

# The PAX Program in Manitoba: A Population-Based Analysis of Children's Outcomes



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## About the Manitoba Centre For Health Policy

The Manitoba Centre for Health Policy (MCHP) is located within the Department of Community Health Sciences, Max Rady College of Medicine, Rady Faculty of Health Sciences, University of Manitoba. The mission of MCHP is to provide accurate and timely information to healthcare decision-makers, analysts and providers, so they can offer services which are effective and efficient in maintaining and improving the health of Manitobans. Our researchers rely upon the unique Manitoba Population Research Data Repository (Repository) to describe and explain patterns of care and profiles of illness and to explore other factors that influence health, including income, education, employment, and social status. This Repository is unique in terms of its comprehensiveness, degree of integration, and orientation around an anonymized population registry.

Members of MCHP consult extensively with government officials, healthcare administrators, and clinicians to develop a research agenda that is topical and relevant. This strength, along with its rigorous academic standards, enables MCHP to contribute to the health policy process. MCHP undertakes several major research projects, such as this one, every year under contract to Manitoba Health, Seniors and Active Living. In addition, our researchers secure external funding by competing for research grants. We are widely published and internationally recognized. Further, our researchers collaborate with a number of highly respected scientists from Canada, the United States, Europe, and Australia.

We thank the Health Research Ethics Board at the University of Manitoba for their review of this project. MCHP complies with all legislative acts and regulations governing the protection and use of sensitive information. We implement strict policies and procedures to protect the privacy and security of anonymized data used to produce this report and we keep the provincial Health Information Privacy Committee informed of all work undertaken for Manitoba Health, Seniors and Active Living.



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# Report Overview

PAX (also known as the PAX Good Behavior Game®) is a school-based mental health promotion strategy developed to improve mental, emotional, behavioural, and academic outcomes in children and youth by teaching children to manage their behaviours and feelings, and collaborate with others to create peaceful and happy classrooms. A cluster randomized controlled trial (RCT) of PAX was implemented by Healthy Child Manitoba in the 2011-12 school year and about 200 schools participated. The cluster RCT involved providing PAX training to grade 1 teachers in about half of these schools in 2011-12. The goal of this study was to investigate the effectiveness of PAX in improving educational outcomes, promoting health, and preventing mental illness in young children.

The specific objectives of this report were to:

1. Transfer data on the PAX program to the Manitoba Population Research Data Repository (Repository) and conduct a quality assessment of the data; and
2. Evaluate the effectiveness of the PAX program in Manitoba, using PAX program data linked with administrative data in the Repository.

## Methods

This study started by transferring PAX program datasets collected and held at the Healthy Child Manitoba Office to the Repository housed at the Manitoba Centre for Health Policy (MCHP). The PAX data underwent MCHP's systematic Data Quality Assessment to determine the capability of linking the data to routinely collected administrative data already held in the Repository. The data in the Repository are de-identified but linkable at the individual level using a scrambled identifier.

There were 4,676 grade 1 students in our 2011-12 school year study cohort. Of these, 2,576 were in classrooms that had been randomly assigned to receive the PAX program ("exposed"), and 2,100 were in classrooms randomly assigned to not receive PAX ("unexposed"). PAX was implemented in the exposed classrooms in the second half of the school year. In this study we produced descriptive statistics and multivariable regression models comparing exposed and unexposed students on a number of different outcomes. For most of the analyses we compared outcomes for exposed to unexposed students in the post-PAX period (after June 30, 2012 and up to March 31, 2015), adjusting for any differences that existed between the groups of students in the pre-PAX period (before January 1, 2012). The outcomes that we were able to examine from the Repository to evaluate the effectiveness of the PAX program included educational assessments and enrolments, physical and mental health outcomes, and involvement with child welfare services (see Table E.1; this table also appears in Section 3 as Table 3.2). We also had measures of student behaviour in grade 1 available from the Strengths and Difficulties Questionnaire (SDQ) for a subset of the study cohort.

All teachers assigned to the unexposed group in 2011-12 (n=142) were offered PAX training for the following school year (that is, 2012-13); 70 (49.3%) of these teachers received PAX training for 2012-13. We compared outcomes for students in grade 1 with these teachers in 2011-12 (unexposed to PAX) to outcomes for students in grade 1 with these same teachers in 2012-13 (exposed to PAX), referred to as the Replication Cohort.

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PAX Good Behavior Game® is a registered trademark of PAXIS Institute.

**Table E.1: Outcomes Examined in the PAX Study**

Outcomes
<ul style="list-style-type: none"> <li>• Strengths and Difficulties Questionnaire (SDQ) (subset of the PAX cohort)</li> <li>• Grade 3 Numeracy Assessment</li> <li>• Grade 3 Reading Assessment</li> <li>• Grade Repetition</li> <li>• Receipt of Special Education Funding for Emotional/Behavioural Disorder (EBD)</li> <li>• Child Hospitalized for an Injury</li> <li>• Child Mental Disorder Diagnosis: <ul style="list-style-type: none"> <li>- Attention-Deficit Hyperactivity Disorder (ADHD)</li> <li>- Conduct Disorder</li> <li>- Mood and Anxiety Disorder</li> </ul> </li> <li>• Child in Care of Child and Family Services (CFS)</li> <li>• Child in Family Receiving Protection or Support Services from Child and Family Services (CFS)</li> <li>• Maternal Mental Disorder Diagnosis (Any Diagnosis of Mood and Anxiety Disorder, Personality Disorder, Schizophrenia, or Substance Use Disorder)</li> </ul>

## Results

While random assignment reduces the chance of systematic differences between groups prior to exposure to an intervention, it does not totally eliminate this possibility. We found several statistically significant differences between the students in the exposed and unexposed groups in the pre-PAX period. These differences indicated that even before the PAX intervention was carried out (i.e., at baseline), students in the exposed group had more characteristics that put them at risk of poorer health and school performance than students in the unexposed group. Therefore, the two groups of students did not start off equally.

For the analysis of the SDQ, the pattern of results showed that students exposed to PAX started out (prior to PAX exposure) with more behaviour problems, but after PAX implementation they no longer differed from the unexposed students. For one type of behaviour measured by the SDQ - prosocial behaviour - the exposed group had better scores than the unexposed group after PAX implementation. This pattern suggests that the students in the exposed group had more behaviour problems before PAX, and the PAX program significantly improved student behaviours during grade 1. For all other outcomes (besides SDQ) shown in Table 3.2, we found no statistically significant differences between the groups in the post-PAX period. It should be kept in mind that although we were able to adjust for some of the pre-existing differences between the exposed and unexposed groups in our regression analyses, there may have been other characteristics that differed between the groups (e.g., parental support at home), that we could not measure or adjust for in our study. Our analysis of the Replication Cohort yielded similar patterns of results.

## Conclusion

We found that PAX resulted in decreases in problem behaviours and increases in prosocial behaviour in the year that it was implemented. We found no differences between students exposed and not exposed to PAX in outcomes measured in grade 3 or later, till March 31, 2015; however, given the initial higher risk factors of the exposed group *before* PAX implementation, this may signal improvements associated with PAX. Longer-term follow-up for differences in mental health and suicidal behaviours is warranted.

## Section 1: Introduction

PAX (also known as the PAX Good Behavior Game or PAX GBG) is a school-based mental health promotion strategy that was developed to improve mental, emotional, behavioural and academic outcomes in children and youth. The goal of PAX is to teach children to manage their behaviours and feelings, and to collaborate with others to create peaceful and happy classrooms. It is thought that by learning these skills, children will become more resilient and capable of facing the challenges in their lives. Mental health promotion (or programs that build resilience) are relatively new in Canada, and rigorous evidence regarding what works to promote health and prevent mental illness is minimal. At any point in time, 14% of Canadian children and youth experience a mental health disorder, underscoring the need for effective programs to prevent mental illness [1,2]. The goal of this study was to provide evidence about the effectiveness of PAX in improving educational outcomes, promoting health and preventing mental illness in Manitoba, Canada. This report was conducted by the Manitoba Centre for Health Policy (MCHP) on behalf of Manitoba Health, Seniors & Active Living (MHSAL), at the request of the Healthy Child Committee of Cabinet (HCCC).

### Background on PAX

PAX enhanced the first generation of the Good Behavior Game (GBG)<sup>™</sup> by adding a set of evidence-based interventions, taken from the applied behavioural field and incorporated into the normal instructional activities of the classroom [3,4].<sup>1</sup> Pax is the Latin word for peace; as a part of PAX, students create a vision of an ideal classroom, using detailed lists of what they would like to see, hear, do, and feel more of, as well as less of, each day. Several times a day, students play PAX during a regular school activity on rotating, cooperative teams. Every team can win simple, fun activity rewards and more PAX Minutes (the goal) by refraining from unwanted impulsive or inattentive behaviours defined for that activity.

The GBG is one of the few evidence-based approaches that has been shown to reduce suicidal behaviours in youth [5–7]. Previous research has linked GBG to other improved outcomes for children and youth, including decreasing tobacco, alcohol and drug use [8], preventing emotional and behavioural problems [9,10], reducing antisocial personality disorders and criminal behaviours [11], and improving academic achievement [12]. Most of this research has been done in lower- to moderate-income urban and predominantly African-American samples. More recent studies focusing on PAX GBG have found decreased hyperactivity and increased prosocial behaviour [13] and small improvements in reading and math scores [14], with results varying according to program fidelity [13] as well as sex and socioeconomic status [14].

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The Good Behavior Game<sup>™</sup> is a trademark of PAXIS Institute

1 Components were added to the GBG to increase its social acceptability and address barriers for adoption[28], including academic elements, Peacebuilders [3] and other simple evidence-based strategies [4].

## PAX in Manitoba

Based on these positive previous findings, the Healthy Child Manitoba Office (HCMO) within the government of Manitoba invited all grade 1 teachers in the province to implement PAX in the 2011-12 school year. Almost 200 schools representing 35 of the 37 school divisions expressed interest. Due to resource constraints, the implementation plan for PAX was to introduce it to the interested schools over a two-year period. This allowed HCMO to set up a study design known as a cluster randomized controlled trial (cluster RCT), meaning that teachers from half of the schools were randomly assigned to receive PAX training in the 2011-12 school year, whereas in the remaining schools, teachers were offered the training in the 2012-13 school year [15,16]. Thus, about half of the schools were “exposed” to PAX in 2011-12, with the other half “unexposed” in that school year. HCMO collected data on both exposed and unexposed schools in the 2011-12 school year. The teacher training involves a 2-day workshop on PAX as well as materials required to implement PAX in the classroom.

## Objectives of this Report

This report used a combination of PAX program information collected by HCMO, and routinely collected health, education and social services administrative data held at MCHP to determine whether students’ outcomes were improved by participating in PAX. Because the PAX datasets (described in Section 2) were new to MCHP and brought in as part of this study, they underwent MCHP’s systematic Data Quality Assessment. We also conducted a variety of checks to determine the feasibility of using these data for examining the effectiveness of PAX, and the capability of linking the information in the datasets to information in the Manitoba Population Research Data Repository (Repository) at MCHP for analysis (described in Section 2). The measures that we were able to examine using the data held in the Repository included educational assessments and measures, physical and mental health outcomes, and involvement with child welfare services.

## Section 2: Data Used in This Report

This report used PAX program data collected by HCMO linked with data contained in the Repository, which is housed at MCHP at the University of Manitoba.

The specific objectives of this study were:

1. To transfer data on the PAX program to the Repository and determine the quality of the PAX data, including completeness and ability to link to other data in the Repository; and
2. To evaluate the effectiveness of the PAX program in Manitoba, using PAX program data linked with health, education and social services data in the Repository.

All management, programming and analyses of these data were performed using SAS® statistical analysis software, version 9.4.

### Data Sources

The Repository is a comprehensive collection of administrative, registry, survey, and other data primarily relating to residents of Manitoba. It can be used to describe and explain patterns of healthcare and social service use as well as profiles of health, illness, and social determinants of health, facilitating inter-sectoral research in areas such as healthcare, education, and social services. All data are de-identified before being transferred to MCHP. All datasets contain a scrambled version of the Personal Health Identification Number (PHIN) which allows for person-level, anonymous linkage across datasets and over time. Along with the PAX data brought in specifically for this study, a list and description of other datasets used in this report can be found in Appendix Table 1.

### Data Acquisition

MCHP has developed a protocol for evaluating the quality and completeness of new datasets deposited into the Repository [17]. A Data Quality Report was generated for PAX and can be found at: <http://mchp-appserv.cpe.umanitoba.ca/deliverablesList.html>. It is essential to assess data quality whenever secondary data are used for research. MCHP has developed a Data Quality Framework based on reviews of existing secondary data quality frameworks from other organizations including the Canadian Institute for Health Information, Statistics Canada, and the Australian Bureau of Statistics. This Data Quality Framework provides a standardized and routinized approach to evaluating the quality of administrative data in the Repository [17].

There are two components to this Framework:

1. Data-specific quality, which generates measures that can be produced with minimal linkages among de-identified data in the Repository; and,
2. Project-specific quality, which generates measures that are investigated within a defined research project and require linkages.

MCHP has developed a number of SAS macros, or standardized SAS programs, that automate the data evaluation process used in the Data Quality Framework. For example, macros are used to produce information about the percentage of valid, invalid, missing, and outlying observations for each field in a dataset, and for fitting lines or curves to temporal data series to identify potential outliers. The information generated by these macros is useful not only for exploring data quality, but for identifying potential problems with the data that may affect analyses and interpretation of findings. Further information about the MCHP Data Quality Framework can be found at: [http://umanitoba.ca/faculties/health\\_sciences/medicine/units/chs/departmental\\_units/mchp/resources/repository/dataquality.html](http://umanitoba.ca/faculties/health_sciences/medicine/units/chs/departmental_units/mchp/resources/repository/dataquality.html).

There were five separate program datasets transferred to MCHP for this study: PAX participation, PAX Early Development Instrument, pre- and post-PAX Strengths and Difficulties Questionnaires (SDQ), program fidelity survey, and PAX teacher training data.

The process of transferring data to MCHP requires de-identification. Manitoba Health acts as a third party that receives identifying information but no program data in order to create a “cross walk” file for linkage. To do this, a scrambled PHIN is added to the cross walk file, along with the program number provided by the data provider (in this case, the scrambled student number provided by HCMO). The identifying information is then removed so that the cross walk consists of two numbers that permit linkage of program data (in this case the PAX project data) to other databases in the Repository.

