THE MENTAL HEALTH OF MANITOBA'S CHILDREN

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Fall 2016

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It is also available in PDF format on our website at:
http://mchp-appserv.cpe.umanitoba.ca/deliverablesList.html

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How to cite this report:
Chartier M, Brownell M, MacWilliam L, Valdivia J, Nie Y, Ekuma O, Burchill C, Hu M, Rajotte L, Kulbaba C. *The Mental Health of Manitoba's Children*. Winnipeg, MB. Manitoba Centre for Health Policy, Fall 2016.

Legal Deposit:
Manitoba Legislative Library
National Library of Canada

ISBN 978-1-896489-84-1

1st printing (Fall 2016)

This report was prepared at the request of Manitoba Health, Healthy Living and Seniors (MHHLS) as part of the contract between the University of Manitoba and MHHLS. It was supported through funding provided by the Department of Health of the Province of Manitoba to the University of Manitoba (HIPC 2013/2014-29). The results and conclusions are those of the authors and no official endorsement by MHHLS was intended or should be inferred. Data used in this study are from the Population Health Research Data Repository housed at the Manitoba Centre for Health Policy, University of Manitoba and were derived from data provided by MHHLS, as well as the Winnipeg Regional Health Authority, Manitoba Education and Training, Healthy Child Manitoba, Manitoba Families, Manitoba Justice, Manitoba Adolescent Treatment Centre, and the Vital Statistics Agency for the use of their data. Strict policies and procedures were followed in producing this report to protect the privacy and security of the Repository data.

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 Population Health 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 University of Manitoba, Rady Faculty of Health Sciences, Max Rady College of Medicine, Health Research Ethics Board 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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ACKNOWLEDGEMENTS

The authors wish to acknowledge the contributions of many individuals whose efforts and expertise made it possible to produce this report. It is with great gratitude that we look back at the unwavering and generous support we have received. So many people contributed and we apologize in advance to anyone we might have overlooked.

We thank our Advisory Group for their dedication, their expertise, and their insightful and enthusiastic contributions. It was clear from the very first meeting that the mental health of children is important to them.

- Rob Santos (Healthy Child Manitoba Office)
- Leanne Boyd (Healthy Child Manitoba Office)
- Steven Feldgaier (Healthy Child Manitoba Office)
- Laurence Katz (University of Manitoba)
- Marion Cooper (Canadian Mental Health Association)
- Jessica Johnson (Winnipeg Regional Health Authority)
- John Walker (University of Manitoba)
- Patti MacEwan (formerly, Winnipeg Regional Health Authority)
- Shelley Rhyno (Northern Regional Health Authority)
- Tiina Cordell (Southern Health/Santé Sud)
- Fran Schellenberg (formerly, Mental Health and Spiritual Health Care)
- Jaye Miles (Manitoba Adolescent Treatment Centre)
- Marg Synyshyn (Manitoba Adolescent Treatment Centre)

We greatly appreciate the valuable and constructive feedback of our external academic reviewers: Maria Chiu (Staff Scientist, ICES Central Mental Health & Addictions Research Program) and Martin Guhn (National Research Lead Forum on Early Child Development Monitoring, Assistant Professor Human Early Learning Partnership, School of Population and Public Health, University of British Columbia). We also thank Michele Jules from Manitoba Justice for clarifying data fields, and Lori Middendorp and Dianne Hoffman from Manitoba Adolescent Treatment Centre for explaining their services and the structure of their databases.

We wish to thank our colleagues at the Manitoba Centre for Health Policy (MCHP) who are always willing to share their expertise. We are fortunate to work with such a talented and generous group of people: Nathan Nickel (Senior Reader), Jennifer Enns (editor), Dan Chateau, Randall Fransoo, Alan Katz, Pat Martens, Colette Raymond, Noralou Roos, Mark Smith, Matt Dahl, Natalia Dik, Heather Prior, Randy Walld, Jennifer Schultz, Theresa Daniuk, Scott McCulloch, Dale Stevenson, Shannon Turczak, Susan Burchill, Alexandra Decker, Jessica Jarmasz, and Iresha Ratnayake. We would also like to thank the Data Management and Data Documentation teams at MCHP, which have the critical role of managing the data in MCHP's Repository.

We acknowledge the University of Manitoba Health Research Ethics Board for their review of the proposed research project. The Health Information Privacy Committee (HIPC) is kept informed of all MCHP deliverables. The HIPC number for this project is 2013/2014-29. We also acknowledge Manitoba Health, Seniors and Active Living, as well as the Winnipeg Regional Health Authority, Manitoba Education and Training, Healthy Child Manitoba, Manitoba Families, Manitoba Justice, Manitoba Adolescent Treatment Centre, and the Vital Statistics Agency for the use of their data.

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ACRONYMS

ADHD	Attention-deficit Hyperactivity Disorder
ASD	Autism Spectrum Disorder
CFS	Child and Family Services
CYMH	Child and Youth Mental Health
EDI	Early Development Instrument
FASD	Fetal Alcohol Spectrum Disorder
IA	Income Assistance
ICD	International Classification of Disease
MATC	Manitoba Adolescent Treatment Centre
MCHP	Manitoba Centre for Health Policy
MHSAL	Manitoba Health, Seniors and Active Living
OR	Odds Ratio
PRISM	Prosecution Information and Scheduling Management
SEM	Structural Equation Modelling
SES	Socioeconomic Status
WRHA	Winnipeg Regional Health Authority

EXECUTIVE SUMMARY

Introduction

This report was conducted by the Manitoba Centre for Health Policy (MCHP) at the request of the Healthy Child Committee of Cabinet (HCCC) and Manitoba Health, Seniors and Active Living (MHSAL). It presents valuable current and cross-departmental information to inform the continued development, implementation, and evaluation of the province's Child and Youth Mental Health (CYMH) Strategy, with the time frames 2012/13 and earlier, providing a comprehensive baseline assessment of children's mental health before the CYMH Strategy was launched.

