Intervention Program; Health for Two; Parents' group classes	Universal - "access support without referral/intake"; low income
PT (individual)	Vermilion Brighter Beginnings	Vermilion	Home visitation; included in program including preschool, summer program, community outreach	Universal
PT (group/individual)	West Edmonton Parent Link Program	Edmonton	Parenting classes; individual training	Universal
PT (group/individual)	Western Rocky View Family & Resource Centre	Cochrane	Parenting classes; individual training	Universal
PT (group/individual)	Western Rocky View Parent Link Centre	Cochrane	Parenting classes; individual training	Universal
PT (group)	YWCA/COMPASS	Calgary	Home visitation	At risk for "social, emotional, and behavioral concerns"

Table 3: Cost of implementation of Triple P program in Alberta

Level	Program	Training the Professionals	Wages of Professionals	Materials	Total Cost
1	Universal - Stay Positive	\$ 20,800	XXX	XXX	\$ 26,000
2	Select Seminar	\$ 14,866	\$ 34,320	\$ 33,638	\$ 82,824
2	Brief PC	\$ 9,671	\$ 114,400	\$ 52,767	\$ 176,838
3	Primary Care	\$ 57,696	\$ 600,600	\$ 33,416	\$ 791,712
3	Discussion Groups	\$ 12,379	\$ 85,800	\$ 2,650	\$ 150,829
4	Standard	\$ 21,258	\$ 1,601,600	\$ 61,425	\$ 1,684,283
4	Group	\$ 32,906	\$ 111,540	\$ 7,648	\$ 232,094
5	Enhanced/Pathways	\$ 14,492	\$ 274,560	\$ 48,438	\$ 337,490
5	Family Transitions	\$ 5,654	\$ 251,680	\$ 7,550	\$ 274,884
5	Lifestyle	\$ 2,433	\$ 18,876	\$ 11,671	\$ 32,980
		\$ 192,153	\$ 3,093,376	\$ 99,203	\$ 3,784,732

Table 4: Percent of group experiencing adverse outcomes

Jurisdiction where outcome experienced	Outcome	Number of times outcome occurs and timing for each person who experiences it	Group with no conduct disorder	Group with conduct disorder	Cost of outcomes
Justice system	Person arrested and convicted (non-traffic)	Once at age 18	4.2%	19.5%	\$5,987
	Person ever imprisoned (adult)	Once at age 18	0.4%	7.6%	\$40,862
Mental health	Person was diagnosed with major depression/anxiety	Annual (10-18)	26.9%	42.1%	\$794
		Annual (18-25)			\$495
Education	School supplement for children with emotional difficulty	Annual (school age 6-18)	Do not receive supplement	3.5% of conduct disorder group	\$15,571
Social Services	Foster Care	Annual (3-18)	2.0%	19.0%	\$44,000
	Income Support	Annual (18-25)	8.5%	32.6%	\$13,465

Table 5: Lifetime cost of conduct disorder

		Lifetime Cost
Justice system	Arrested convicted (non-traffic)	\$1,089,537
	Ever imprisoned (adult)	\$2,898,220
Mental health	Diagnosed with Major depression/ anxiety	\$4,983,903
Education	Supplement for children with emotional difficulty	\$10,505,392
Social Services	Foster Care	\$9,031,757
	Income Support	\$27,440,775
Lifetime costs of adverse events		\$55,949,584

Table 6: Net benefit of Triple P intervention program

		Without Triple P	With Triple P				
		No reduction in conduct disorder incidence	1% reduction	5% reduction	10% reduction	25% reduction	48% reduction
Justice system	Arrested convicted (non-traffic)	\$1,089,537	\$ 1,078,642	\$ 1,035,060	\$ 980,583	\$ 817,153	\$ 566,559
	Ever imprisoned (adult)	\$2,898,220	\$ 2,867,436	\$ 2,751,580	\$ 2,606,760	\$ 2,172,300	\$ 1,506,128
Mental health	Diagnosed with Major depression/ anxiety	\$4,983,903	\$ 4,934,064	\$ 4,734,708	\$ 4,485,513	\$ 3,737,927	\$ 2,591,629
Education	Supplement for children with emotional difficulty	\$10,505,392	\$10,400,338	\$ 9,980,122	\$ 9,454,853	\$ 7,879,044	\$5,462,804
Social Services	Foster Care	\$ 9,031,757	\$ 8,941,439	\$ 8,580,169	\$ 8,128,581	\$ 6,773,818	\$ 4,696,514
	Income Support	\$27,440,775	\$27,166,368	\$26,068,737	\$24,696,698	\$20,580,581	\$14,269,203
Total costs of adverse events		\$55,949,584	\$55,388,287	\$53,150,376	\$50,352,988	\$41,960,823	\$29,092,837
Cost savings (Cost with Triple P-Cost without Triple P)		\$0	\$ 561,297	\$ 2,799,208	\$ 5,596,596	\$13,988,761	\$26,856,747
Net benefit (cost savings-cost of Triple P)		(\$3,784,732)	(\$3,223,435)	(\$ 985,524)	\$ 1,811,864	\$10,204,029	\$23,072,015



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