The data provider (in this case, HCMO) creates a separate set of program (PAX project) data for MCHP that has all information identifying the individual removed, but includes the scrambled program number, and then sends it separately to MCHP. Program data, like those provided by HCMO for this project, generally arrive at MCHP consisting of one or more data files in varying formats. These files are converted to a form suitable for data analysis at MCHP and are made internally coherent. Some preliminary testing, validation, data cleaning and recoding of values is done to ensure the data conform to MCHP standards. Format files (codes and labels) are made available in SAS.

The Data Quality Report for the PAX data indicated that the majority of variables were good quality, in that there were very few variables with invalid values. The linkage to the Manitoba Health Insurance Registry (98%) was excellent. The Data Quality Report showed that some of the variables had minimal potential issues with data quality, however many have missing values. The Participant table had a moderate degree (20-25%) of missing or invalid birth year and/or month and a significant degree (51%) of missing or invalid postal code information. However, this was not a concern for this study because this information could also be retrieved from the datasets in the Repository once the records were linked. The SDQ data containing measures of student behaviour were better filled out in the pre- (85%) than the post-PAX (63%) period. Teacher surveys on fidelity of PAX implementation were available for less than half (48.3%) of the eligible teachers. See Section, *Defining “High Fidelity” Teachers*, in the Appendix for more information.

A discussion of the findings from linking the PAX participation information (i.e., which students, teachers and schools participated in the PAX cluster RCT) with other datasets in the Repository, as well as agreement between variables from different data sources, can be found in the next Section.

## Section 3: Methods and Definitions

In June of 2011, HCMO invited all grade 1 teachers in Manitoba to be part of the PAX RCT in the 2011-12 school year.<sup>2</sup> Almost 200 schools (n=196) accepted this offer and were randomly assigned to receive teacher training for PAX in 2011-12 ("exposed" to PAX) or to be part of the control group that did not receive teacher training for PAX in 2011-12 ("unexposed" to PAX). Teachers in the unexposed group were offered training the next year (for the 2012-13 school year). Information about which schools, teachers, and students were assigned to the exposed group and which were assigned to the unexposed group was collected by HCMO, along with other PAX program data (e.g., SDQ) described in Section 2. We used this information to develop the study cohort for our evaluation of the PAX program.

Figure 3.1 shows how we developed the grade 1 cohort for the study. The PAX participation data from HCMO included 6,383 records for students who had participated in the PAX clustered RCT. A small percent of these records had no student number (known as the MET number; 109 students, 1.7%) or valid PHIN (12 students, 0.2%), so were excluded from the study cohort because they could not be linked to Repository data. We then used scrambled PHINs to link the remaining 6,262 records to enrolment data from Manitoba Education & Training held in the Repository. Using the enrolment data, we examined how many of the 6,262 records were students enrolled in grade 1 in the 2011-12 school year. We found that 1,541 (about 25%) of the 6,262 records were for students who were not in grade 1. Because this was a study of the effectiveness of the PAX program for grade 1 students, we excluded the records for students who received PAX in the 2011-12 school year but were not enrolled in grade 1. Additional details about the identification of grade 1 students for the study cohort can be found in Appendix Figure 1.

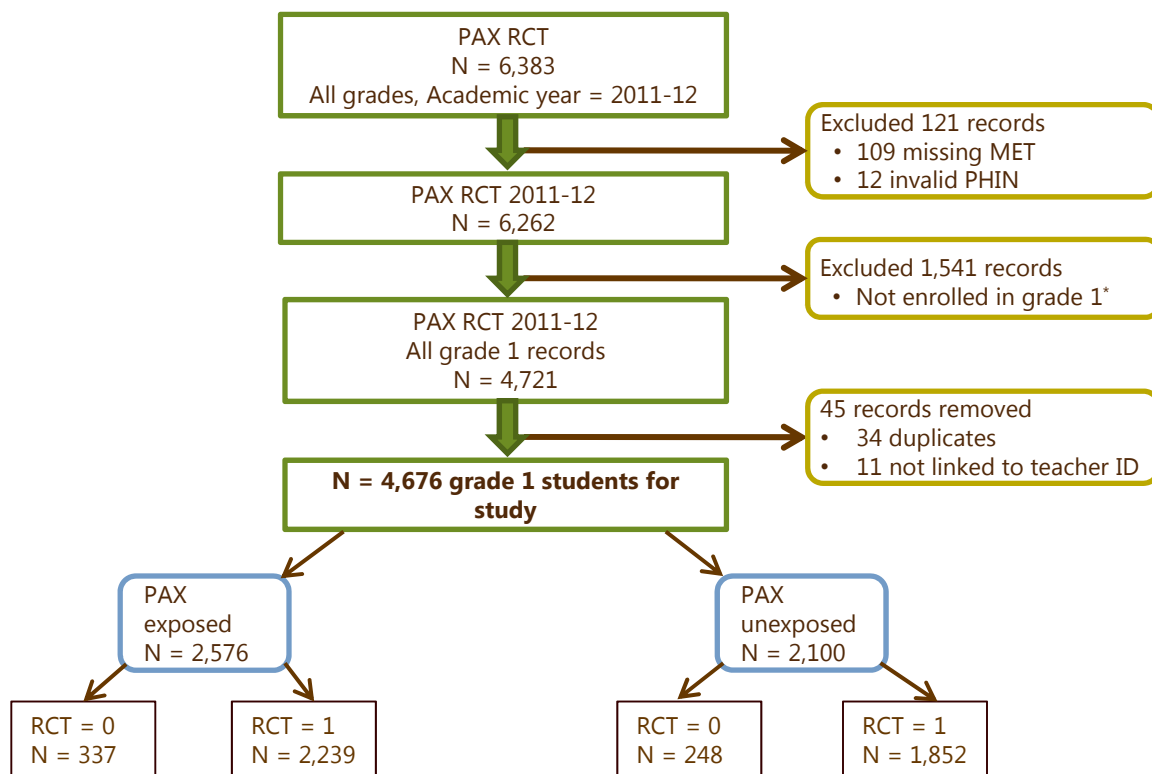
After removing students who were not in grade 1 in the 2011-12 school year, 4,721 records remained. We excluded an additional 45 records: 34 were duplicates and 11 could not be linked to a teacher ID (so it could not be determined whether they were in a classroom that received or did not receive PAX). Thus, there were 4,676 grade 1 students in our final study cohort. Of these, 2,576 were in classrooms that had been randomly assigned to receive the PAX program ("exposed" in Figure 3.1), and 2,100 were in classrooms randomly assigned to not receive PAX ("unexposed" in Figure 3.1). After the random assignment was done by HCMO, some schools or classrooms decided NOT to participate in the PAX RCT – the students in these classrooms or schools are indicated in Figure 3.1 as "RCT=0"; students who were in classrooms/schools that chose to remain in the PAX RCT are shown as "RCT=1." Although we know that the students who were RCT=0 did not participate in the PAX RCT, for analyses they were kept in the study cohort. This is known as "intention to treat" and not only helps to retain balance between the exposed and unexposed groups, but also reduces bias in results [18]. As a sensitivity analysis, we re-ran all analyses excluding the students who were RCT=0 to determine whether including or excluding these students made a difference to the results.

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2 The invitation letter was sent to the following: Manitoba Association of School Superintendents, Chairs of School Boards, Manitoba School Board Association, Manitoba First Nations Education Resource Centre, Manitoba Teachers' Society, Manitoba Association of Parent Councils, and school principals.

**Figure 3.1: Formation of 2011-12 PAX Grade 1 Study Cohort**

Inclusion and Exclusion Criteria



\* See Appendix Figure 1 for details on the identification of grade 1 students

As part of our examination of the effectiveness of PAX, we were also interested in determining whether there were differences between schools/classrooms that took the opportunity to be part of the PAX RCT and those that did not. Using the Manitoba Education & Training enrolment data we selected all schools in Manitoba with grade 1 students in the 2011-12 school year and separated them into those that initially agreed to participate in the PAX RCT (i.e., the schools that the 4,676 students attended in 2011-12, shown in Figure 3.1) and those that did not.

## Study Period

The PAX RCT took place in the second half of the 2011-12 school year. There were a number of different training dates for teachers whose schools were randomly assigned to the exposed group. Table 3.1 shows that some teachers received their PAX training as early as November 2011 and some as late as March 2012. Under ideal conditions, teachers would have received training at the beginning of the school year and would have started implementing PAX in the classroom in September. To determine whether the amount of time children were exposed to PAX made a difference to outcomes, we re-ran analyses replacing the comparison between exposed and unexposed students with a categorical variable for number of days from training to end of school year (all students in the unexposed group were categorized as 0 days). Some teachers who were assigned to the exposed condition did not actually attend PAX training in the 2011-12 school year ( $n=6$ , or 3.5%); therefore, their students were also categorized as 0 days. As a further sensitivity analysis, we re-ran our analyses excluding teachers who did not receive training in the 2011-12 school year and the students in their classrooms to determine whether their inclusion or exclusion made a difference to the results. It should be noted that although we received data on the dates teachers in the exposed group received their PAX training, we did not have information for all these teachers



about whether they actually used the PAX program in their classrooms. Only half of the teachers who received training in the 2011-2012 school year (84/168, or 50%) filled out forms on the fidelity of PAX implementation. To determine whether fidelity of implementation affected the results, we re-ran analyses comparing outcomes for students of "high fidelity" teachers with unexposed students. Information on how fidelity was defined can be found in Appendix Table 7 (Technical Definitions).

**Table 3.1: PAX Training Dates for Teachers of Students in the Exposed Group for Academic Year 2011-12**

Training Date for Teachers who were Exposed to PAX	Teachers who Received PAX Training	
	Number	Percent
November 15, 2011	8	4.6
January 30, 2012	45	25.9
February 1, 2012	37	21.3
February 23, 2012	61	35.1
March 22, 2012	17	9.8
No Training*	6	3.4
<b>Total</b>	<b>174</b>	<b>100</b>

\* This category includes teachers with a 'missing training date' or teachers who received PAX training after June 30, 2012

For measuring students' outcomes, we divided the study period into three distinct phases:

1. Pre-PAX: defined as before implementation of PAX in exposed classrooms (before January 1, 2012<sup>3</sup>);
2. During PAX: defined as the time PAX was being implemented in the exposed classrooms (January 1, 2012 to June 30, 2012);
3. Post-PAX: defined as after the end of the school year (after June 30, 2012) and up to March 31, 2015.

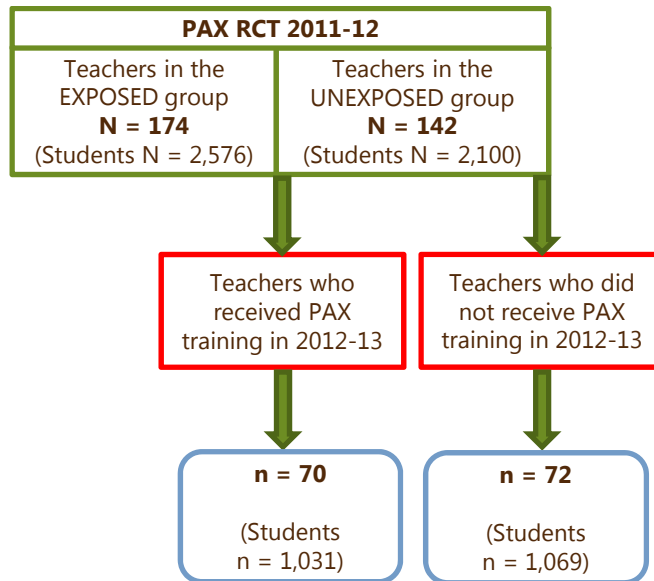
For most analyses, we compared outcomes for exposed students to outcomes for unexposed students in the post-PAX period, adjusting for any differences in pre-PAX measures (described in more detail in the section on regression analyses).

All teachers in the unexposed group in the 2011-12 PAX RCT were offered PAX training for the following school year, (i.e., 2012-13). Of the 142 teachers in the unexposed condition in 2011-12, 70 (49.3%) received PAX training in 2012-13 (see Figure 3.2).<sup>4</sup> For schools where these teachers taught in both 2011-12 and 2012-13, we compared outcomes for students in grade 1 with these teachers in 2011-12 (unexposed to PAX) to outcomes for students in grade 1 with these same teachers in 2012-13 (exposed to PAX). We refer to this group of teachers and their students as the Replication Cohort. The number of students included in this comparison is shown in Figure 3.2.

3 For the eight teachers in the exposed group who received their training prior to January 1, we checked to make sure that measures defined as occurring in the "pre-PAX period" for their students did not occur only between their date of PAX training and December 31, 2011.

4 Although all teachers in the unexposed condition in 2011-12 were offered PAX training in the following year, there are many reasons why only half of the teachers actually received the PAX training in the 2012-13 school year, including personal choice and no longer teaching in that particular school or grade.

**Figure 3.2: Formation of the Replication Cohort of Grade 1 Students Whose Teachers were in the Unexposed Group in 2011-12, but Who Received PAX Training in the 2012-13 School Year**



## Outcomes Examined

In order to determine whether there were differences between students exposed and students not exposed to PAX, we examined a number of different outcomes, listed in Table 3.2. The first outcomes we examined were derived from the Strengths and Difficulties Questionnaire (SDQ). The SDQ is a questionnaire that teachers fill out for each student that measures their behaviour across five domains: emotional behaviour (e.g., often unhappy, down-hearted, or tearful); hyperactivity (e.g., restless, overactive, cannot sit still for long); conduct disorder (e.g., often fights with other children or bullies them); peer relationships (e.g., rather solitary, tends to play alone) and prosocial behaviour (e.g., considerate of other people's feelings) [19]. Teachers in the PAX RCT were asked to fill out the SDQ for each student in their classroom prior to implementing PAX (for exposed classes). In the unexposed classes, most teachers filled out the SDQs in February. We refer to this as the pre-PAX SDQ. Teachers in both the exposed and unexposed groups were also asked to fill out the SDQ for all students at the end of the school year, referred to as the post-PAX SDQ. If PAX had a positive effect on students' behaviour, it was expected that students in the exposed group would show greater improvement in SDQ scores between pre- and post-PAX SDQ than students in the unexposed group. Pre- and post-SDQs were not available for all students in the PAX RCT; this created the potential that results would be biased, particularly if those students with both pre- and post-SDQs (what we refer to as "complete SDQs") were different from those without complete SDQs. We adjusted our analyses so that those with complete SDQs were representative of the entire study cohort. Details of this adjustment and analysis can be found in the Appendix Figure 2.