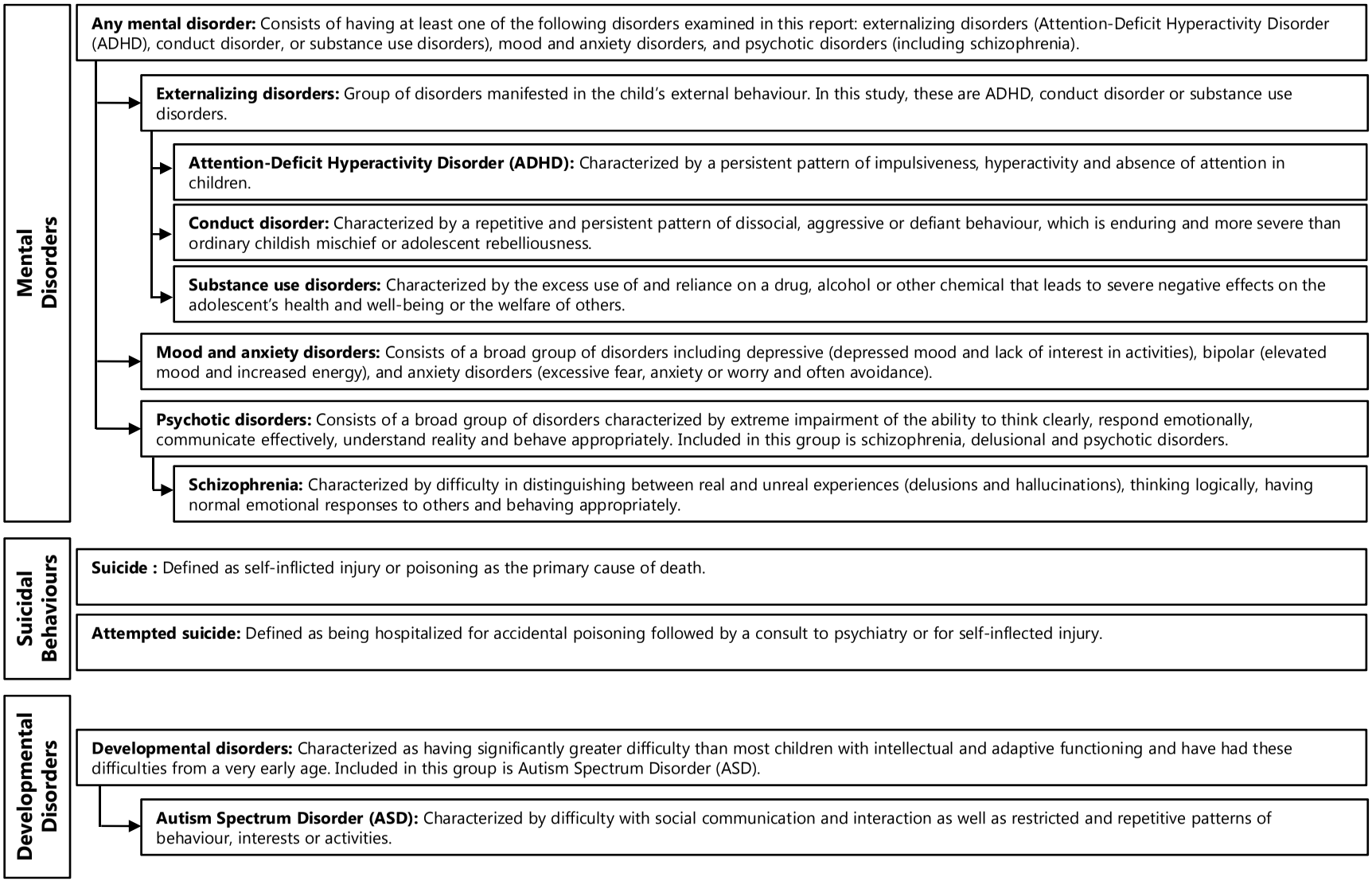
Mental disorders are the most common of childhood illnesses and yet until recently they have received relatively little attention (Kieling et al., 2011). Waddell, McEwan, Shepherd, Offord, and Hua (2005) reported that at any point in time 12.6% of Canadian children are experiencing a mental disorder. In a recent Ontario study, 34% of Grade 7 to 12 students reported a moderate-to-serious level of psychological distress and 12% of students had had serious thoughts about suicide in the past year (Boak, Hamilton, Adlaf, Henderson, & Mann, 2016). Mental disorders in children and adolescents can negatively impact their lives by interfering with their ability to succeed in school, establish healthy relationships, and eventually make their way into the workforce. The age of onset of most mental disorders is in childhood and they often persist into adulthood (Woodward & Fergusson, 2001). Unfortunately, most children with mental disorders do not receive appropriate treatment. It is important to keep children mentally healthy and prevent mental illness from developing, rather than waiting until an illness is well established and has caused considerable suffering (National Research Council & Institute of Medicine (US) Committee on the Prevention of Mental Disorders and Substance Abuse Among Children, 2009). It is therefore critical to understand what influences the development of mental disorders. Understanding the relationships between mental disorders, and healthcare services, social services, justice system involvement, educational outcomes, physical health problems, and early childhood factors may increase our understanding of how and when to intervene in supporting the mental health of children, and how best to integrate public policies across sectors to address mental health.

We examined a number of mental health indicators in this study (see Figure E.1) and we identified five main objectives for this report:

1. What are the diagnostic prevalence estimates of children with mental disorders, developmental disorders, and suicidal behaviours, and do these prevalence estimates differ by factors such as age, sex, geographic region, and income quintile?
2. How do children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to children with no disorders in their healthcare use, social services use, and justice system involvement?
3. How do the educational outcomes of children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to the educational outcomes of children with no disorders?
4. How does the physical health of children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to the physical health of children with no disorders?
5. What early childhood factors are associated with being diagnosed with attention-deficit hyperactivity disorder (ADHD), conduct disorder, and mood and anxiety disorders in middle childhood?

No Disorders is defined as not having any of the diagnosed mental disorders, suicidal behaviours, and diagnosed developmental disorders examined in this report.

Figure E.1: Mental Health Indicators Examined in this Study



Methods

This report used existing data contained in the Population Health Research Data Repository (Repository), which is housed at MCHP at the University of Manitoba. The Repository is a comprehensive collection of administrative, registry, survey, and other data relating to residents of Manitoba and as such captures information describing virtually all children in Manitoba. Because the Repository contains healthcare and social services, education, and justice data, inter-sectoral research is possible. All data in the Repository are de-identified, meaning that identifiers such as names and addresses are removed to protect people's privacy before any data are transferred to MCHP.

Mental disorders are considered to be chronic disorders and are not necessarily recorded in administrative data on a regular basis (e.g., yearly) (Meltzer, Gatward, Corbin, Goodman, & Ford, 2003). For this reason, the research team decided that the prevalence of mental disorders in children would be more accurately determined by calculating a *four-year prevalence* that would capture any diagnosis over a four year period. For developmental disorders and Autism Spectrum Disorder (ASD), a lifetime prevalence was calculated, meaning that any diagnosis from a child's birth to their age at the end of our study period (2012/13) was included in the analyses. Prevalence estimates were calculated using two four-year time periods: fiscal years 2005/06-2008/09 and 2009/10-2012/13. The prevalence estimates of mental disorders, developmental disorders, and suicidal behaviours are presented by age group, health region, community area, sex, and urban and rural income quintile. These estimates will vary by the type of available data, the time frames and the age groups examined.

In this study, the term *diagnostic prevalence* was used to communicate that the prevalence estimates of mental and developmental disorders are based on diagnoses from medical claims, hospitalization records, and, for some disorders, prescription data, education data, and the Manitoba FASD (Fetal Alcohol Spectrum Disorders) Centre data. These children were seen by a physician and received a diagnosis of a mental or developmental disorder.

For the purposes of this study, a "child" was considered to be any Manitoba resident aged 0-19 (inclusively). Cohorts of children with mental disorders, developmental disorders, and suicidal behaviours were created in each of the study periods. Given that the ages of onset of the disorders are different for each mental health indicator, three different age ranges were established: 0-19 years, 6-19 years, and 13-19 years. We refer to the group aged 13-19 as "adolescents". A cohort of children with "no disorders" was created as a reference cohort: these children received no diagnosis for any of the disorders examined in this study and exhibited no suicidal behaviours, as captured in the Repository data.

We examined our cohort of children by mental health indicators from a variety of perspectives: their healthcare services use, social services use, justice system involvement, educational outcomes, and physical health. In these analyses, we studied the following mental health indicators: externalizing disorders (consisting of ADHD, conduct disorder and substance use disorder), mood and anxiety disorders, psychotic disorders (including schizophrenia), suicide and attempted suicide, and developmental disorders (including ASD). Finally, we examined the inter-relationships among early childhood factors that are associated with the diagnosis of mental disorders in middle childhood, using a statistical method called structural equation modelling.

Summary of Results

Diagnostic Prevalence of Mental Disorders

Over a four-year period, this study found that 14% of children in Manitoba received a diagnosis for at least one of the mental disorders that we examined in this study (Table E.1). With the exception of substance use disorder and psychotic disorders, we found increases over two time periods in the prevalence of all other disorders examined (2005/062008/09 to 2009/102012/13). Externalizing disorders (consisting of ADHD, conduct disorder, and substance use disorders) were the most prevalent, followed by mood and anxiety disorders. Psychotic disorders were comparatively rare. A higher percentage of children were diagnosed with ADHD and conduct disorder in middle childhood (ages 6-12 years) than in adolescence (ages 13-19 years). Conversely, a higher percentage of older children were diagnosed with mood and anxiety disorders than younger children. We only reported substance use disorders and psychotic disorders in adolescents (ages 13-19), given the very low prevalence of these disorders in younger children.