**Table 3.2: Outcomes Examined in the PAX Study**

Outcomes
<ul style="list-style-type: none"> <li>• Strengths and Difficulties Questionnaire (SDQ) (subset of the PAX cohort)</li> <li>• Grade 3 Numeracy Assessment</li> <li>• Grade 3 Reading Assessment</li> <li>• Grade Repetition</li> <li>• Receipt of Special Education Funding for Emotional/Behavioural Disorder (EBD)</li> <li>• Child Hospitalized for an Injury</li> <li>• Child Mental Disorder Diagnosis: <ul style="list-style-type: none"> <li>- Attention-Deficit Hyperactivity Disorder (ADHD)</li> <li>- Conduct Disorder</li> <li>- Mood and Anxiety Disorder</li> </ul> </li> <li>• Child in Care of Child and Family Services (CFS)</li> <li>• Child in Family Receiving Protection or Support Services from Child and Family Services (CFS)</li> <li>• Maternal Mental Disorder Diagnosis (Any Diagnosis of Mood and Anxiety Disorder, Personality Disorder, Schizophrenia, or Substance Use Disorder)</li> </ul>

Besides the SDQ, a number of other outcomes were examined in the post-PAX period, comparing the students exposed and unexposed to PAX (see Table 3.2). These outcomes were defined using datasets from the Repository and were measured up to three years after the students had been in the PAX RCT in grade 1 in 2011-12. Additional details about these outcomes are found in Appendix Table 7 (Technical Definitions).

Four of the outcomes were defined using information from the Manitoba Education & Training 'Enrolment, Marks and Assessments' dataset:

1. Grade 3 Numeracy Assessments;
2. Grade 3 Reading Assessments;
3. Grade Repetition; and
4. Receipt of Special Education Funding for Emotional/Behavioural Disorders (EBD).

Five of the outcomes were defined using information from Manitoba Health records (including hospitalizations, physician visits and medications prescribed):

1. Hospitalizations for Injury;
2. Attention-Deficit Hyperactivity Disorder (ADHD);
3. Conduct Disorder;
4. Childhood Mood and Anxiety Disorders; and
5. Any of the three mental disorders above (ADHD, conduct disorder, childhood mood and anxiety disorders).

Finally, we examined three measures of family functioning using various sources of data from the Repository:

1. Children in Care of Child and Family Services (CFS);
2. Children Living in Families who were Receiving Protection or Support Services from CFS; and
3. Children whose Mothers were diagnosed with a Mental Disorder: Mood and Anxiety Disorder, Personality Disorder, Schizophrenia, or Substance Use Disorder.

## Analyses

We conducted three different sets of analyses in this study, all comparing groups of grade 1 students.

1. We compared students in schools that chose to participate in the PAX RCT (both exposed and unexposed to PAX) in the 2011-12 school year to students in schools that did not choose to participate.
2. We compared students exposed to PAX to students unexposed to PAX in the PAX RCT in 2011-12.
3. We compared students whose teachers did not receive PAX training in 2011-12 (unexposed in PAX RCT) to students of these same teachers who received PAX training in 2012-13 (Replication Cohort).

Each set of analyses included descriptive comparisons of the characteristics of students in the different groups. For the second and third sets of analyses we also ran regression models, which allowed us to examine differences in outcomes between groups of students while simultaneously controlling for pre-existing characteristics that could influence the outcomes.

### Regression Analyses for SDQ Outcomes

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As mentioned above, not all students in the PAX RCT had complete SDQs (that is, both pre- and post-PAX). Only 43.9% of the students in the PAX RCT had complete SDQs (see Appendix Figure 2). Because there was a possibility that the students who had complete SDQs differed in some way from those who did not, we adjusted our SDQ analyses to account for these possible differences. To do this, we used what we knew about how representative those with complete SDQs were of the whole study cohort, and developed inverse probability treatment weights (IPTWs) using propensity scores (further details available in the Appendix Figure 2). We then modeled the SDQ score for each of the five behavioural domains. For each of the five SDQ domains only students who had a complete SDQ (i.e., both a pre- and post-PAX SDQ) with three or more non-missing SDQ score values in their pre- and post-periods were included in the regression modeling. A Generalized Linear Regression Model including a Generalized Estimating Equation (GEE) and a weight statement was used to model the scores for each of the five SDQ domains. A GEE is used in longitudinal, nested or repeated measure studies because it can account for correlated data within clusters. In this case each student is their own cluster and the measures of interest are their pre- and post-SDQ scores. Therefore, the repeated subject was the student. A normal distribution with an identity link function was utilized; the identity link function is one of the available link functions applied in a regression model to model a continuous outcome.

### Regression Analyses for Other Outcomes

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For comparisons of students exposed and unexposed to PAX on the remaining outcome variables (defined from the Repository), we ran separate logistic regression models for each outcome. Since it was possible that even with random assignment, the exposed and unexposed groups could differ in their baseline characteristics before PAX implementation, we included in our regression models a number of different covariates related to the outcome of interest in order to adjust for potential imbalances between the two groups. The list of covariates used in the regression models can be found in Table 3.3.

As described above, we conducted several sensitivity analysis regressions:

1. Excluding students whose teachers or schools dropped out of PAX after randomization;
2. Excluding teachers in the exposed group who did not attend PAX training in the 2011-12 school year;
3. Including a measure of number of days exposed to PAX; and
4. Restricting the exposed group to include only those students whose teachers were categorized as “high fidelity.”

Knowing that PAX may be more effective for some groups of students than others [10,20], we also conducted a series of stratified analyses, stratifying students by sex, income quintile, mothers’ age at first birth, school location (urban/rural), family receipt of income assistance, and family involvement with Child and Family Services.

Generalized Linear Regression Models including GEEs produced odds ratios and 95% confidence intervals for each of our outcomes (see Table 3.2). As mentioned in the *Regression Analyses for SDQ Outcomes*, GEEs are used to account for clustering in the data, in this case, students clustered within teachers (i.e., to adjust for teacher effects). The teacher ID was used as the repeated subject. The models utilized a binomial distribution and logit link function. The logit, calculated as the log of the odds, is one of the available link functions applied in a regression model to model a binary outcome. In general, a p-value <0.05 was considered statistically significant. We used similar regression models for the Replication Cohort analyses.

**Table 3.3: List of Covariates used in the Regression Models**

<b>Categorical variables:</b>
Exposed to PAX
Male
Child Diagnosed with a Major Illness (ACG)
Child Diagnosed with a Conduct Disorder
Child Diagnosed with a Mood and Anxiety Disorder
Child Diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD)
Child in Care of Child and Family Services (CFS)
Child in Family Receiving Services from Child and Family Services (CFS)
Child "Not Ready" in One or More EDI Domains
Urban School*
Family Receipt of Income Assistance
Diagnosis of Maternal Mental Disorder
Maternal Justice Involvement**
<b>Continuous variables:</b>
Child's Age (in months)
Mother's Age at First Birth
Area-level SES of Child (SEFI)
Average Area-Level SES of Classroom (SEFI)

\* Urban school was defined as those within the borders of the six Winnipeg school divisions plus Brandon School Division, whereas rural schools were defined as all other schools.

\*\* As an accused, victim, witness or eye witness

Note: ACG represents Adjusted Clinical Groups®, a measure of health status



## Section 4: Results

### Comparing Schools that Participated in PAX to Schools that did not

There were 598 public and funded independent schools in Manitoba with students enrolled in grade 1 in 2011-12 and of those, one third (n=196, 32.8%) accepted the invitation to participate in the PAX RCT. Most schools in Manitoba are public schools and these also made up the majority (n=174, 88.8%) of the schools that chose to participate in the PAX RCT. Table 4.1 shows the characteristics of students in classrooms/schools that participated and did not participate in the PAX RCT. In general, schools that participated in the PAX RCT had students with higher risk factors for poorer health, social and school outcomes than students in schools that did not participate. Students in schools that participated in the PAX RCT had a slightly higher average age, were more likely to be from families receiving services from CFS, to be in care, in a rural school, from a family receiving income assistance, and have a lower area-level socioeconomic status (SES, as measured by the Socio-Economic Factor Index, SEFI – higher SEFI is indicative of lower SES). They were also more likely to live in the lowest two rural income areas and the lowest urban income area, and less likely to live in the highest two rural income areas and highest urban income area. Students in the PAX RCT schools were also more likely to live in the Prairie-Mountain, Interlake-Eastern, and Northern Health Regions than students whose schools did not participate in the PAX RCT.

**Table 4.1: Characteristics of all Grade 1 Students in Manitoba by Involvement in PAX RCT, 2011-12**

Variable	Students in schools that chose to Participate in PAX RCT N = 4,676	Students in schools that chose NOT to Participate in PAX RCT N = 9,304	p-value
<b>Child Characteristics</b>			
<b>Child's Age in Years (mean)</b>	<b>6.39</b>	<b>6.35</b>	<b>&lt;0.001</b>
Male (%)	50.15	51.30	0.37
Child Diagnosed with a Developmental Disability (%)	2.03	1.90	0.61
<b>Child in Care of Child and Family Services (CFS) (%)</b>	<b>7.61</b>	<b>4.85</b>	<b>&lt;0.0001</b>
<b>Child in Family Receiving Services from CFS (%)</b>	<b>16.32</b>	<b>11.94</b>	<b>&lt;0.0001</b>
<b>Not Ready EDI Domain</b>			
Child "Not Ready" in One or More EDI Domains (%)	23.03	22.47	0.51
<b>Maternal Characteristics</b>			
<b>Family Receipt of Income Assistance (%)</b>	<b>24.12</b>	<b>18.49</b>	<b>&lt;0.0001</b>
<b>Area-level SES* (SEFI) (mean)</b>	<b>0.32</b>	<b>-0.13</b>	<b>&lt;0.0001</b>
<b>School Characteristics</b>			
<b>Urban School (%)</b>	<b>42.09</b>	<b>63.62</b>	<b>&lt;0.0001</b>
<b>Health Regions</b>			
<b>Southern Health-Santé Sud (%)</b>	<b>15.98</b>	<b>19.55</b>	<b>&lt;0.0001</b>
<b>Winnipeg Regional Health Authority (%)</b>	<b>40.74</b>	<b>56.23</b>	<b>&lt;0.0001</b>
<b>Prairie Mountain Health (%)</b>	<b>15.33</b>	<b>12.73</b>	<b>&lt;0.0001</b>
<b>Interlake-Eastern RHA (%)</b>	<b>11.63</b>	<b>7.48</b>	<b>&lt;0.0001</b>
<b>Northern Health Region (%)</b>	<b>15.01</b>	<b>3.29</b>	<b>&lt;0.0001</b>
<b>Income Quintile</b>			
<b>R1 – Lowest Rural (%)</b>	<b>23.33</b>	<b>16.81</b>	<b>&lt;0.0001</b>
<b>R2 (%)</b>	<b>22.38</b>	<b>18.46</b>	<b>&lt;0.001</b>
<b>R3 (%)</b>	<b>16.79</b>	<b>18.96</b>	<b>&lt;0.05</b>
R4 (%)	21.78	22.20	0.73
<b>R5 – Highest Rural (%)</b>	<b>15.73</b>	<b>23.58</b>	<b>&lt;0.0001</b>
<b>U1 – Lowest Urban (%)</b>	<b>23.98</b>	<b>18.83</b>	<b>&lt;0.0001</b>
U2 (%)	19.54	17.83	0.13
U3 (%)	20.15	19.65	0.66
U4 (%)	19.39	20.51	0.34
<b>U5 – Highest Urban (%)</b>	<b>16.94</b>	<b>23.19</b>	<b>&lt;0.0001</b>

**Bold** type indicates values are statistically significant

\* Socioeconomic Status

## Comparing Students Assigned to the “Exposed” and “Unexposed” Groups in the pre-PAX Period

Recall from Figure 3.1, there were 4,676 students in grade 1 in 2011-12 who attended schools that participated in the PAX RCT; 55.1% (or 2,576) of these students were in schools that were randomly assigned to receive PAX in the classroom, whereas 44.9% (or 2,100) were in schools assigned to not receive PAX in 2011-12. We refer to the students in the schools assigned to receive PAX as “exposed” and the students in the school that did not receive PAX as “unexposed.”



Even though random assignment reduces the chance that there will be systematic differences between the exposed and unexposed groups prior to the intervention taking place, it does not totally eliminate this possibility. This is particularly the case in clustered RCTs [21]. Therefore, systematic differences are possible in our study given that several grade 1 classrooms may be found in one school. For this reason, the first comparison we made between the exposed and unexposed groups was of baseline characteristics in the pre-PAX period. Table 4.2 shows the results of this comparison. The table shows that there were several statistically significant differences between the students in the exposed and unexposed groups in the pre-PAX period. Taken together these differences indicate that before the PAX intervention was carried out, students in the exposed group had more characteristics that put them at risk of poorer health and school performance than students in the unexposed group. Students in the exposed group were more likely to have a major illness, have a diagnosis of ADHD, be in a family receiving protection or support services from CFS, have mothers who were younger at their first birth, be in a family receiving income assistance, have a lower mean emotional maturity score in kindergarten, and have a higher SEFI score (indicating lower SES). Students in the exposed group were also more likely to be from the lowest rural and urban income quintiles, as well as the highest rural income quintile, and less likely to be from the second lowest and second highest rural income quintiles, the second highest urban income quintile and from the Southern Health-Santé Sud Region.