The diagnostic prevalence of mental disorders differed by age, sex, and where the children lived. Mental disorders were more common in boys than girls, particularly externalizing disorders and psychotic disorders. An exception to this were mood and anxiety disorders, which were more prevalent in girls than boys. The prevalence estimates of most mental disorders that we examined were higher in urban areas compared to rural areas. Substance use disorders and psychotic disorders were the exception, where the prevalence of substance use disorders was higher in rural areas and the psychotic disorders prevalence was similar in urban and rural areas. In urban areas, we found an income gradient for all mental disorders, whereby every increase in income was associated with a lower prevalence of a disorder. However, in rural areas, the results were mixed: we found an income gradient for substance use disorders and psychotic disorders with higher rates associated with lower income; no income gradient was found for conduct disorders and mood and anxiety disorders; and for ADHD, the income gradient was opposite to that found in urban areas, meaning that with every increase in income we observed a higher prevalence.

Suicide and Attempted Suicide

In Manitoba, over the four-year period 2009/10-2012/13, there were 74 deaths by suicide per 100,000 children and 459 attempted suicides that resulted in hospitalization per 100,000 children (Table E.1). We could not capture attempted suicides that did not result in hospitalization. No increases were found between the first and second time periods. Suicides and attempted suicides are rare in young children, and were therefore only calculated among adolescents aged 13-19. Both suicide and attempted suicide were more common in girls than in boys. Higher rates of attempted suicide were found in rural areas compared to urban areas. Suicide and attempted suicide were more prevalent in low income areas than in higher income areas. Among those who had attempted suicide or died by suicide, 78% had a diagnosis of a mental disorder in the same time period.

Table E.1: Summary of Diagnostic Prevalence of Mental and Developmental Disorders and Rates of Suicidal Behaviours in Children in Manitoba, 2009/10 – 2012/13

Age- and sex-adjusted, four-year time period

Mental Health Indicators	Manitoba Overall	Age Groups (years)**			Sex		Urban vs Rural	Low Income vs High Income‡	
		0-5	6-12	13-19	Boys	Girls		Urban	Rural
Mental Disorders (four-year prevalence)									
Any Mental Disorder (%)	14.0	n/a	10.8	17.0	17.6†	13.3	Urban higher	Low income higher	No difference
Externalizing Disorders (%)	8.5	n/a	9.7	7.5	11†	5.7	Urban higher	Low income higher	No difference
Attention-Deficit Hyperactivity Disorder (%)	6.8*	n/a	8.7	4.8	8.7†	3.5	Urban higher	Low income higher	High income higher
Conduct Disorder (%)	1.5	n/a	2.1	1.1	1.7†	1.2	Urban higher	Low income higher	No difference
Substance Use Disorders (%)	2.6	n/a	n/a	2.6	2.4	2.9	Rural higher	Low income higher	Low income higher
Mood and Anxiety Disorders (%)	7.3*	n/a	2.2	12.0	7.2†	9.5	Urban higher	Low income higher	No difference
Psychotic Disorders (%)	0.75	n/a	n/a	0.75	0.88†	0.55	No difference	Low income higher	Low income higher
Schizophrenia (%)	0.34	n/a	n/a	0.34	0.45†	0.19	No difference	Low income higher	No difference
Suicidal Behaviours (four-year prevalence)									
Suicide (per 100,000)	74	n/a	n/a	74	66	84	n/a	Low income higher	
Attempted Suicide (per 100,000)	459	n/a	n/a	459	213†	729	Rural higher	Low income higher	Low income higher
Developmental Disorders (lifetime prevalence)									
Developmental Disorders (%)	2.9*	2.5	3.2	2.9	3.6†	1.6	Urban higher	Low income higher	No difference
Autism Spectrum Disorder (%)	1.4*	1.4	1.5	1.2	2.1†	0.6	Urban higher	Low income higher	High income higher

* indicates statistical increase from first time period (2005/06-2008/09) to second time period (2009/10-2012/13).

** no testing was conducted to determine differences between age groups.

† indicates a statistical difference between boys and girls.

‡ a linear trend test was conducted to determine if prevalence increases or decreases with each increase in income.

Note: n/a indicates not available for that indicator

Developmental Disorders

As shown in Table E.1, we studied developmental disorders, made up of many disorders affecting development, and Autism Spectrum Disorder (ASD), which is also included in the developmental disorders indicator. In Manitoba, the lifetime prevalence of developmental disorders in children increased over time from 2.5% to 2.9%. Similarly, the lifetime prevalence of ASD increased over time from 1.0% to 1.4%. The prevalence for both indicators was higher for boys than girls and higher in urban areas than in rural areas. In urban areas, an income gradient was found for developmental disorders and ASD, meaning that as income increased we found a lower prevalence of developmental disorders. In rural areas, no income gradient was found for developmental disorders. For ASD, the income gradient in rural areas was opposite to that found in urban areas, meaning that as income increased we found a higher prevalence.

Healthcare Use, Social Services Use, and Justice Involvement

Children diagnosed with mental disorders, developmental disorders, and suicidal behaviours use more healthcare services, social services, and are more involved with the justice system than those with no disorders (see Table E.2). As expected, given their diagnoses, children with mental and developmental disorders and suicidal behaviours are high users of mental health services, such as visits to a psychiatrist and to the Manitoba Adolescent Treatment Centre (MATC). However, in examining healthcare services before and after a suicide attempt, we found modest increases in healthcare services use after a suicide attempt.

Children with diagnosed mental and developmental disorders and suicidal behaviours are more likely to have been taken into the care of Child and Family Services (CFS), to have received other services from CFS, to have lived in social housing, to have received income assistance (IA) themselves, or to have lived in families receiving IA than children with no disorders. A higher percentage of these children have also been involved with the justice system as the accused or the victim of a crime compared to children with no disorders.

Table E.2: Percentages and Rates of Health Care and Social Services Use, and Justice System Involvement by Mental Health Indicators, 2012/13

Indicators	Externalizing (Ages 6-19)	Mood and Anxiety (Ages 6-19)	Psychotic (Ages 13-19)	Suicide and Attempted Suicide (Ages 13-19)	Developmental (Ages 0-19)
Health Care Use					
Physician Visits (per child)	**4.4**	**5.7**	**5.7**	**5.4**	**5.0**
Psychiatrist Vists (per child)	**6.2**	**14.0**	**28.2**	**18.9**	**4.1**
Inpatient Hospitalizations (per 1,000 children)	**57.1**	**147.9**	**558.8**	**838.6**	**127.5**
Injury Hospitalizations (per 1,000 children)	**15.1**	**32.7**	**60.8**	**80.5***	**15.4**
Social Services Use					
Manitoba Adolescent Treatment Centre Services (percentage)	**11.0**	**16.3**	**33.0**	**32.1**	**8.9**
Child and Family Services Contact (percentage)	**19.2**	**15.8**	**30.0**	**29.9**	**14.2**
Children in Care (percentage)	**14.8**	**9.8**	**26.3**	**21.0**	**11.2**
Income Assistance - Family (percentage)	**17.2**	**15.0**	**24.9**	**20.2**	**18.6**
Income Assistance - Young Adult (Ages 18-19) (percentage)	**24.5**	**18.6**	**40.9**	**25.9**	**54.4**
Social Housing (percentage)	**10.9**	**9.1**	**10.9**	**10.3**	**4.0**
Justice Involvement					
Accused (Ages 13-19) (percentage)	**11.6**	**7.9**	**13.0**	**18.4**	**3.8**
Victim (percentage)	**2.3**	**2.0**	**5.9**	**7.5**	**1.0**

bold values indicate statistically significant difference from children with No Disorders

* Injury hospitalizations from self-inflicted injuries were removed from the Suicide and Attempted Suicide indicator

Educational Outcomes

Children with mental disorders, developmental disorders, and with suicidal behaviours had poorer educational outcomes and were less likely to complete high school compared to children with no disorders, suggesting that these disorders interfere with academic achievement (Table E.3).

Table E.3: Percentages of Children with Positive Educational Outcomes by Mental Health Indicators, 2009/10 - 2012/13

Indicators	Externalizing (Ages 6-19)	Mood and Anxiety (Ages 6-19)	Psychotic (Ages 13-19)	Suicide and Attempted Suicide (Ages 13-19)	Developmental (Ages 0-19)
Grade 3 Numeracy	**55.0**	**64.4**	-	-	**30.5**
Grade 3 Reading	**62.1**	**77.8**	-	-	**35.8**
Grade 7 Mathematics	**51.1**	**61.8**	**37.4**	49.9	**28.6**
Student Engagement in Grade 7	**41.9**	**52.4**	**23.1**	**40.7**	**28.8**
Grade 8 Reading and Writing	**60.3**	74.6	**58.1**	65.9	**32.8**
High School Completion	**62.3**	**70.2**	**47.2**	**43.2**	**60.9**

bold values indicate statistically significant difference from children with No Disorders

Physical Health

With some exceptions, children with mental disorders, developmental disorders, and suicidal behaviours have a higher prevalence of asthma, diabetes, and atopic dermatitis than children with no disorders (see Table E.4). The presence of these disorders and suicidal behaviours were also associated with higher childhood mortality rates. The causes of death include suicide, complications from injuries and poisoning, and congenital abnormalities.

Table E.4: Rates of Physical Health Conditions by Mental Health Indicators

Indicators	Externalizing (Ages 6-19)	Mood and Anxiety (Ages 6-19)	Psychotic (Ages 13-19)	Suicide and Attempted Suicide (Ages 13-19)	Developmental (Ages 0-19)
Asthma (2011/12-2012/13) (prevalence)	**20.0**	**21.6**	**17.0**	**19.9**	**17.0**
Diabetes (2010/11-2012/13) (prevalence)	**0.5**	**0.9**	**2.0**	**3.0**	**0.7**
Atopic Dermatitis (2012/13) (prevalence)	**16.2**	**18.0**	13.3	14.3	**15.8**
Child Mortality (2009/10-2012/13) (per 100,000 children)	**145.7**	**238.1**	s	s*	**966.7**

bold values indicate statistically significant difference from children with No Disorders

s indicates suppressed due to small numbers

* in calculating the mortality rate, we removed all children who had died by suicide in the Suicide and Attempted Suicide indicator

Early Childhood Factors and Mental Disorders in Middle Childhood

Our results suggest many associations between early childhood factors and a diagnosis of ADHD, conduct disorder, or mood and anxiety disorders in middle childhood:

- Low child emotional and social development scores, as measured by the Early Development Instrument, were associated with being diagnosed with a mental disorder.
- Being from a high risk family environment (family with many parenting risk factors) was associated with being diagnosed with a mental disorder. This relationship was partially mediated or explained through low child development scores, meaning that high risk family environment is also related to low child development scores, which is in turn related to being diagnosed with a mental disorder.
- Unexpectedly, low socioeconomic status (SES) was associated with a decreased chance of being diagnosed with a mental disorder, possibly due to barriers preventing low-income families from accessing adequate resources to identify and treat mental disorders in children or to data limitations in capturing mental disorders in rural areas. As expected, we found that the relationship between living in a low SES area and mental disorders was explained through other pathways. We found that low SES was associated with lower child development scores, which in turn was associated with being diagnosed with a mental disorder. Low SES area was also associated with being from a high risk family, which in turn was associated with being diagnosed with a mental disorder.

Strengths and Limitations

It is important to interpret our findings with an understanding of the strengths and limitations of the methods and datasets that were used. This report provides a population-based perspective of the mental health of Manitoba's children. We used the Repository, which contains data on virtually all children in the province. We report the diagnostic prevalence of many clinically relevant mental and developmental disorders as well as indicators of marked psychological distress – suicide and attempted suicide. A rare intersectoral perspective is provided by examining healthcare and social services use, justice system involvement, educational outcomes, and physical health indicators. Capitalizing on the longitudinal data in the Repository, the structural equation modelling in Chapter 7 sheds some light on factors that are associated with the development of mental disorders in children over time.

With the exception of Chapter 7, we endeavoured to describe the "What" regarding patterns of mental disorders of children rather than explaining the "Why". We did not attempt to control for confounders in our analyses: meaning, we did not account for other factors that could influence the associations between mental disorders and early childhood factors examined in this report. Also, due to lack of available data, we were unable to examine some important disorders, such as eating disorders, tics, self-harm and oppositional disorders.

We acknowledge that our diagnostic prevalence estimates likely underreport the true prevalence of mental disorders. The diagnostic prevalence tells us the number of children who were diagnosed by a physician. We are not capturing services received by other professionals, such as psychologists, social workers, counsellors, or nurses. It is also important to keep in mind that visits to salaried primary care physicians may not all be captured in the Repository as effectively as visits to fee-for-service physicians. This limitation is particularly relevant in the Northern Health Region where many physicians are salaried. Furthermore, for reasons of stigma, lack of information, or access many children with mental disorders are likely not receiving mental health services. The "no disorders" group will consist largely of children with no disorders but will also include children with *undiagnosed* disorders. This should be kept in mind when we used the "no disorders" group as our comparison group.

Conclusions

This report represents the first comprehensive look at the mental health of children in Manitoba. The findings indicate that children's mental health needs are high and are increasing over time, but some services are decreasing or unchanged over time. Children with diagnosed mental disorders are using more services and have poorer outcomes in the province's health, education, social services, and justice systems, all affecting the quality of children's lifetime success. The report shows that children's lives are shortened, with higher mortality associated with several disorders, commonly linked to suicide. Our longitudinal findings show that mental disorders are linked to children's early development before they start school, particularly in high-risk family environments with greater social and economic needs. This reinforces the need for a considerable concerted and cross-sectoral shift to preventing mental illness before it starts, by tackling root causes in early childhood across multiple systems and sectors. A whole-of-government approach, particularly during childhood, would reduce cost pressures on all major public services, in addition to creating hope and better lifelong outcomes for present and future generations of Manitoba's young people and their families and communities.

Based on the study findings, this report offers a number of recommendations, including the following:

- continuing to develop, invest in, and implement Manitoba's Child and Youth Mental Health Strategy;
- strengthening and scaling up mental health promotion and mental illness prevention programs and strategies for children, especially in early childhood (prenatal through preschool years);
- addressing the needs of children with mental disorders and suicide attempts through an integrated service delivery system for children;
- addressing the needs of children with developmental disorders and increasing supports for their families;
- developing, investing in, and implementing short- and long-term strategies to address health inequities in children's mental health;
- improving knowledge and skills for service providers across sectors in the area of mental health for children;
- facilitating further research and evaluation to improve prevention, early intervention, and treatments for children with mental disorders.

CHAPTER 1: INTRODUCTION AND METHODS

Introduction

Purpose of the Report

This report was conducted by the Manitoba Centre for Health Policy (MCHP) at the request of the Healthy Child Committee of Cabinet (HCCC) and Manitoba Health, Seniors and Active Living (MHSAL). MCHP was asked to examine the diagnostic prevalence of mental disorders in Manitoba's children, as well as the health and social services use, justice system involvement, and educational outcomes of children with mental disorders. The HCCC also asked MCHP to examine the relationship between physical health and mental health, as well as the association between parental and child mental health status.

This report provides valuable current and cross-departmental information to inform the continued development, implementation and evaluation of the province's Child and Youth Mental Health (CYMH) Strategy, with the time frames 2012/13 and earlier, providing a comprehensive baseline assessment of children's mental health before the CYMH Strategy was launched. The strategy, announced in May 2015, "*will build a continuum of supports ranging from mental health promotion and the prevention of mental health problems to interventions and treatment for children and youth with the most complex needs*" (Government of Manitoba, 2015).

Mental Health Indicators Examined in this Report

To address the request made by HCCC and MHSAL, we used the available administrative data to examine a number of mental health indicators, listed and defined below. These will be defined in greater detail in Chapters 2 and 3. The specific International Classification of Disease (ICD) codes (ICD-9 and ICD-10) used to create these indicators are found in Appendix 1. The ICD is a diagnostic tool developed and maintained by the World Health Organization to measure disease prevalence (World Health Organization, 2014). Note that the administrative databases provide the ICD-9 and ICD-10 codes, but not the codes from the American Psychiatric Association's Diagnostic Statistical Manual (2013).