**Table 4.2: Characteristics of Exposed vs. Unexposed Students in the Pre-PAX Implementation (baseline) Period**

Students in PAX RCT 2011-12

Variable	Exposed to PAX N = 2,576	Unexposed to PAX N = 2,100	p-value
<b>Child Characteristics</b>			
Child's Age in Years (mean)	6.40	6.37	0.08
Male (%)	49.69	50.71	0.62
<b>Child Diagnosed with a Major Illness (ACG) (%)</b>	<b>14.32</b>	<b>12.05</b>	<b>&lt;0.05</b>
Child Diagnosed with a Conduct Disorder (%)	2.14	1.90	0.58
Child Diagnosed with a Mood and Anxiety Disorder (%)	0.43	0.43	0.99
<b>Child Diagnosed with ADHD (%)</b>	<b>3.26</b>	<b>2.14</b>	<b>&lt;0.05</b>
Child Diagnosed with FASD (%)	0.04	0.19	0.15
Child Diagnosed with a Developmental Disability (%)	2.06	2.00	0.89
Receipt of Special Education Funding for Emotional/Behavioural Disorder (EBD) (%)	0.27	0.05	0.10
Children Hospitalized for an Injury (%)	1.13	0.90	0.46
Total Number of Injury Hospitalizations (mean)	0.01	0.01	0.33
Child in Care of Child and Family Services (CFS) (%)	8.15	6.95	0.14
<b>Child in Family Receiving Services from CFS (%)</b>	<b>18.05</b>	<b>14.19</b>	<b>&lt;0.01</b>
Child Justice Involvement* (%)	1.98	2.29	0.47
<b>Not Ready EDI Domain</b>			
Physical Health and Well-being (%)	11.99	11.81	0.87
Social Competence (%)	13.26	14.67	0.25
Emotional Maturity (%)	12.73	11.35	0.23
Language and Cognitive Development (%)	11.89	13.58	0.15
General Knowledge and Communication Skills (%)	12.52	12.21	0.79
Child "Not Ready" in One or More EDI Domains (%)	28.72	30.43	0.34
Child "Not Ready" in Two or More EDI Domains (%)	16.41	16.62	0.88
<b>EDI Score for Domain:</b>			
Physical Health and Well-being (mean)	8.72	8.74	0.71
Social Competence (mean)	8.12	8.09	0.64
<b>Emotional Maturity (mean)</b>	<b>7.76</b>	<b>7.91</b>	<b>&lt;0.01</b>
Language and Cognitive Development (mean)	8.08	8.04	0.48
General Knowledge and Communication Skills (mean)	7.56	7.47	0.33

**Bold** type indicates values are statistically significant

\* as a victim, witness or eye witness

Note: ACG represents Adjusted Clinical Groups®, a measure of health status

**Table 4.2: Continued**

Students in PAX RCT 2011-12

Variable	Exposed to PAX N = 2,576	Unexposed to PAX N = 2,100	p-value
<b>Maternal Characteristics</b>			
<b>Mother's Age at First Birth (mean)</b>	<b>23.22</b>	<b>23.73</b>	<b>&lt;0.01</b>
Mother's Age at Child's Birth (mean)	27.26	27.50	0.17
<b>Family Receipt of Income Assistance (%)</b>	<b>25.50</b>	<b>22.43</b>	<b>&lt;0.05</b>
Maternal Mental Disorder Diagnosis (%)	39.05	36.24	0.12
Maternal Justice Involvement (%)**	29.77	28.33	0.36
<b>Area-level SES (SEFI) (mean)</b>	<b>0.36</b>	<b>0.27</b>	<b>&lt;0.05</b>
<b>School Characteristics</b>			
Urban School (%)	40.57	43.95	0.08
<b>Health Regions</b>			
<b>Southern Health-Santé Sud (%)</b>	<b>17.39</b>	<b>14.24</b>	<b>&lt;0.01</b>
Winnipeg Regional Health Authority (%)	39.40	42.38	0.11
Prairie Mountain Health (%)	16.27	14.19	0.07
Interlake-Eastern RHA (%)	11.49	11.81	0.75
Northern Health Region (%)	14.13	16.10	0.08
<b>Income Quintile</b>			
<b>R1 – Lowest Rural (%)</b>	<b>28.08</b>	<b>17.24</b>	<b>&lt;0.0001</b>
<b>R2 (%)</b>	<b>19.06</b>	<b>26.64</b>	<b>&lt;0.0001</b>
R3 (%)	17.24	16.21	0.52
<b>R4 (%)</b>	<b>17.78</b>	<b>26.90</b>	<b>&lt;0.0001</b>
<b>R5 – Highest Rural (%)</b>	<b>17.85</b>	<b>13.02</b>	<b>&lt;0.01</b>
<b>U1 – Lowest Urban (%)</b>	<b>26.35</b>	<b>21.22</b>	<b>&lt;0.05</b>
U2 (%)	17.82	21.55	0.06
U3 (%)	20.95	19.23	0.40
<b>U4 (%)</b>	<b>17.35</b>	<b>21.77</b>	<b>&lt;0.05</b>
U5 – Highest Urban (%)	17.54	16.24	0.49

**Bold** type indicates values are statistically significant

\*\* As an accused, victim, witness or eye witness

Note: SES represents Socioeconomic Status

## SDQ Results

As explained in Section 3 (and shown in Appendix Figure 2), due to the fact that only 43.9% of the students in the PAX RCT had both a pre- and post-PAX SDQ, we weighted the analyses so that the results were representative of the entire PAX RCT population. More detail about this weighting, as well as unweighted results, can be found in Appendix Tables 4-6.

Tables 4.3 and 4.4 show the results of the pre- and post-SDQ analyses. Table 4.3 emphasizes the differences between the pre- and post-PAX SDQ results, and Table 4.4 emphasizes the differences between the exposed and unexposed groups. For the first four behavioural domains, higher scores are associated with poorer outcomes (e.g., scored higher on emotional problems scale), whereas for the final domain (prosocial behaviour), higher scores are associated with better behaviour. Table 4.3 shows that the students in the exposed group demonstrated statistically significant decreases in the first four domains over time, whereas the unexposed group's scores showed a significant decrease only for the hyperactivity domain. The decrease in the hyperactivity domain was larger for the exposed (19.0%) than the unexposed (9.0%) group. The last row in Table 4.3 shows that both exposed and unexposed groups had statistically significant increases in prosocial behaviour; however, the increase was larger for the exposed (10.4%) compared to the unexposed (2.2%) group. Thus, exposure to PAX resulted in greater decreases in behavioural problems and greater increases in positive behaviour.

Table 4.4 provides a picture of how the two groups differed before and after PAX. For the first four domains, all showed the same pattern of results: there were statistically significant differences between the exposed and unexposed students in the pre-PAX (baseline) period, with exposed students having poorer outcomes. In the post-PAX period, there were no longer significant differences between the exposed and unexposed students for these four domains. For the prosocial behaviour domain, we found that in the pre-PAX (baseline) period the exposed students had lower (poorer) scores than the unexposed students (Table 4.4), but after PAX the exposed students had significantly higher prosocial behaviour scores than the unexposed students (Table 4.4). The results suggest that students in the exposed group had more behavioural problems to begin with (pre-PAX), but after PAX implementation their behavioural problems had decreased to the extent that they no longer differed from the unexposed students, except on prosocial behaviour, where they surpassed the unexposed group. Taken together, the results shown in Tables 4.3 and 4.4 show that exposure to PAX resulted in more improvements in behaviour, and that the exposed group had more behaviour problems to begin with (pre-PAX, or baseline).

**Table 4.3: Weighted Mean SDQ Scores by exposure to PAX and by Pre- and Post-SDQ**

Students in PAX RCT 2011-12

SDQ Domain	Exposed to PAX N=1,135			Unexposed to PAX N=917		
	Pre-SDQ N=1,135	Post-SDQ N=1,135	p-value	Pre-SDQ N=917	Post-SDQ N=917	p-value
Emotional problems	<b>2.02</b>	<b>1.50</b>	<b>&lt;0.0001</b>	1.50	1.45	0.36
Conduct problems	<b>1.57</b>	<b>1.22</b>	<b>&lt;0.0001</b>	1.24	1.21	0.44
Hyperactivity	<b>4.15</b>	<b>3.36</b>	<b>&lt;0.0001</b>	<b>3.67</b>	<b>3.34</b>	<b>&lt;0.0001</b>
Peer problems	<b>1.77</b>	<b>1.40</b>	<b>&lt;0.0001</b>	1.49	1.42	0.18
Prosocial	<b>7.01</b>	<b>7.74</b>	<b>&lt;0.0001</b>	<b>7.29</b>	<b>7.45</b>	<b>&lt;0.01</b>

**Bold** type indicates values are statistically significant

**Table 4.4: Weighted Mean SDQ Scores by Pre- and Post-SDQ and by exposure to PAX**

Students in PAX RCT 2011-12

SDQ Domain	Pre-SDQ N=2,052			Post-SDQ N=2,052		
	Exposed to PAX N=1,135	Unexposed to PAX N=917	p-value	Exposed to PAX N=1,135	Unexposed to PAX N=917	p-value
Emotional problems	<b>2.02</b>	<b>1.50</b>	<b>&lt;0.0001</b>	1.50	1.45	0.61
Conduct problems	<b>1.57</b>	<b>1.24</b>	<b>&lt;0.01</b>	1.22	1.21	0.96
Hyperactivity	<b>4.15</b>	<b>3.67</b>	<b>&lt;0.01</b>	3.36	3.34	0.89
Peer problems	<b>1.77</b>	<b>1.49</b>	<b>&lt;0.01</b>	1.40	1.42	0.78
Prosocial	<b>7.01</b>	<b>7.29</b>	<b>&lt;0.05</b>	<b>7.74</b>	<b>7.45</b>	<b>&lt;0.05</b>

**Bold** type indicates values are statistically significant

Recall from Section 3 that we re-ran analyses replacing the exposed versus unexposed comparison with a comparison that grouped children according to number of days from teacher training to the end of the school year. This was done in order to determine whether there was a “dose response” of PAX; that is, whether more time exposed to PAX was associated with better outcomes. In this case, number of days since PAX training for the teacher served as a proxy for exposure to PAX. The results of this analysis did not differ from the exposed versus unexposed comparison.<sup>5</sup> Recall also that we re-ran analyses restricting the exposed group to include only students whose teachers were categorized as “high fidelity.” These results also did not differ from the analyses where students of all teachers in the exposed condition were included.

## Results for Outcomes Defined using the Repository

Table 4.5 shows the differences between the students who were exposed and the students who were unexposed to PAX on all of the longer-term outcomes measured using the data in the Repository. Three of the outcomes relate to school achievement, five are measures of the child’s mental health, and the final four in the table relate to family functioning. For all of these outcomes, no statistically significant differences were found between the students exposed and unexposed to PAX. As stated in Section 3, we ran sensitivity analyses to explore whether the results were affected by: 1) excluding students in the schools that dropped out of the PAX RCT prior to PAX implementation; 2) excluding students in the exposed group whose teachers had not attended the PAX training in the 2011-12 school year. We also ran a dose response analysis that used number of days since teacher training rather than comparing exposed to unexposed. Furthermore, we ran an analysis restricting the exposed group to include only those students whose teachers were categorized as “high fidelity.” All of these sensitivity analyses for outcomes defined using data in the Repository yielded the same pattern of results, with no statistically significant differences between exposed and unexposed students.<sup>5</sup>

As mentioned in Section 3, we also conducted a series of stratified analyses, stratifying students by sex, income quintile, mothers’ age at first birth, school location (urban/rural), family receipt of income assistance, and family involvement with CFS. None of these analyses yielded statistically significant results for any of the outcomes.

**Table 4.5: Comparisons Between Grade 1 Students Exposed and Unexposed to PAX in 2011-12**

Outcome in Post-PAX implementation period, July 1, 2012 - March 31, 2015

Outcome Variables	Odds (95% CI)	p-value
Grade 3 Numeracy Assessment	1.04 (0.83-1.30)	0.75
Grade 3 Reading Assessment	1.07 (0.85-1.34)	0.56
Grade Repetition	1.39 (0.70-2.74)	0.35
Child Diagnosed with a Conduct Disorder	0.85 (0.52-1.40)	0.53
Child Diagnosed with a Mood and Anxiety Disorder	0.64 (0.33-1.25)	0.19
Child Diagnosed with ADHD	1.02 (0.76-1.35)	0.91
Child Diagnosed with Any Mental Disorder	0.99 (0.77-1.26)	0.91
Receipt of Special Education Funding for Emotional/Behaviour Disorder (EBD)	1.18 (0.60-2.34)	0.62
Child Hospitalized for an Injury	1.20 (0.60-2.40)	0.61
Child in Care of Child and Family Services (CFS)	1.04 (0.62-1.73)	0.88
Child in Family Receiving Services from CFS	1.25 (0.93-1.67)	0.14
Diagnosis of Maternal Mental Disorder	1.04 (0.85-1.26)	0.73

<sup>5</sup> Results are available in the report data extras at <http://mchp-appserv.cpe.umanitoba.ca/deliverablesList.html>

## Analysis of the Replication Cohort

We also looked at grade 3 reading and numeracy assessments in our analysis of the Replication Cohort. This analysis compares grade 1 students whose teachers were in the unexposed to PAX group in the 2011-12 school year with the students of these same teachers but in the following year (that is, the 2012-13 school year) after the teachers had received PAX training (see Figure 3.2). Table 4.6 shows that neither of these outcomes showed statistically significant differences between the two groups. SDQs were only filled out in 2011-12, so no comparison using SDQs could be done with the Replication Cohort analysis.

**Table 4.6: Comparison of Grade 3 Assessments for the Replication Cohort**

Students in PAX RCT 2011-12

Outcome Variables	Odds (95% CI)	p-value
Grade 3 Numeracy Assessment*	1.19 (0.91-1.55)	0.20
Grade 3 Reading Assessment**	1.21 (0.97-1.50)	0.08

\* measuring if the student is meeting or approaching all four competencies



## Section 5: Discussion

### What Do These Results Mean?

There were several findings from this report worth noting.

There were differences between schools that responded to HCMO's initial call and were willing to be involved in the PAX RCT and those that did not respond. In general, students from schools that were involved in the PAX RCT had characteristics that put them at greater risk for poorer health, social and school outcomes than students in schools that did not get involved in the PAX RCT. This suggests that schools with students in higher risk circumstances are being proactive and addressing their students' needs with prevention measures.

Among the students from schools that *were* involved in the PAX RCT, there were also differences between students assigned to the exposed and unexposed groups. Random assignment to treatment (exposed) and control (unexposed) groups is considered the gold standard for evaluating the effectiveness of programs such as PAX, because it increases the likelihood that individuals in the two groups will have similar characteristics. Despite the use of a clustered RCT study design for PAX, we found some significant differences between students in the schools randomized to receive PAX (exposed group) compared to the controls (unexposed group). In general, the students in the exposed group had more characteristics that put them at risk for poorer health, social and school outcomes than students in the unexposed condition *before* the PAX program was implemented. Using regression modeling we were able to adjust for many of these characteristics; however, there may have been other characteristics that differed between the groups (e.g., parental support at home) that we could not adjust for or measure. This potential unmeasured confounding (or differences in characteristics we could not measure) between our exposed and unexposed groups should be considered when reviewing the results.