For additional information on indicators and other concepts found in this report, please see the MCHP Concept Dictionary. The Concept Dictionary contains detailed operational definitions and SAS® program code for variables and measures developed from administrative data (website: http://portal.cpe.umanitoba.ca/research_resources/concept_dictionary/default.aspx).

Mental Disorders

- **Attention-Deficit Hyperactivity Disorder (ADHD)** is a neurobehavioural developmental disorder that is characterized by a persistent pattern of impulsiveness, hyperactivity and absence of attention in children.
- **Conduct disorder** is characterized by a repetitive and persistent pattern of dissocial, aggressive or defiant behaviour, which is enduring and more severe than ordinary childish mischief or adolescent rebelliousness.
- **Substance use disorders** are characterized by the excess use of and reliance on a drug, alcohol or other chemical that leads to severe negative effects on the user's health and well-being or the welfare of others.
- **Externalizing disorders** include at least one of the three following disorders: ADHD, conduct disorder or substance use disorders.
- **Mood and anxiety disorders** consist of a broad group of mental disorders including depressive (depressed mood and lack of interest in activities), bipolar (eleveated mood and increased energy), and anxiety disorders (excessive fear, anxiety or worry and often avoidance).
- **Psychotic disorders** are a broad group of disorders characterized by extreme impairment of the ability to think clearly, respond emotionally, communicate effectively, understand reality and behave appropriately. Included in this group is schizophrenia, delusional and psychotic disorders.

- **Schizophrenia** is characterized by difficulty in distinguishing between real and unreal experiences (delusions and hallucinations), thinking logically, having normal emotional responses to others and behaving appropriately.
- **Any mental disorder** consists of having at least one of the following disorders examined in this report: externalizing disorders (ADHD, conduct disorder, or substance use disorders), mood and anxiety disorders, and psychotic disorders (including schizophrenia).

Suicidal Behaviours

- **Suicide** is defined as self-inflicted injury or poisoning as the primary cause of death.
- **Attempted suicide** is defined as being hospitalized for accidental poisoning followed by a consult to psychiatry or for self-inflicted injury.

Developmental Disorders

- Children with **developmental disorders** have greater difficulty than most children with intellectual and adaptive functioning, and having had these difficulties from a very early age. Included in this group is Autism Spectrum Disorder (ASD),
- Children with **Autism Spectrum Disorder (ASD)** have difficulty with social communication and interaction as well as restricted and repetitive patterns of behaviour, interests or activities.

No Disorders

- **No disorders** is defined as not having any of the mental disorders, suicidal behaviours and developmental disorders examined in this report.

Objectives

We identified five main objectives for this report:

1. What are the diagnostic prevalence estimates of children with mental disorders, developmental disorders, and suicidal behaviours, and do these prevalence estimates differ by factors such as age, sex, geographic region, and income quintile?
2. How do children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to children with no disorders in their healthcare use, social services use, and justice system involvement?
3. How do the educational outcomes of children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to the educational outcomes of children with no disorders?
4. How does the physical health of children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to the physical health of children with no disorders?
5. What early childhood factors are associated with being diagnosed with ADHD, conduct disorder, and mood and anxiety disorders in middle childhood?

Background on the Mental Health of Children

Waddell, McEwan, Shepherd, Offord, and Hua (2005) reported that in British Columbia, 12.6% of children aged 4-17 are experiencing a mental disorder at any point in time. The National Research Council report (National Research Council & Institute of Medicine (US) Committee on the Prevention of Mental Disorders and Substance Abuse Among Children, 2009) suggests that these rates are rising in North America. Mental health problems are the most common childhood illnesses and yet until recently they have received relatively little attention (Kieling et al., 2011). Mental disorders in children are associated with high degrees of emotional suffering and can negatively impact their lives by interfering with their ability to succeed in school, establish healthy relationships, and make their way into the workforce. For example, Van Ameringen, Mancini, and Farvolden (2003) reported that anxiety disorders are associated with underachievement at school. Anxiety disorders in particular are very common, but are often not recognized by parents and teachers, given that the symptoms are emotional and internally felt rather than behavioural (Breton et al., 1999).

Most children with mental disorders do not receive appropriate mental health treatment. Wildman, Kinsman, Logue, Dickey, and Smucker (1997) found that less than 7% of children who displayed psychosocial problems received a diagnosis by their family doctor. A recent study in Manitoba showed that 6.4% of children (13-19 years) had received a diagnosis of mood and anxiety disorders by a physician over a two-year period (Brownell et al., 2012), although epidemiological studies suggest much higher rates of these disorders. For example, a US epidemiological study reported that 31.9% of adolescents have anxiety disorders and 14.3% have mood disorders over their lifetime (Merikangas et al., 2010). Fortunately, there is some evidence that the likelihood of receiving care increases with the severity of the disorder, offering some reassurance that children with the highest needs are receiving services (Burns et al., 1995). The age of onset of most mental disorders is in childhood and these disorders often persist into adulthood unless treated (Kessler et al., 2005; Woodward & Fergusson, 2001). In a longitudinal study, Miettunen et al. (2014) found that externalizing problems at age 8 were associated with later substance use disorders. Understanding the relationship between mental disorders and health and social services use, educational outcomes, and physical health conditions may increase our understanding of how and when to intervene in supporting the mental health of children, and how best to integrate public policies across sectors to address mental health.

The National Research Council report (2009) on mental health in youth stresses the importance of keeping children and youth mentally healthy and preventing mental illness from developing in the first place, instead of waiting until an illness is well established and has caused considerable suffering. It is therefore critical to understand what may be influencing the development of mental disorders. Mental disorders in children and youth are thought to be the result of multiple factors, including a genetic predisposition, prenatal factors, and exposure to significant negative adversity in their environment, which is often referred to as toxic stress (Champagne, 2010; Dombrowski, Martin, & Huttunene, 2005; Rasic, Hajek, Alda, & Uher, 2014; Vaurio, Riley, & Mattson, 2011). Nurturing environments are an important element for promoting healthy socio-emotional development and preventing the development of mental, emotional, and behavioural disorders (Biglan, Flay, Embry, & Sandler, 2012). Adverse childhood experiences, including challenging family characteristics, are closely related to children's long-term health and well-being, making it critical to understand how families are faring (Chartier, Walker, & Naimark, 2009). Factors such as poverty are known to be associated with the development of mental health problems (Costello et al., 1996). Growing evidence suggests that high levels of social stress may play a role in the development of psychotic symptoms (Cantor-Graae, 2007).

Taking a *life course* approach and *inter-sectoral* approach to health, including mental health promotion of children, promises to have a positive influence on the life trajectories of individuals (Irwin, Siddiqi, & Hertzman, 2007). The life course approach views the state of an individual as a result of all his or her lifetime experiences (Graham & Power, 2004; Kuh, Power, Blane, & Bartley, 1997; Rutter, 1989). An inter-sectoral approach can be defined as all government sectors contributing to the mental health of children, but can also be viewed more broadly involving all segments of society.

Epidemiological Studies Examining the Mental Health of Children

Epidemiological studies document patterns of disorders in communities in order to understand the burden of illness, better plan services and training, and set priorities for future research (Rutter & Stevenson, 2008). Several studies have examined the prevalence of mental disorders worldwide and these are useful for comparing the findings in this report. It is important to keep in mind that the prevalence of mental disorders will depend on the type of data used, the time frame, the survey design, the interview guide used, and the population surveyed. Studies based on survey data will depend on the participants' memory and understanding of the disorders. Longer time frames provide more time to detect a mental disorder and usually report higher prevalence estimates than studies with shorter time frames (e.g., one year versus four years). Studies with populations that are more vulnerable will find higher prevalence estimates compared to studies using a general population.

Below is a brief description of some of the main studies referenced in this report. Where possible, the prevalence estimates in these studies are compared to the prevalence estimates found in this report; these comparisons are made following the presentation of the mental health indicators in the section "What do these results mean?"

- A meta-analysis of 41 studies reporting the prevalence of mental disorders in 27 countries including three Canadian studies were used in this report (Breton et al., 1999; Offord et al., 1987; Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015; Romano, Tremblay, Vitaro, Zoccolillo, & Pagani, 2001). The studies were published between 1985 and 2015, and summarized current to 12-month prevalence estimates. Several characteristics determined the prevalence estimates including sample representativeness, sample frame, and diagnostic interview used. The estimates did not differ by geographic location or the year of data collection.
- The 2003 National Survey of Children is a US national survey of anxiety, mood, behaviour, and substance disorders among adolescents. There were 10,123 adolescents aged 13-17 interviewed through face-to-face interviews in their homes with one parent of each adolescent completing a questionnaire. The study reported 30-day, 12-month, and lifetime prevalence estimates (Kessler et al., 2012; Merikangas et al., 2010).
- The 2012 National Health Interview Survey was a multipurpose health survey conducted in the US by the Centers for Disease Control and Prevention's National Centre of Health Statistics. The Survey consisted of questions on a broad range of health measures, including ADHD for a population of children under 18 years of age (Bloom, Jones, & Freeman, 2013).
- The Great Smoky Mountain Study is a multistage cohort design in which 4,500 of the 11,758 children aged 9, 11, and 13 years in the southeastern US were randomly selected for screening for psychiatric symptoms. Children who scored in the top 25% on the screening questionnaire, together with a random sample of the rest of the children, were recruited for four waves of annual interviews (N = 1,015 at wave 1). In addition, all American Indian children aged 9, 11, and 13 years were recruited (N = 323 at wave 1) in a parallel study (Copeland, Shanahan, Costello, & Angold, 2011; Costello et al., 1996).

What's in this Report?

The remainder of this chapter provides background information on mental disorders in children and describes the methods used to conduct the analyses. Chapter 2 presents the diagnostic prevalence estimates of clinically relevant mental disorders, suicide, and attempted suicide in children in Manitoba. Chapter 3 describes the diagnostic prevalence estimates of developmental disorders and ASD in children. Chapter 4 examines the health and services use of children by mental health indicator (externalizing disorders, mood and anxiety disorders, psychotic disorders, suicide and attempted suicide, and developmental disorders). Chapter 5 examines a number of educational outcomes for children by mental health indicator. Chapter 6 examines several physical health outcomes in children by mental health indicator. In Chapter 7, the results of statistical models used to identify factors associated with mental disorders in children in Manitoba are presented. Chapter 8 provides a summary of the report findings and recommendations based on these findings.

Methods

Datasets Used in Report

Currently in Manitoba mental health services for children are delivered through health and education systems and through a modest private sector of psychologists and social workers. Services from these areas are mainly delivered independently with little coordination. Manitoba Health, Seniors and Active Living (MHSAL) funds a significant portion of public services primarily through delegation to regional health authorities. Primary care services are provided by the provincial government to address the needs of children with mental disorders. Children can access mental health services through the education system's school counsellors and psychologists. Also funded are a variety of specialty services and programs, including the province-wide Manitoba Adolescent Treatment Centre. Healthy Child Manitoba funds and oversees prevention and early intervention programs within the public health system, community agencies, and schools. Many, although not all, of these services are captured in administrative data files.

This report used existing data contained in the Population Health Research Data Repository (Repository), which is housed at the Manitoba Centre for Health Policy (MCHP) at the University of Manitoba. The Repository is a comprehensive collection of administrative, registry, survey, and other data relating to residents of Manitoba. It was developed to describe and explain patterns of healthcare and profiles of health and illness. Because the Repository also contains education, social services, and justice data, inter-sectoral research is possible. All data are de-identified, meaning that identifiers, such as names and addresses, are removed to protect people's privacy before any data are transferred to MCHP. All datasets contain a scrambled version of the Personal Health Identification Number (PHIN), which allows for person-level, de-identified linkage across datasets over time.

Datasets (and data providers) used in this study are listed below:

1. Manitoba Adolescent Treatment Centre (MATC) to report the use of mental health treatment services provided by MATC.
2. Canada Census to obtain relevant community-level data on key socioeconomic characteristics (e.g., income quintile).
3. Drug Program Information Network (MHSAL) used in some definitions of mental disorders.
4. Hospital Abstracts (MHSAL) used in definitions of mental disorders, developmental disorders, and attempted suicide as well as reporting on hospitalizations.
5. Manitoba Health Insurance Registry (MHSAL) to provide information on age and place of residence (by postal code and municipal code only) for population comparison groups, and to provide denominators for the calculation of rates.
6. Medical Services (MHSAL) used in definitions of mental disorders and developmental disorders as well as reporting on physician visit rates.
7. Provider Registry (MHSAL) used to determine the type of physician providing the diagnosis and to report physician and psychiatrists visits.
8. Vital Statistics Mortality (Vital Statistics) used to determine deaths by suicide.
9. Early Development Instrument (Healthy Child Manitoba) used as a measure of child development.
10. Manitoba Fetal Alcohol Spectrum Disorder Centre (Winnipeg Regional Health Authority) used to define children with FASD.
11. Child and Family Services Applications and Intake (Manitoba Families) used to identify children in care or receiving protection or support services.
12. Enrollment, Marks, and Assessments (Manitoba Education and Training) used to measure educational outcomes.
13. Tenant Management System (Manitoba Families) used to identify children living in social housing.
14. Employment and Income Assistance Data (Manitoba Families) used to identify income assistance beneficiaries.
15. Prosecution Information and Scheduling (Manitoba Justice) used to examine children's patterns of contact with the legal system.

Detailed descriptions of these databases can be found on MCHP's Repository Data List (webpage: http://umanitoba.ca/faculties/health_sciences/medicine/units/community_health_sciences/departmental_units/mchp/resources/repository/datalist.html).

Study Population and Time Period

This report presents descriptive and statistical analyses regarding children's mental health in Manitoba. Mental disorders can be considered chronic diseases that are not necessarily recorded in administrative data on a regular basis (Meltzer, Gatward, Corbin, Goodman, & Ford 2003). For this reason, the research team decided that the prevalence of mental disorders in children would be more accurately determined by calculating a *four-year* prevalence. There are two study periods in this report: 2005/06-2008/09 and 2009/10-2012/13. Observing prevalence over two time periods provides some indication of whether rates are changing or remaining stable over time. The International Classification of Disease (ICD) coding system was developed by the World Health Organization and is used to classify diseases and related health problems. We chose our specific time periods to avoid the change from ICD-9-CM to ICD-10-CA codes that occurred in 2004 in the hospital records data. Avoiding the change in coding systems ensured that the same codes were used for the definitions of mental health indicators, which made these indicators comparable across time periods.

For the purposes of this study, a "child" was considered to be any Manitoba resident aged 0-19 inclusively. Cohorts of children with mental disorders, developmental disorders, and suicide and attempted suicide were created in each of the study periods (defined below). We sometimes refer to the group of children with a mental disorder, developmental disorder, or suicidal behaviour as "children with disorders". Given that the age of onset is different across the disorders and suicidal behaviours, three different age ranges were established to examine the disorders: 019 years, 619 years, and 1319 years. We refer to the group aged 13-19 as "adolescents". Any child within the relevant age-range and diagnosed with a disorder or exhibiting suicidal behaviours within the four-year time period was part of the relevant cohort. The age of each child was set at their age at diagnosis. See Appendix 2 for more details.

Table 1.1 shows the number of children living in Manitoba by age group, health region, community area, and time period. We note an increase in the number of children from the first time period to the second. The majority of Manitoba's children are living in Winnipeg and fewer children are living in the Northern and Interlake Eastern regions. Children under the category "Public Trustee" represent a small number of children who could not be categorized by health region because of insufficient information on where they lived. By examining the postal codes, we note that these children were likely in the care of Child and Family Services or (for some 18- and 19-year-olds) the Public Trustee Office.