Given that we found the exposed group tended to have more characteristics that put them at risk of poor outcomes, it is not surprising that the analysis of the Strengths and Difficulties Questionnaire (SDQ) suggested that students in the exposed group had more behavioural problems *before* PAX implementation, when compared to the students in the unexposed group. They also had lower scores on prosocial behaviour at baseline. The analysis also showed that the students exposed to PAX had more improvements in their classroom behaviour than the students in the unexposed group, as assessed by their teachers.

For outcomes measured using education and health information in the Repository, we found no statistically significant effects of the PAX program. Given that the students in the exposed group had many more risk factors to begin with (that is, before PAX implementation or at baseline), the finding that these students were similar to their unexposed peers on the grade 3 reading and numeracy assessments and on measures of mental disorders, may actually signal an improvement in the exposed group. That is, from the differences found between the groups at baseline, we might have expected poorer assessments in grade 3 among the exposed group, had there been no PAX program.

For some of the mental health outcomes it may not be surprising that we did not detect any effect of PAX, given that we could only follow the students to the year they turned 9 years old. Studies that have found improvements in mental health and decreases in suicidal behaviour resulting from PAX have followed participants for several years – through the teen years – when mental health conditions are most prevalent. In the future, when more years of data become available, it will be possible to conduct a long-term follow up of the PAX RCT cohort in Manitoba using the Repository data.

There are several limitations of this study that warrant discussion. We had program fidelity data from only half of the teachers in the exposed condition, and fidelity was self-reported. Ideally, fidelity should be assessed by trained observers who not only monitor and rate whether teachers are implementing PAX, but also provide feedback and coaching for PAX implementation. Thus it was difficult to know which teachers in the exposed condition were effectively implementing the PAX game.

Furthermore, SDQ data were collected by teachers who knew whether their students were in the exposed or unexposed groups. We do not know whether this had any influence on the way teachers rated their students on the five domains or how this would have affected the results.

Although the administrative data in the Repository allowed us to examine a broad range of variables as outcomes, some of the outcomes were quite general (e.g., whether a child is meeting or not meeting the expectations for grade 3 reading); more specific measures (such as written tests of reading or math comprehension) may have been necessary to detect any changes between students in the exposed and unexposed groups. Furthermore, several of the outcomes we looked at, such as maternal mental health and involvement with child welfare services, were not part of the PAX program goals, thus expectations that these would be affected by PAX may have been unrealistic.

While we had a broad range of variables to use as covariates to control for differences between the study groups, there are many characteristics of students that we could not control for, and these may have differed between the exposed and unexposed groups. For example, we have access to few measures of the home environment, and cannot control for factors such as whether the child is read to at home, the amount of time spent watching TV or playing video games, or parenting style. Given that the exposed and unexposed groups differed on several factors that we *could* measure, it is likely they also differed on factors we *could not* measure.

This study highlights some of the difficulties of implementing and evaluating programs in real-world conditions. Schools with multiple grade 1 classrooms were all assigned to the same group (exposed or unexposed to PAX); however, clustering of classrooms within schools may have contributed to the failure of the clustered RCT to result in groups with comparable student characteristics. Furthermore, the demanding nature of the grade 1 classroom meant that only a fraction of teachers completed the assessments and forms requested as part of the evaluation. The offer for involvement in the PAX RCT went out to all schools in Manitoba, regardless of geographic location; there are challenges with providing training and support for teachers in schools in remote or isolated areas. Despite the challenges, valuable information on the implementation of the PAX program and who participated was collected, and can be used in future for longer-term follow-up studies.

This current study is based on data collected in the first year of implementation (2011-12). The first years of large scale implementation are often challenging given the barriers to implementation. These include issues with acceptability, adoption, appropriateness, feasibility, fidelity and sustainability [22]. Even for programs with a strong evidence base, these barriers can undermine the effectiveness of programs. For instance, under ideal conditions, teachers would have received training at the beginning of the school year and would have started implementing PAX in the classroom in September. The earliest training provided in the PAX RCT was in November, and the majority (almost 70%) of the teachers who trained in the RCT year received their training in the second half of the school year. Furthermore, some teachers may have required additional support after the 2-day training in order to implement PAX as intended.



We found decreases in problem behaviours and increases in prosocial behaviour in grade 1 as a result of PAX, which replicates previous findings from HCMO [23]. While we found no differences between students exposed and unexposed to PAX in school and mental health outcomes two to three years after PAX, given the initial higher risk factors of the exposed group, this may signal protective factors associated with PAX. Longer-term follow up for differences in mental health and suicidal behaviours is warranted. There is currently a study on PAX in First Nations communities in Manitoba that is examining facilitators, barriers and adaptations in implementing PAX using culturally grounded methodology [24]. Given the challenges of implementing programs in remote northern First Nations communities, adaptations and enhancements to the materials, training and support to the schools will be required. Of the 196 schools that participated in the PAX RCT, close to one quarter were from 38 First Nations communities. Using similar methods as the present report, the First Nations PAX study will examine whether or not students exposed to PAX have better grade 3 outcomes and fewer diagnoses of mental disorders compared to those not exposed to PAX.

Taken together, the findings of this study point to improved short-term emotional and behavioural outcomes associated with the program. The findings around longer-term educational and mental health outcomes are less clear. In future studies, implementation factors should be examined to ensure that PAX is being implemented as intended. In addition, suicidal behaviours, mental health and educational outcomes should be studied in a longer-term follow-up of the 2011-12 cohort.



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# Appendix

## Datasets Used in the Report

Appendix Table 1: List and Descriptions of Datasets Used in this Report

Data Source	Dataset	Data Years	Description of Dataset	Use
<b>Manitoba Health</b>	Manitoba Health Insurance Registry	1984/85–2014/15	A longitudinal population-based registry maintained by Manitoba Health of all individuals who have been registered with Manitoba Health at some point since 1970. The registry includes individual-level demographics, family composition information, residential postal codes, and data fields for registration, birth, entry into province, and migration in/out of province.	For linkage between all sources of data, and to examine the sociodemographic characteristics and coverage benefits of the Manitoba students and their families.
	Drug Program Information Network (DPIN)	1995/96 – 2014/15	An electronic, on-line, point-of-sale prescription drug database that connects Manitoba Health and all pharmacies in Manitoba. The DPIN system generates complete drug profiles for each client including all transactions at the point of distribution. Information about pharmaceutical dispensations, prescriptions identified as potential drug utilization problems, non-adjudicated prescriptions, and ancillary programs and non-drug products are captured in real time for all Manitoba residents, including Registered First Nations, regardless of insurance coverage or final payer.	To examine the use of pharmaceutical drugs and define chronic diseases (e.g., ADHD, family history of mental health disorders.)
	Medical Claims / Medical Services (Physician Billings)	1984/85 – 2014/15	Data consisting of claims for physician visits in offices, hospitals and outpatient departments; fee-for-service components for tests such as lab and x-ray procedures performed in offices and hospitals; payments for on-call agreements (e.g. anaesthetists) that are not attributed to individual patients; as well as information about physicians' specialities. These data files contain records for both Manitoba and non-Manitoba residents who visit Manitoba providers.	To define chronic diseases (e.g., ADHD, family history of mental health disorders.)
	Hospital Abstracts	1984/85–2014/15	Data consisting of hospital forms/computerized records containing summaries of demographic and clinical information (e.g., gender, postal code, diagnoses and procedure codes) completed at the point of discharge from the hospital. Several hundred thousand abstracts per year are submitted for all separations from acute and chronic care facilities in Manitoba and for all Manitobans admitted to out-of-province facilities. There are up to 16 ICD-9-CM diagnosis codes (up to March 31, 2014) and up to 25 ICD-10-CA diagnosis codes (from April 1, 2014 onward).	To define chronic diseases (e.g., ADHD, family history of mental health disorders), injuries, comorbidities, and health care use.

Appendix Table 1 Continued: List and Descriptions of Datasets Used in this Report

Data Source	Dataset	Data Years	Description of Dataset	Use
<b>Manitoba Families</b>	Social Assistance Management Information Network (SAMIN)	1995/96 – 2014/15	Data that provide information on Manitoba residents who receive support from the Employment and Income Assistance (EIA) Program, a provincial program of last resort for people who need help to meet basic personal and family needs.	To examine family receipt of income assistance.
	Child and Family Services: Application and Intake	1992/93 – 2014/15	These data provide information concerning children in care and families receiving protection and support services from Child and Family Services (CFS). Cases are entered into the province-wide management system by mandated agencies and service providers. The data combines information recorded in the Intake Module (INTAKE) and Child and Family Services Information System (CFSIS).	To identify children in care or receiving protection or support services and their circumstances.
<b>Healthy Child Manitoba Office</b>	Early Development Instrument (EDI)	2006 – 2013	Designed to support healthy child development by assessing kindergarten children's developmental health at school entry in communities across Manitoba. Data is collected by Kindergarten teachers province-wide and is used to assess children's readiness to learn in five domains: physical health and well-being, social knowledge and competence, emotional health/maturity, language and cognitive development, and general knowledge and communication skills.	Assess the child's readiness for school and identify risk factors.
	PAX	2011/12 – 2012/13	Program data for teachers and students participating in the PAX RCT in 2011/12 and the PAX Replication Cohort in 2012/13	Identify teachers if/when teachers got PAX training, identify students exposed and unexposed to PAX, Strength and Difficulties Questionnaires
<b>Winnipeg Regional Health Authority</b>	Manitoba Fetal Alcohol Spectrum Disorder	1999/2000 – 2014/15	Clinical health data that provide details concerning Manitoba preschool children, school age children, adolescents, and adults with Fetal Alcohol Spectrum Disorder (FASD) identified through the Manitoba FASD Centre program. To be included, individuals must have known prenatal alcohol exposure, developmental and learning concerns, and consent of their legal guardian if under 18 years of age.	Identify children with FASD as part of the definition for developmental disabilities.

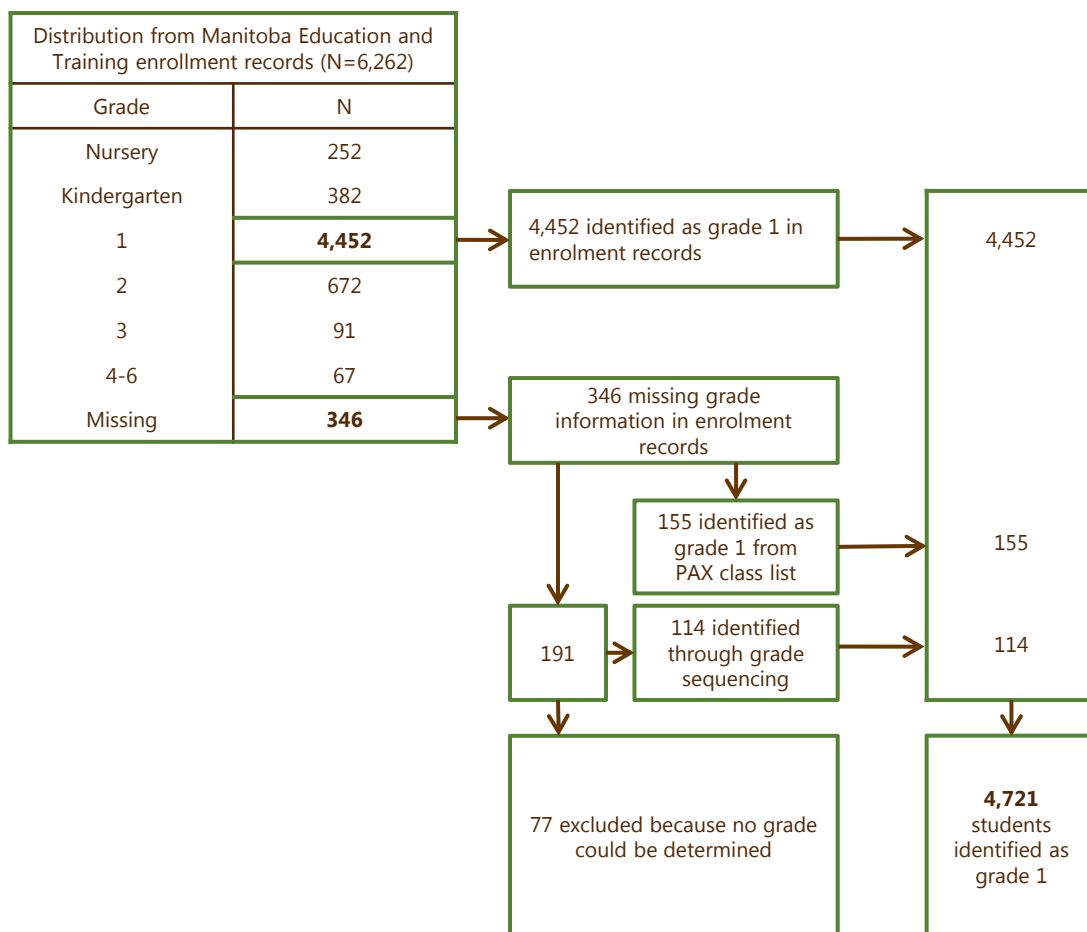
**Appendix Table 1 Continued: List and Descriptions of Datasets Used in this Report**

<b>Data Source</b>	<b>Dataset</b>	<b>Data Years</b>	<b>Description of Dataset</b>	<b>Use</b>
<b>Manitoba Education and Training</b>	Education – Enrollment, Marks, and Assessments	1995/96 – 2014/15	Data that provides information on enrollment, courses, marks, standard tests, assessments, graduation status, level of funding, and demographics for Manitoba students from Kindergarten to Grade 12. Students from public and private schools, as well as those that are home schooled, are included.	To study and compare educational outcomes for PAX versus no PAX groups and assess children who have special needs funding.
<b>Manitoba Justice</b>	Prosecutions Information Management System (PRISM)	2002 – 2012	PRISM is an incident-tracking system developed to provide information to prosecutors by tracking incidents (e.g. Domestic Trouble, Break and Enter) as well as charges and involvements (e.g. witness, accused, victim) relating to those incidents.	To identify involvement with the Justice system, as a control variable
<b>Statistics Canada</b>	Canadian Census Files (public-use)	2001, 2006, 2011	Social data based on a population survey (census) that include aggregate demographic information such as age, sex, marital status, employment and income for all persons and housing units within a dissemination area in Canada. Statistics Canada conducts a Census every five years. It takes account of all Canadian citizens (by birth and by naturalization), landed immigrants, and non-permanent residents together with family members living with them.	To obtain relevant community-level data on socioeconomic characteristics (e.g. income quintile).

## Information on Identification of Grade 1 Students

After excluding 121 records due to missing Manitoba Education & Training (MET) numbers and missing valid PHINs, we used the MET enrolment dataset to determine the grade that the students in the PAX Program dataset were enrolled in during the 2011-12 school year. We found that not all 6,262 of the records reported enrolment in grade 1 (see Appendix Figure 1). Because this was a study of the effectiveness of the PAX program for grade 1 students, we excluded records for students who received PAX in the 2011-12 school year but were enrolled in grades other than grade 1 ( $n=1,541$ , or 24.6% of the 6,262 records). As can be seen from Appendix Figure 1, there were 4,452 records with grade 1 enrolment and there were also 346 records that were missing enrolment data for the 2011-12 school year. For these records with missing enrolment data, we looked at the grade listed on the PAX Program Data. Of the 346 records, 155 were identified as grade 1 on the PAX data and were thus included in the grade 1 cohort. Of the remaining 191, we looked at grade sequencing in the enrolment data to see if we could identify any more grade 1 students. To do this, we checked previous and subsequent years of enrolment data. For example, for records where enrolment data showed kindergarten enrolment in 2010-11 and grade 2 enrolment in 2012-13, we assumed enrolment in 2011-12 was grade 1. There were 114 records with grade enrolment sequencing patterns consistent with grade 1 enrolment in 2011-12 and these were kept in the study. Thus there were 4,721 ( $4,452 + 155 + 114$ ) records identified as grade 1 in 2011-12.

**Appendix Figure 1: Identification of Grade 1 Students in PAX RCT in 2011-12**





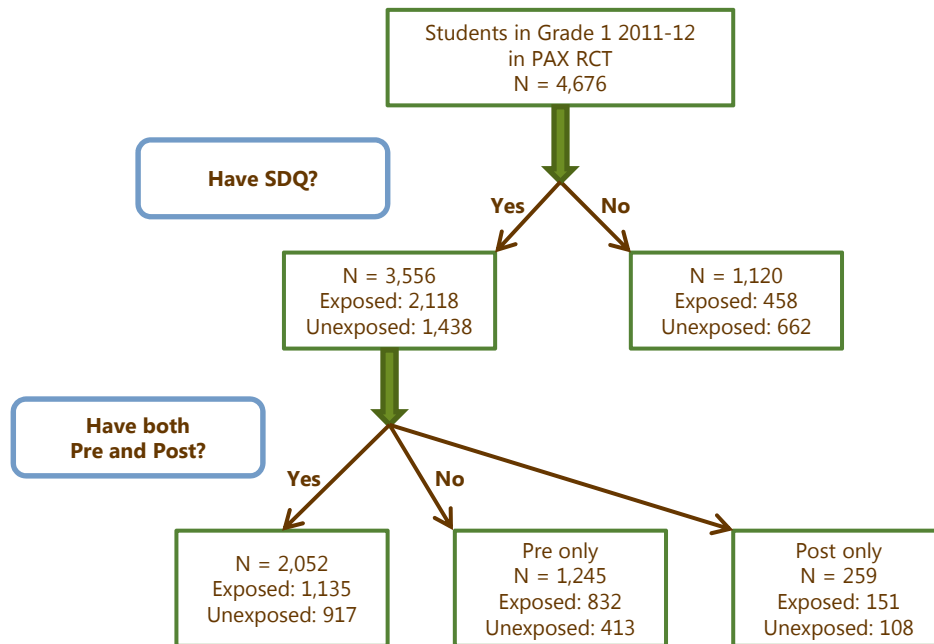
## Defining “High Fidelity” Teachers

The teacher survey that measures fidelity was sent to all teachers in the exposed group. We examined surveys from teachers in the exposed group who had PAX training between Nov 2011 and March 2012 (2011-12 academic year). Of the 168 teachers in the exposed group who we knew received training in the 2011-12 academic year, only 84 (50.0%) filled out the survey. The survey asks about whether the teachers created a PAX Vision in their classroom. This involves students creating a vision of what they think a wonderful classroom would look like and includes developing detailed lists of what the students would like to see, hear, do and feel more of, as well as less of, each day. Of the 84 teachers who completed the fidelity survey, 73 (or 86.9%) indicated they had created a PAX Vision in their classroom. The survey also asks teachers to report how often they played PAX in the classroom, with the following possible answers: “rarely or never”, “1-2 times a week”, “3-4 times a week”, “1-2 times a day” and “3 or more times a day.” Since PAX is supposed to be played daily, we chose the categories “1-2 times a day” and “3 or more times a day” in combination with creating a PAX Vision as “high fidelity” teachers. There were 55 teachers out of the 84 who filled out the fidelity survey who indicated they had created a PAX Vision and played PAX 1-2 or 3 or more times each day. These 55 teachers were used in the sensitivity analyses comparing outcomes of students with “high fidelity” teachers to students in the unexposed group.

## SDQ Analysis

As can be seen in Appendix Figure 2, SDQs were not filled out for all students in the PAX RCT. Of the 4,676 students in the PAX RCT, 1,120 (24.0%) did not have an SDQ filled out either in the pre- or post-PAX period. Of the 3,556 students who had an SDQ, 2,052 had both a pre- and post-PAX SDQ (43.9% of the 4,676 PAX RCT students). Of those 2,052 students with both pre- and post-PAX SDQs, 55.3% were in the exposed group, whereas 44.7% were in the unexposed group. Whenever information is not collected on all students who are part of an RCT, there is potential for bias in the results. With less than half of the students in the PAX RCT having both pre- and post-PAX SDQ, it is possible that any differences observed between exposed and unexposed groups in changes in SDQ could be due to some sort of selection bias. For example, if the teachers in the unexposed classrooms with students with the most difficult behaviours were less likely to fill out the SDQ, and the teachers in the exposed classrooms with the fewest students with difficult behaviours were the most likely to fill out the SDQ, then even if there was no effect of PAX, the exposed group would show more improvements in the SDQ. On the other hand, if the teachers in the exposed classrooms with the most difficult behaviours were less likely to fill out the SDQ, and teachers in the unexposed classrooms with the fewest students with the most difficult behaviours were most likely to fill out the SDQ, then the results may underestimate any improvement associated with PAX. To correct for this potential bias, we used information on characteristics of students with both pre- and post-PAX SDQs and compared this to information on those missing pre- or post-PAX SDQs or both (i.e., students with pre-PAX SDQ only, with post-PAX SDQ only, or with neither pre- or post-PAX SDQ) to determine how representative the students with both pre- and post-PAX SDQs were of the entire group of PAX RCT students.

**Appendix Figure 2: Number of Students in the PAX RCT who had Complete (both pre and post) Strengths and Difficulties Questionnaires (SDQs)**



Appendix Table 2 demonstrates that students with both pre-and post-PAX SDQs were from higher SES areas (shown by lower SEFI in the table), had mothers who were younger at the student's birth as well as at the birth of the mother's first child, and were less likely to be from the lowest urban and rural income quintiles.

**Appendix Table 2: Characteristics of Students With vs. Without Complete Strengths and Difficulties Questionnaire (SDQ)**  
Pre-PAX Implementation Period, PAX RCT 2011-12

Variable	SDQ - Yes* N=2,052	SDQ - No** N=2,624	p-value
Child's Age in Years (mean)	6.37	6.39	0.20
Male (%)	49.66	50.53	0.68
Urban School (%)	41.47	42.57	0.57
<b>Mother's Age at First Birth (mean)</b>	<b>24.29</b>	<b>22.79</b>	<b>&lt;0.0001</b>
<b>Mother's Age at Child's Birth (mean)</b>	<b>27.80</b>	<b>27.03</b>	<b>&lt;0.0001</b>
<b>Area-level SES of Child (SEFI) (mean)</b>	<b>0.05</b>	<b>0.53</b>	<b>&lt;0.0001</b>
<b>R1 – Lowest Rural Income Quintile (%)</b>	<b>17.24</b>	<b>28.30</b>	<b>&lt;0.0001</b>
<b>U1 – Lowest Urban Income Quintile (%)</b>	<b>20.81</b>	<b>26.36</b>	<b>&lt;0.05</b>

**Bold** type indicates values are statistically significant

\* child had both Pre and Post SDQ

\*\* child had Pre only, Post only, or no SDQ

Note: SES represents Socioeconomic Status

Appendix Table 3 shows that for students with complete SDQs, those in the exposed and unexposed groups were similar in age, sex, mother's age at child's birth and first birth, percent urban school, and percent in the lowest income quintile. The exposed group were from higher SES areas (shown by lower SEFI value) but were more likely than the unexposed group to live in the lowest rural income quintile.

**Appendix Table 3: Characteristics of Exposed vs. Unexposed Students with Complete\* Strengths and Difficulties Questionnaire (SDQ) in the Pre-PAX Implementation Period**

Students in PAX RCT 2011-12

Variable	Exposed N = 1,135	Unexposed N = 917	p-value
Child's Age in Years (mean)	6.38	6.37	0.91
Male Sex (%)	49.52	49.84	0.92
<b>Area-level SES of Child (SEFI) (mean)</b>	<b>0.01</b>	<b>0.11</b>	<b>&lt;0.05</b>
Mother's Age at First Birth (mean)	24.30	24.27	0.91
Mother's Age at Child's Birth (mean)	27.83	27.77	0.80
Urban School (%)	40.53	42.64	0.46
<b>R1 – Lowest Rural Income Quintile (%)</b>	<b>23.95</b>	<b>8.64</b>	<b>&lt;0.0001</b>
U1 – Lowest Urban Income Quintile (%)	20.04	21.71	0.60

**Bold** type indicates values are statistically significant

\* child had both Pre and Post SDQ

Note: SES represents Socioeconomic Status

Weighting was used to account for the fact that those with and without complete SDQs differed on a number of baseline characteristics. A Propensity Score Model (PSM) was run to predict the probability of a student having complete SDQ vs not having complete SDQ. The covariates entered into the PSM are related to the SDQ domains, and are shown in Appendix Table 4. Based on the predicted probabilities obtained from the PSM, the inverse probability of treatment weights (IPTWs) for the two SDQ groups were then computed.

The IPTW equations are presented below:

If the child had a complete SDQ then 
$$IPTW = \frac{1}{\text{predicted probability}}$$

If the child did not have a complete SDQ then 
$$IPTW = \frac{1}{(1 - \text{predicted probability})}$$

We then calculated the standardized differences for each of the covariates included in the PSM before weighting was applied vs after weighting was applied. When the standardized differences between the two groups are all less than 10%, the groups are considered to be "balanced" [25].

Appendix Table 4 shows for those with and without complete SDQs (both pre- and post-PAX) the percent of each of the characteristics used in the weighting, as well as the standardized differences between these groups on those characteristics before and after the weights were applied. For two-thirds of the characteristics, the standardized differences were balanced even prior to weighting; for 5 of the 15 variables (family receipt of income assistance, maternal justice involvement, mother's age at first birth, area-level SES of child, and average area-level SES of classroom) the characteristics showed relatively large differences prior to weighting and minimal differences after weights were applied [26,27].

**Appendix Table 4: Standardized Differences Between Students With vs. Without Complete Strengths and Difficulties Questionnaire (SDQ)**

Pre-PAX Implementation Period, PAX RCT 2011-12

<b>Categorical Variable</b>	<b>SDQ - Yes (%)<sup>*</sup> N = 2,052</b>	<b>SDQ - No (%)<sup>**</sup> N = 2,624</b>	<b>Standardized difference before weighting (%)</b>	<b>Standardized difference after weighting (%)</b>
Exposed to PAX	55.31	54.92	0.80	1.87
Male	49.66	50.53	1.75	0.17
Child Diagnosed with a Major Illness (ACG)	13.89	12.84	3.07	0.58
Child Diagnosed with a Conduct Disorder	2.05	2.02	0.19	0.66
Child Diagnosed with a Mood and Anxiety Disorder	0.39	0.46	1.04	0.47
Child Diagnosed with ADHD	1.95	3.39	8.96	0.59
Child "Not Ready" in One or More EDI Domains	22.32	23.59	3.02	0.10
Urban School	41.47	42.57	2.22	1.51
Family Receipt of Income Assistance	19.49	27.74	19.52	0.00
Diagnosis of Maternal Mental Disorder	36.70	38.64	4.02	0.32
Maternal Justice Involvement †	22.61	34.22	25.96	1.77
<b>Continuous Variable</b>	<b>SDQ - Yes (mean)<sup>*</sup> N = 2,052</b>	<b>SDQ - No (mean)<sup>**</sup> N = 2,624</b>	<b>Standardized difference before weighting (mean)</b>	<b>Standardized difference after weighting (mean)</b>
Child's Age (in months)	82.04	82.32	6.63	1.21
Mother's Age at First Birth	24.29	22.79	26.62	1.47
Area-level SES of Child (SEFI)	0.05	0.53	42.68	2.35
Average Area-level SES of Classroom (SEFI)	0.05	0.53	49.34	2.66

\* child had both Pre and Post SDQ

\*\* child had Pre only, Post only, or no SDQ

† as an accused, victim, witness or eye witness

Note: ACG represents Adjusted Clinical Groups®, a measure of health status

Note: SES represents Socioeconomic Status

Section 4 in the report shows the weighted SDQ comparisons; Appendix Tables 5 and 6 below show the crude mean results before any weights were applied. A comparison to the results shown in Section 4, indicate that the crude and weighted analyses produced similar results.