A cohort of children with "no disorders" was created as a comparison cohort. This cohort comprises children who did not receive a diagnosis of any disorders found in this report, as well as children who had no suicidal behaviours. We created this cohort by counting the number of children within the relevant age range at a specific point in the relevant time period (that is, on December 31, 2008 or December 31, 2012) who did not receive a diagnosis of a mental disorder or exhibit suicidal behaviours in the relevant time period and who did not *ever* receive a diagnosis of a developmental disorder. A limitation of our comparison group is that it will include some children are experiencing mental disorders but have not received a diagnosis.

Table 1.1: Populations of Children During Study Time Periods

Area	2005/06-2008/09				2009/10-2012/13			
	0-5	6-12	13-19	0-19	0-5	6-12	13-19	0-19
Health Regions								
Southern Health/Santé Sud	14,677	18,280	19,202	52,159	16,669	19,043	20,280	55,992
Winnipeg	43,426	55,895	61,682	161,003	47,043	54,436	62,727	164,206
Prairie Mountain Health	11,010	13,929	16,081	41,020	12,408	13,705	15,056	41,169
Interlake-Eastern	7,870	11,146	12,610	31,626	8,424	10,302	12,435	31,161
Northern	8,817	9,869	9,698	28,384	9,968	9,606	9,227	28,801
Public Trustee	346	745	910	2,001	676	1,366	1,856	3,898
Manitoba	86,146	109,864	120,183	316,193	95,188	108,458	121,581	325,227
Winnipeg Community Areas								
Fort Garry/River Heights	7,310	9,330	10,387	27,027	7,674	9,295	10,796	27,765
St. James/Assiniboine South	5,191	7,243	8,744	21,178	5,311	6,520	8,324	20,155
St. Vital/St. Boniface	7,304	9,514	10,520	27,338	7,973	9,263	10,643	27,879
River East/Transcona	8,107	11,072	12,563	31,742	8,684	10,357	12,307	31,348
Seven Oaks/Inkster	6,426	8,718	9,332	24,476	7,271	9,066	10,337	26,674
Downtown/Point Douglas	8,990	9,927	10,043	28,960	10,038	9,853	10,240	30,131
City of Winnipeg	43,328	55,804	61,589	160,721	46,951	54,354	62,647	163,952

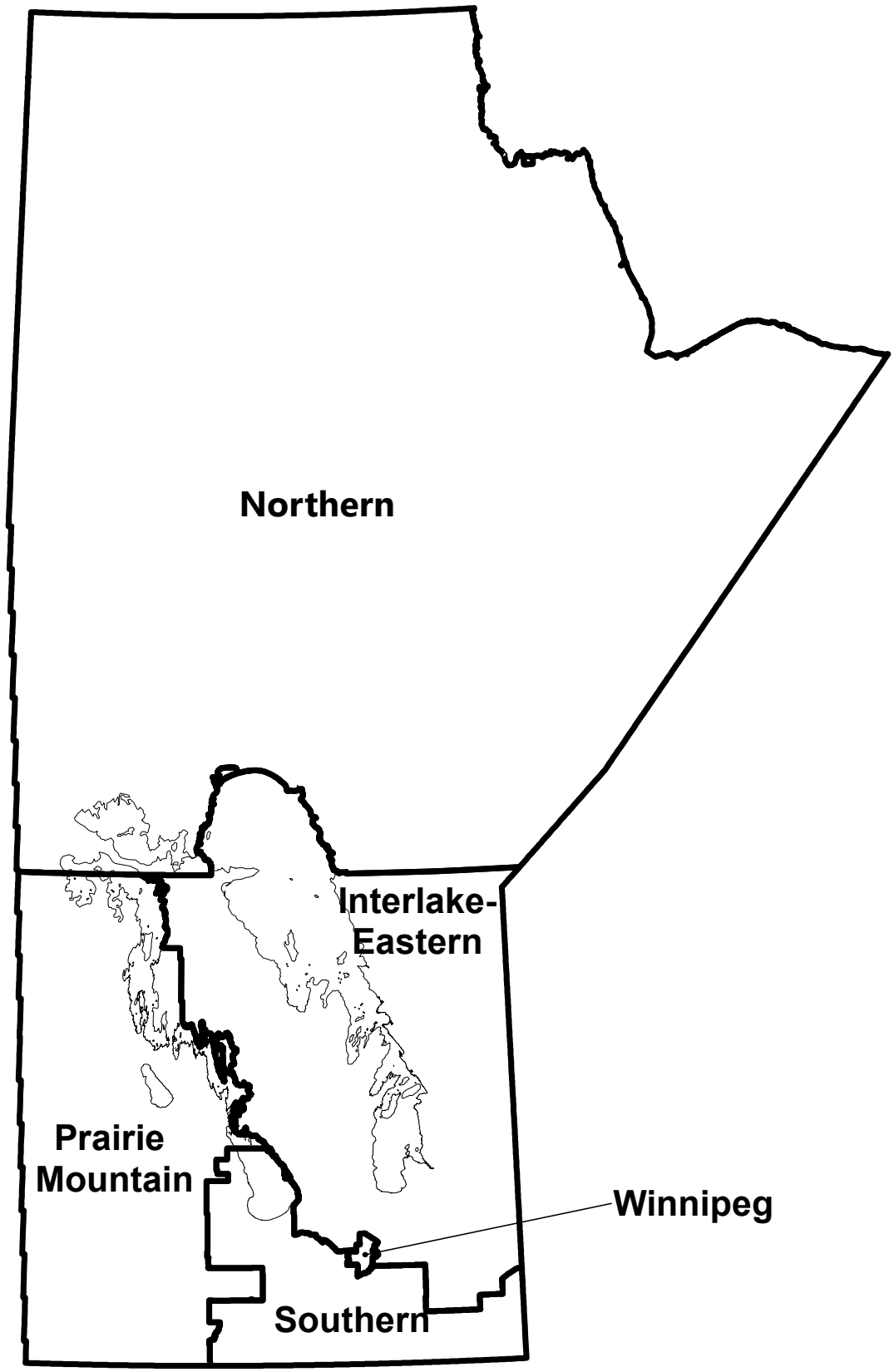
Note: the Winnipeg Health Region includes both the City of Winnipeg and the Town of Churchil

Presentation of Mental Health Indicators

The prevalence of each mental health indicator is presented by time period, age group, health region, community area, sex, and urban and rural income quintile. The age groups examined depend upon the age of onset of the disorder in question. For substance use disorders, psychotic disorders, schizophrenia, and suicide and attempted suicide, the prevalence is presented for one age group: adolescents aged 13-19. The prevalence of ADHD, conduct disorders, and mood and anxiety disorders is presented for children aged 6-19, 6-12, and 13-19. And finally, for developmental disorders, prevalence is presented for four age groups: children aged 0-19, 0-5, 6-12, and 13-19.