**Appendix Table 5: Unweighted Mean SDQ Scores by exposure to PAX and by Pre- and Post SDQ**

SDQ Domain	Exposed to PAX N = 1,135			Unexposed to PAX N = 917		
	Pre-SDQ N = 1,135	Post-SDQ N = 1,135	p-value	Pre-SDQ N = 917	Post-SDQ N = 917	p-value
Emotional problems	<b>1.922</b>	<b>1.390</b>	<b>&lt;0.0001</b>	1.440	1.386	0.26
Conduct problems	<b>1.458</b>	<b>1.143</b>	<b>&lt;0.0001</b>	1.206	1.163	0.26
Hyperactivity	<b>3.962</b>	<b>3.200</b>	<b>&lt;0.0001</b>	<b>3.548</b>	<b>3.212</b>	<b>&lt;0.0001</b>
Peer problems	<b>1.613</b>	<b>1.296</b>	<b>&lt;0.0001</b>	1.355	1.288	0.13
Prosocial	<b>7.212</b>	<b>7.862</b>	<b>&lt;0.0001</b>	<b>7.385</b>	<b>7.564</b>	<b>&lt;0.01</b>

**Bold** type indicates values are statistically significant

Note: Only students with both pre- and post-SDQs are included

**Appendix Table 6: Unweighted Mean SDQ Scores by Pre- and Post-SDQ and exposure to PAX**

SDQ Domain	Pre-SDQ N = 2,052			Post-SDQ N = 2,052		
	Exposed to PAX N = 1,135	Unexposed to PAX N = 917	p-value	Exposed to PAX N = 1,135	Unexposed to PAX N = 917	p-value
Emotional problems	<b>1.922</b>	<b>1.440</b>	<b>&lt;0.0001</b>	1.390	1.386	0.96
Conduct problems	<b>1.458</b>	<b>1.206</b>	<b>&lt;0.01</b>	1.143	1.163	0.82
Hyperactivity	<b>3.962</b>	<b>3.548</b>	<b>&lt;0.01</b>	3.200	3.212	0.93
Peer problems	<b>1.613</b>	<b>1.355</b>	<b>&lt;0.01</b>	1.296	1.288	0.92
Prosocial	7.212	7.385	0.13	<b>7.862</b>	<b>7.564</b>	<b>&lt;0.01</b>

**Bold** type indicates values are statistically significant

Note: Only students with both pre- and post-SDQs are included

## Technical Definitions of Indicators and Outcomes

**Appendix Table 7: Technical Definitions**

<b>Education Indicators</b>	
<b>Indicator</b>	<b>Definition</b>
<b>Grade 3 Reading Assessment</b>	<p>Evaluations of reading skills for students in Grades 3 and 4 of publicly funded schools in Manitoba. Students in English and Français programs are assessed in reading in Grade 3. Students in the French Immersion program are assessed in reading in Grades 3 and 4. Using select criteria provided by the Department of Education, these assessments are conducted by the teacher early in the school year in order to identify strengths and needs in reading and to guide the class curriculum for the school year.</p> <p>Reading competencies:</p> <ul style="list-style-type: none"> <li>• Reflects on and sets reading goals;</li> <li>• Uses strategies during reading to make sense of texts; and</li> <li>• Demonstrates comprehension.</li> </ul> <p>The outcome measures of the assessments are:</p> <ul style="list-style-type: none"> <li>• Meeting expectations;</li> <li>• Approaching expectations;</li> <li>• Needs ongoing help; and</li> <li>• Out of Range (students who are working well below grade-level curriculum relative to the competencies assessed, due to their learning disabilities or their need for new language learning).</li> </ul> <p>In this study, we combined meeting expectations and approaching expectations in each of these assessments as the outcome measured. For more information, please see <a href="http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1435">http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1435</a></p>
<b>Grade 3 Numeracy Assessment</b>	<p>Evaluations of math and number skills for students in Grade 3 of publicly funded schools in Manitoba. Using select criteria provided by the Department of Education, these assessments are conducted by the teacher early in the school year in order to identify strengths and needs in reading and to guide the class curriculum for the school year.</p> <p>Numeracy competencies:</p> <ul style="list-style-type: none"> <li>• Predicts an element in a repeating pattern;</li> <li>• Understands that the equal symbol represents an equality of the terms found on either side of the symbol;</li> <li>• Understands that given whole numbers may be represented in a variety of ways (to 100); and</li> <li>• Uses various mental math strategies to determine answers to addition and subtraction questions to 18.</li> </ul> <p>The outcome measures of the assessments are:</p> <ul style="list-style-type: none"> <li>• Meeting expectations;</li> <li>• Approaching expectations;</li> <li>• Needs ongoing help; and</li> <li>• Out of Range (students who are working well below grade-level curriculum relative to the competencies assessed, due to their learning disabilities or their need for new language learning).</li> </ul> <p>In this study, we combined meeting expectations and approaching expectations in each of these assessments as the outcome measured. For more information, please see <a href="http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1435">http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1435</a></p>

Appendix Table 7 Continued

Child Physical Health Indicators	
Indicator	Definition
<b>Major Illness</b>	<p>In accordance with the Johns Hopkins definition ADG codes 3, 9, 11, 12, 13, 18, 25, and 32 are used to determine the major illnesses for children ages <math>\geq 2</math>:</p> <ul style="list-style-type: none"> <li>• ADG 3: Time Limited: Major;</li> <li>• ADG 9: Likely to Recur: Progressive;</li> <li>• ADG 11: Chronic Medical: Unstable;</li> <li>• ADG 12: Chronic Specialty: Stable-Orthopedic;</li> <li>• ADG 13: Chronic Specialty: Stable-Ear, Nose, Throat;</li> <li>• ADG 18: Chronic Specialty: Unstable-Eye;</li> <li>• ADG 25: Psychosocial: Recurrent or Persistent, Unstable; and</li> <li>• ADG 32: Malignancy.</li> </ul>
<b>Injury Hospitalizations</b>	<p>Hospitalizations lasting one day or longer that resulted from an injury as indicated by the presence of one of the ICD-9-CM E-Codes in any of the 16 diagnosis variables (<i>prior to 2004-05 hospital data</i>) OR any ICD-10-CA code beginning with V, W, X, or Y in any of the 25 diagnosis variables (<i>beginning with 2004-05 hospital data</i>) that are recorded on the hospital discharge abstract.</p> <p>Excluded from the count of hospitalizations due to injury are those related to medical error or drug complications, as follows:</p> <ul style="list-style-type: none"> <li>• misadventures during surgical or medical care: <ul style="list-style-type: none"> <li>- ICD-9-CM codes E870-E876 (or ECLASS =10) or</li> <li>- ICD-10-CA codes Y60-Y69, Y88.1;</li> </ul> </li> <li>• reactions or complications due to medical care: <ul style="list-style-type: none"> <li>- ICD-9-CM codes E878-E879 (or ECLASS =11) or</li> <li>- ICD-10-CA codes Y70-Y84, Y88.2, Y88.3;</li> </ul> </li> <li>• adverse effects due to drugs: <ul style="list-style-type: none"> <li>- ICD-9-CM codes E930-E949 (or ECLASS =18) or</li> <li>- ICD-10-CA codes Y40-Y59, Y88.0.</li> </ul> </li> </ul>

Appendix Table 7 Continued

Child Physical Health Indicators	
Indicator	Definition
<b>Major Illness</b>	<p>In accordance with the Johns Hopkins definition ADG codes 3, 9, 11, 12, 13, 18, 25, and 32 are used to determine the major illnesses for children ages <math>\geq 2</math>:</p> <ul style="list-style-type: none"> <li>• ADG 3: Time Limited: Major;</li> <li>• ADG 9: Likely to Recur: Progressive;</li> <li>• ADG 11: Chronic Medical: Unstable;</li> <li>• ADG 12: Chronic Specialty: Stable-Orthopedic;</li> <li>• ADG 13: Chronic Specialty: Stable-Ear, Nose, Throat;</li> <li>• ADG 18: Chronic Specialty: Unstable-Eye;</li> <li>• ADG 25: Psychosocial: Recurrent or Persistent, Unstable;</li> <li>• ADG 32: Malignancy.</li> </ul>
<b>Injury Hospitalizations</b>	<p>Hospitalizations lasting one day or longer that resulted from an injury as indicated by the presence of one of the ICD-9-CM E-Codes in any of the 16 diagnosis variables (<i>prior to 2004-05 hospital data</i>) OR any ICD-10-CA code beginning with V, W, X, or Y in any of the 25 diagnosis variables (<i>beginning with 2004-05 hospital data</i>) that are recorded on the hospital discharge abstract.</p> <p>Excluded from the count of hospitalizations due to injury are those related to medical error or drug complications, as follows:</p> <ul style="list-style-type: none"> <li>• misadventures during surgical or medical care: <ul style="list-style-type: none"> <li>- ICD-9-CM codes E870-E876 (or ECLASS =10) or</li> <li>- ICD-10-CA codes Y60-Y69, Y88.1;</li> </ul> </li> <li>• reactions or complications due to medical care: <ul style="list-style-type: none"> <li>- ICD-9-CM codes E878-E879 (or ECLASS =11) or</li> <li>- ICD-10-CA codes Y70-Y84, Y88.2, Y88.3;</li> </ul> </li> <li>• adverse effects due to drugs: <ul style="list-style-type: none"> <li>- ICD-9-CM codes E930-E949 (or ECLASS =18) or</li> <li>- ICD-10-CA codes Y40-Y59, Y88.0.</li> </ul> </li> </ul>



Appendix Table 7 Continued

Child Mental Health Indicators	
Indicator	Definition
<b>Attention-Deficit Hyperactivity Disorder (ADHD)</b>	<p>Attention-Deficit Hyperactivity Disorder (ADHD) can generally be described as a neurobehavioural developmental disorder that is characterized by inattention, hyperactivity, and impulsivity. The disorder is often identified during school ages and symptoms may continue into adulthood. ADHD occurs twice as commonly in boys as in girls (American Psychiatric Association, 2000).</p> <p>MCHP has defined ADHD as:</p> <ul style="list-style-type: none"> <li>• one or more hospitalizations with a diagnosis of hyperkinetic syndrome (ICD-9-CM code 314 or ICD-10-CA code F90) in one fiscal year</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• one or more physician visits with a diagnosis of hyperkinetic syndrome (ICD-9-CM code 314) in one fiscal year</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• two or more prescriptions for ADHD drugs in one fiscal year without a diagnosis in the same fiscal year of: <ul style="list-style-type: none"> <li>- conduct disorder (ICD-9-CM code 312 or ICD-10-CA codes F63, F91, F92) or</li> <li>- disturbance of emotions (ICD-9-CM code 313 or ICD-10-CA codes F93, F94) or</li> <li>- cataplexy/narcolepsy (ICD-9-CM code 347 or ICD-10-CA code G47.4);</li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• one prescription for ADHD drugs in one fiscal year AND a diagnosis of hyperkinetic syndrome in the previous three years.</li> </ul> <p>The lists of ADHD medications used in these reports varies:</p> <ul style="list-style-type: none"> <li>• the ATC code N06BA; or</li> <li>• the generic product name of DEXTROAMPHETAMINE or AMPHETAMINE.</li> </ul> <p>The definition is restricted to residents ages 3 and older.</p>
<b>Conduct Disorder</b>	<p>Disorders characterized by a repetitive and persistent pattern of dissocial, aggressive, or defiant conduct. Such behaviour should amount to major violations of age-appropriate social expectations; it should therefore be more severe than ordinary childish mischief or adolescent rebelliousness and should imply an enduring pattern of behaviour (six months or longer). Features of conduct disorder can also be symptomatic of other psychiatric conditions, in which case the underlying diagnosis should be preferred.</p> <p>MCHP has defined conduct disorder as either:</p> <ul style="list-style-type: none"> <li>• one or more hospitalizations with a diagnosis of conduct disorder: <ul style="list-style-type: none"> <li>- ICD-9-CM code 312 or</li> <li>- ICD-10-CA codes All F91 except F91.3;</li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• one or more physician visits with a diagnosis of conduct disorder: <ul style="list-style-type: none"> <li>- ICD-9-CM code 312.</li> </ul> </li> </ul> <p>The definition is restricted to residents ages 3 and older.</p>

Appendix Table 7 Continued

Child Mental Health Indicators Continued	
Indicator	Definition
<b>Developmental Disorder</b>	<p>This study used four data sources available from the MCHP Data Repository to identify children with a developmental disability:</p> <ol style="list-style-type: none"> <li>1. Enrolment, Marks and Assessments (STS/ICAB) Data</li> </ol> <p>In the Manitoba Education &amp; Youth (MEY) Special Needs data file, children receiving special (categorical) funding for special needs were identified using the variable CATEGORYN. Children with developmental disabilities are selected by a value of "Multiple Handicaps" ("MH") or "Autism Spectrum Disorder" (ASD) in this variable.</p> <p>The data also contains a variable STATUSN, that identifies whether the funding is approved, denied, non-supportable or terminated, and works in conjunction with CATEGORYN. Only those with an "approved status" are included in the selection process.</p> <p>For more information, please read the Special Needs Children - Method of Identification from Education Data concept. (<a href="http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1376">http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1376</a>)</p> <ol style="list-style-type: none"> <li>2. Hospital Abstract Data</li> </ol> <p>In the Hospital Abstract data, individuals with at least one of the following ICD-9-CM diagnosis codes in any of the diagnosis fields were selected as DD cases. (NOTE: In Manitoba, up to 16 diagnoses can be coded in a hospital abstract using ICD-9-CM):</p> <ul style="list-style-type: none"> <li>• 317 = Mild Mental Retardation (MR);</li> <li>• 318 = Other MR;</li> <li>• 319 = Unspecified MR;</li> <li>• 299 = Autism and other psychoses with origin specific to childhood;</li> <li>• 758.0 - 758.3 = Chromosomal Anomalies (includes Down's, Patau's and Edward's syndromes);</li> <li>• 759.81 - 759.89 = Other and unspecified congenital anomalies (includes Fragile X and Prader-willi syndromes);</li> <li>• 760.71 = Fetal Alcohol Syndrome (FAS).</li> </ul> <p>The timeframe for this study involved a change in the ICD coding system in the Hospital Abstract data, and the following ICD-10-CA codes were used to select cases of Developmental Disability. (NOTE: up to 25 diagnoses can be coded in a hospital abstract using ICD-10-CA):</p> <ul style="list-style-type: none"> <li>• F70.0, F70.1, F70.8, F70.9 = Mild mental retardation;</li> <li>• F71.0, F71.1, F71.8, F71.9 = Moderate mental retardation;</li> <li>• F72.0, F72.1, F72.8, F72.9 = Severe mental retardation;</li> <li>• F73.0, F73.1, F73.8, F73.9 = Profound mental retardation;</li> <li>• F78.0, F78.1, F78.8, F78.9 = Other mental retardation;</li> <li>• F79.0, F79.1, F79.8, F79.9 = Unspecified mental retardation;</li> <li>• F84.0, F84.1, F84.3, F84.4, F84.5, F84.8, F84.9 = Pervasive developmental disorders;</li> <li>• P04.3 = Fetus and newborn affected by maternal use of alcohol (this excludes fetal alcohol syndrome = Q86.0);</li> <li>• Q86.0, Q86.1, Q86.2, Q86.8 = Congenital malformation syndromes due to known exogenous causes, not elsewhere classified;</li> </ul>

**Appendix Table 7 Continued**

<b>Child Mental Health Indicators Continued</b>	
<b>Indicator</b>	<b>Definition</b>
<b>Developmental Disorder Continued</b>	<ul style="list-style-type: none"> <li>• Q87.0, Q87.1, Q87.2, Q87.3, Q87.5, Q87.8 = Other specified congenital malformation syndromes affecting multiple systems; Q89.8 = Other specified congenital malformations;</li> <li>• Q90.0, Q90.1, Q90.2, Q90.9 = Down's syndrome;</li> <li>• Q91.0, Q91.1, 91.2, Q91.3, 91.4, Q91.5, 91.6, Q91.7 = Edward's syndrome and Patau's syndrome;</li> <li>• Q93.0, Q93.1, Q93.2, Q93.3, Q93.4, Q93.5, Q93.6, Q93.7, Q93.8, Q93.9 = Monosomies and deletions from the autosomes, not elsewhere classified; and</li> <li>• Q99.2 = Fragile X chromosome.</li> </ul> <p>3. Medical Services / Physician Visit Data</p> <p>In the Medical Services (Physician Visit) data, diagnoses are recorded using three-digit ICD-9-CM diagnosis codes, and therefore the 5-digit, specific codes used in the hospital data are not available from the Medical Services data. The following 3-digit ICD-9-CM codes were used to select cases of Developmental Disability from the Medical Services data:</p> <ul style="list-style-type: none"> <li>• 317 = Mild Mental Retardation (MR);</li> <li>• 318 = Other MR;</li> <li>• 319 = Unspecified MR;</li> <li>• 299 = Autism and other psychoses with origin specific to childhood.</li> </ul> <p>4. FASD Data</p> <p>Children with a diagnosis of 'ARND' (alcohol-related neurodevelopmental disorder), 'ARND/ARBD' (alcohol-related birth defects), 'FAS' (fetal alcohol syndrome), 'FAS/ARBD', or 'Partial FAS', which are diagnostic categories taken from the Manitoba FASD Centre clinical database.</p> <p>The definition is restricted to residents ages 3 and older.</p>

Appendix Table 7 Continued

Child Mental Health Indicators	
Indicator	Definition
<b>Mood and Anxiety Disorders</b>	<p>Mood disorder is the term given for a group of diagnoses in the Diagnostic and Statistical Manual of Mental Disorders classification system where a disturbance in the person's mood is hypothesized to be the main underlying feature.</p> <p>A child is considered to have a mood or anxiety disorder if they meet one of the following criteria:</p> <ul style="list-style-type: none"> <li>• one or more hospitalizations with a diagnosis for depressive disorder, affective psychoses, neurotic depression or adjustment reaction: <ul style="list-style-type: none"> <li>- ICD-9-CM codes 296.1-296.8, 300.4, 309, 311 or</li> <li>- ICD-10-CA codes F31, F32, F33, F34.1, F38.0, F38.1, F41.2, F43.1, F43.2, F43.8, F53.0, F93.0, F93.1, F93.2;</li> </ul> </li> </ul> <p>OR</p> <p>with a diagnosis for an anxiety state, phobic disorders or obsessive-compulsive disorders:</p> <ul style="list-style-type: none"> <li>- ICD-9-CM codes 300.0, 300.2, 300.3, 300.7 or</li> <li>- ICD-10-CA codes F40, F41.0, F41.1, F41.3, F41.8, F41.9, F42, F45.2;</li> <li>• one or more hospitalizations with a diagnosis for anxiety disorders: <ul style="list-style-type: none"> <li>- ICD-9-CM code 300 or</li> <li>- ICD-10-CA codes F32, F34.1, F40, F41, F42, F44, F45.0, F45.1, F45.2, F48 AND</li> <li>- one or more prescriptions for an antidepressant or mood stabilizer, including medications with the ATC codes N05AN01, N05BA, N06A;</li> </ul> </li> <li>• one or more physician visits with a diagnosis for depressive disorder or affective psychoses: <ul style="list-style-type: none"> <li>- ICD-9-CM codes 296, 311;</li> </ul> </li> <li>• one or more physician visits with a diagnosis for anxiety disorders: <ul style="list-style-type: none"> <li>- ICD-9-CM code 300 AND</li> <li>- one or more prescriptions for an antidepressant or mood stabilizer, including medications with the ATC codes N05AN01, N05BA, N06A;</li> </ul> </li> <li>• three or more physician visits with a diagnosis for anxiety disorders or adjustment reaction: ICD-9-CM code 300, 309.</li> </ul> <p>The definition is restricted to residents ages 3 and older.</p>

Appendix Table 7 Continued

Maternal Mental Health Indicators Continued	
Indicator	Definition
<b>Mood and Anxiety Disorders</b>	<p>Mood disorder is the term given for a group of diagnoses in the Diagnostic and Statistical Manual of Mental Disorders classification system where a disturbance in the person's mood is hypothesized to be the main underlying feature.</p> <p>An individual is considered to have a mood or anxiety disorder if they meet one of the following criteria:</p> <ul style="list-style-type: none"> <li>• one or more hospitalizations with a diagnosis for depressive disorder, affective psychoses, neurotic depression or adjustment reaction: <ul style="list-style-type: none"> <li>- ICD-9-CM codes 296.1-296.8, 300.4, 309, 311 or</li> <li>- ICD-10-CA codes F31, F32, F33, F34.1, F38.0, F38.1, F41.2, F43.1, F43.2, F43.8, F53.0, F93.0;</li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>with a diagnosis for an anxiety state, phobic disorders or obsessive-compulsive disorders: <ul style="list-style-type: none"> <li>- ICD-9-CM codes 300.0, 300.2, 300.3, 300.7 or</li> <li>- ICD-10-CA codes F40, F41.0, F41.1, F41.3, F41.8, F41.9, F42, F45.2;</li> </ul> </li> <li>• one or more hospitalizations with a diagnosis for anxiety disorders: <ul style="list-style-type: none"> <li>- ICD-9-CM code 300 or</li> <li>- ICD-10-CA codes F32, F34.1, F40, F41, F42, F44, F45.0, F45.1, F45.2, F48, F68.0, F99 AND</li> <li>- one or more prescriptions for an antidepressant or mood stabilizer, including medications with the ATC codes: N05AN01, N05BA, N06A;</li> </ul> </li> <li>• one or more physician visits with a diagnosis for depressive disorder or affective psychoses: <ul style="list-style-type: none"> <li>- ICD-9-CM codes 296, 311;</li> </ul> </li> <li>• one or more physician visits with a diagnosis for anxiety disorders: <ul style="list-style-type: none"> <li>- ICD-9-CM code 300 AND</li> <li>- one or more prescriptions for an antidepressant or mood stabilizer, including medications with the ATC codes N05AN01, N05BA, N06A;</li> </ul> </li> <li>• three or more physician visits with a diagnosis for anxiety disorders or adjustment reaction: <ul style="list-style-type: none"> <li>- ICD-9-CM code 300, 309.</li> </ul> </li> </ul> <p>The definition is restricted to residents ages 10 and older.</p>
<b>Personality Disorder</b>	<p>A class of mental illnesses characterized by chronic behavioural and relationship patterns that often cause serious personal and social difficulties, as well as a general impairment of functioning.</p> <p>MCHP has defined personality disorders as either:</p> <ul style="list-style-type: none"> <li>• one or more hospitalizations with a diagnosis of personality disorder: <ul style="list-style-type: none"> <li>- ICD-9-CM code 301 or</li> <li>- ICD-10-CA codes F34.0, F60, F61, F62, F68.1, F68.8, F69;</li> </ul> </li> <li>• one or more physician visits with a diagnosis of personality disorder: <ul style="list-style-type: none"> <li>- ICD-9-CM code 301.</li> </ul> </li> </ul> <p>The definition was restricted to residents ages 10 and older.</p>

Appendix Table 7 Continued

<b>Maternal Mental Health Indicators Continued</b>	
<b>Indicator</b>	<b>Definition</b>
<b>Schizophrenia</b>	<p>A long-term mental illness that affects how a person thinks, feels and acts. Symptoms of the illness include auditory hallucinations, delusions, difficulty in expressing emotions, or disorganized speech and thought.</p> <p>MCHP has defined schizophrenia as either:</p> <ul style="list-style-type: none"> <li>• one or more hospitalizations with a diagnosis of schizophrenia: <ul style="list-style-type: none"> <li>- ICD-9-CM code 295 or</li> <li>- ICD-10-CA codes F20, F21, F23.2, F25;</li> </ul> </li> <li>• one or more physician visits with a diagnosis of schizophrenia: <ul style="list-style-type: none"> <li>- ICD-9-CM code 295.</li> </ul> </li> </ul> <p>The definition is restricted to residents ages 12 and older.</p>
<b>Substance Use Disorder</b>	<p>The excess use of and reliance on a drug, alcohol, or other chemical that leads to severe negative effects on the individual's health and well-being or to the welfare of others.</p> <p>MCHP has defined substance use disorder as:</p> <ul style="list-style-type: none"> <li>• one or more hospitalization with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs, using: <ul style="list-style-type: none"> <li>- ICD-9-CM codes: <ul style="list-style-type: none"> <li>▪ 291 (alcoholic psychoses) or</li> <li>▪ 292 (drug psychoses) or</li> <li>▪ 303 (alcohol dependence) or</li> <li>▪ 304 (drug dependence) or</li> <li>▪ 305 (nondependent abuse of drugs);</li> </ul> </li> <li>- ICD-10-CA codes: <ul style="list-style-type: none"> <li>▪ F10-F19 and F55.</li> </ul> </li> </ul> </li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• one or more physician visits with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs using the same ICD-9-CM codes listed above.</li> </ul> <p>The definition is restricted to residents ages 10 and older.</p>

Appendix Table 7 Continued

Family Function and Social Indicators	
Indicator	Definition
<b>Child in Care of Child and Family Services (CFS)</b>	Children in care are children who have been removed from the care of their original families because of a situation where authorities have deemed their family unable or unfit to look after them properly. In some cases, children are voluntarily placed into care by their parents or guardians. Children can come into care for a variety of reasons including abuse and neglect, illness, death of a parent, addiction issues or conflict in their family, disability, or emotional problems. Some children are placed in care for very short time periods before being returned to their families, whereas others may spend many years in care. Children in care do not include children who remain with or are returned to a parent or guardian under an order of supervision.
<b>Child in Family Receiving Protection or Support Services from Child and Family Services (CFS)</b>	Children whose health or emotional well-being is thought to be endangered, but who remain in a family that receives a service from Child and Family Services (CFS). Services requested by the family or received upon "recommendation" by CFS are intended to serve as aid in the resolution of family matters.
<b>Prosecution Information and Scheduling Management (PRISM)</b>	<p>PRISM is an incident-tracking system developed and maintained by Manitoba Justice's Prosecution Service. This system was designed to provide information to prosecutors by tracking incidents (e.g. Domestic Trouble, Break and Enter) as well as charges and involvements (e.g. witness, accused, victim) relating to those incidents. The data currently contain over one million incidents (with dates ranging from the 1950s to 2012) and approximately 500, 000 individuals. Although the system is incident-based it is possible to examine individuals' involvement histories over time. It is important to note that it is not currently possible to determine the outcomes of charges in PRISM, this may eventually be possible using the CCAIN and COMS data.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <li>• For this study we were interested in identifying mothers that were involved with the Justice System as a victim, accused, witness and/or eye witness.</li> <li>• For this study we were only able to identify children that were involved with the Justice System as a victim, witness and/or eye witness.</li> </ul>
<b>Receipt of Income Assistance</b>	Income assistance is a program of financial assistance for people who need help to meet basic personal and family needs. As such, it is a measure of poverty. IA involves monetary support allocated by the provincial government to individuals and/or their dependents who meet a standard financial need test that qualifies them for benefits. It is administered via the Employment and Income Assistance (EIA) program.

Appendix Table 7 Continued

PAX-Related Indicators/Outcomes	
Indicator	Definition
<b>PAX</b>	<p>PAX is a Healthy Child Manitoba program that was piloted in Manitoba over two years. Approximately 200 Schools with 5,000 children participated in the PAX randomized control trial for 2011/12 to 2012/13 school years.</p> <p>PAX teaches students autonomous self-control and self-management through collaborating with others for peace, productivity, health &amp; happiness. PAX is an evidence-based, childhood mental health promotion strategy which combines the science from PeaceBuilders, Good Behaviour Game &amp; other studies.</p>
<b>Strengths and Difficulties Questionnaire (SDQ)</b>	<p>The Strengths and Difficulties Questionnaire (SDQ) is one of the most commonly used instruments for screening psychopathology in children and adolescents. This study evaluated the hypothesized five-factor structure of the SDQ and examined its convergent validity against comprehensive clinical diagnostic assessments.</p> <p>NOTE: The SDQ dataset is a subset of the PAX dataset.</p> <p>There are five domains that are measured using SDQ:</p> <ol style="list-style-type: none"> <li>1. Emotional Problems (item numbers 3, 8, 13, 16, 24);</li> <li>2. Conduct Problems (item numbers 5, 7, 12, 18, 22);</li> <li>3. Hyperactivity (item numbers 2, 10, 15, 21, 25);</li> <li>4. Peer Problems (item numbers 6, 11, 14, 19, 23); and</li> <li>5. Prosocial (item numbers 1, 4, 9, 17, 20).</li> </ol>
<b>High Fidelity Teachers</b>	<p>Teachers in the PAX Exposed group who reported that they:</p> <ul style="list-style-type: none"> <li>• had created a PAX vision for their classroom; and</li> <li>• played the PAX game "1-2 times a day" or "3 or more times a day."</li> </ul>



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