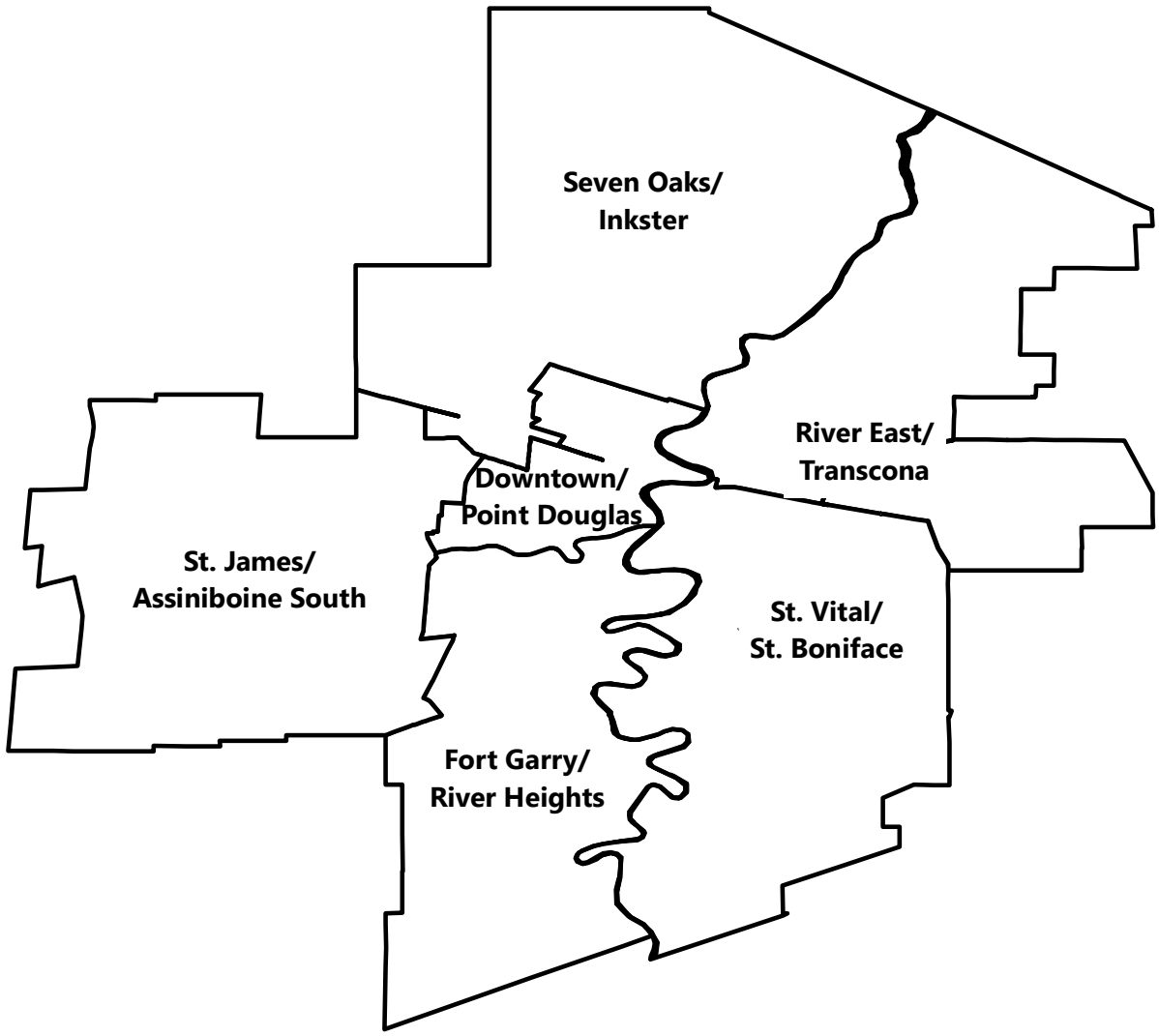
The health regions in Manitoba are shown in Figure 1.1, and include Northern, Interlake-Eastern, Prairie Mountain Health, Southern Health/Santé Sud, and Winnipeg Regional Health Authority (WRHA). The order of the health regions in graphs and tables is determined by health status, with regions with the lowest premature mortality rates (mortality before the age of 75) presented first. Results in this report are based on where the children lived at the midpoint in the study period, not on where they received services or attended school. For example, to determine if a child has a mental disorder, we may have used hospitalization data in Winnipeg or physician visits in a nearby community, but this child was still counted in his/her health region of residence.

Figure 1.1: Map of Manitoba Health Regions



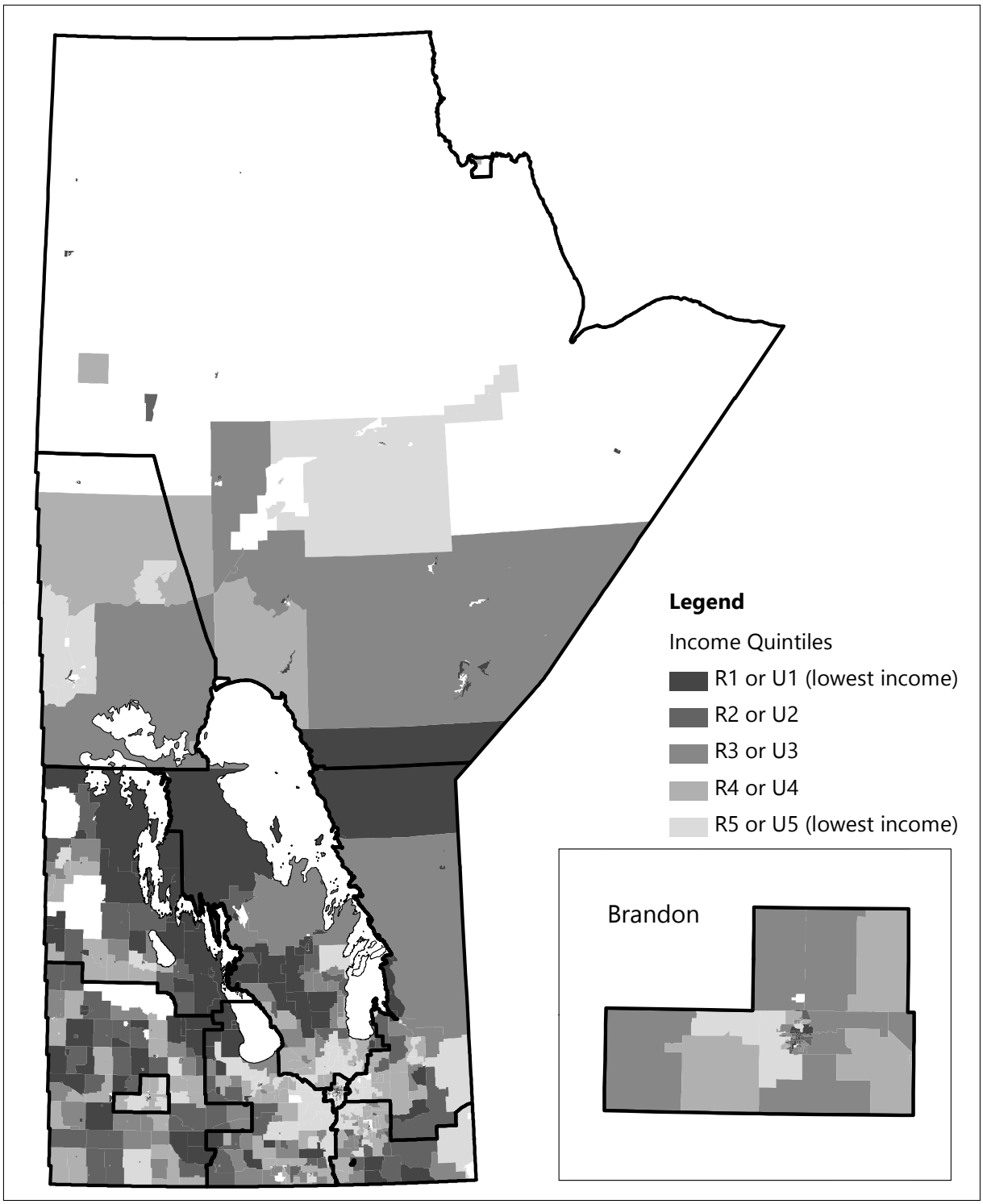
Given that the population in the WRHA is larger than all other regions combined, mental health indicators are also shown by paired Winnipeg Community Areas. The community areas were paired to ensure a sufficient number of children for stable indicator estimates. Figure 1.2 shows the following six paired community areas as suggested by the WRHA: Fort Garry/River Heights; St. James Assiniboia/Assiniboine South; St. Vital/St. Boniface; River East/Transcona; Seven Oaks/Inkster; and Downtown/Point Douglas.

Figure 1.2: Map of Winnipeg Community Area Pairings



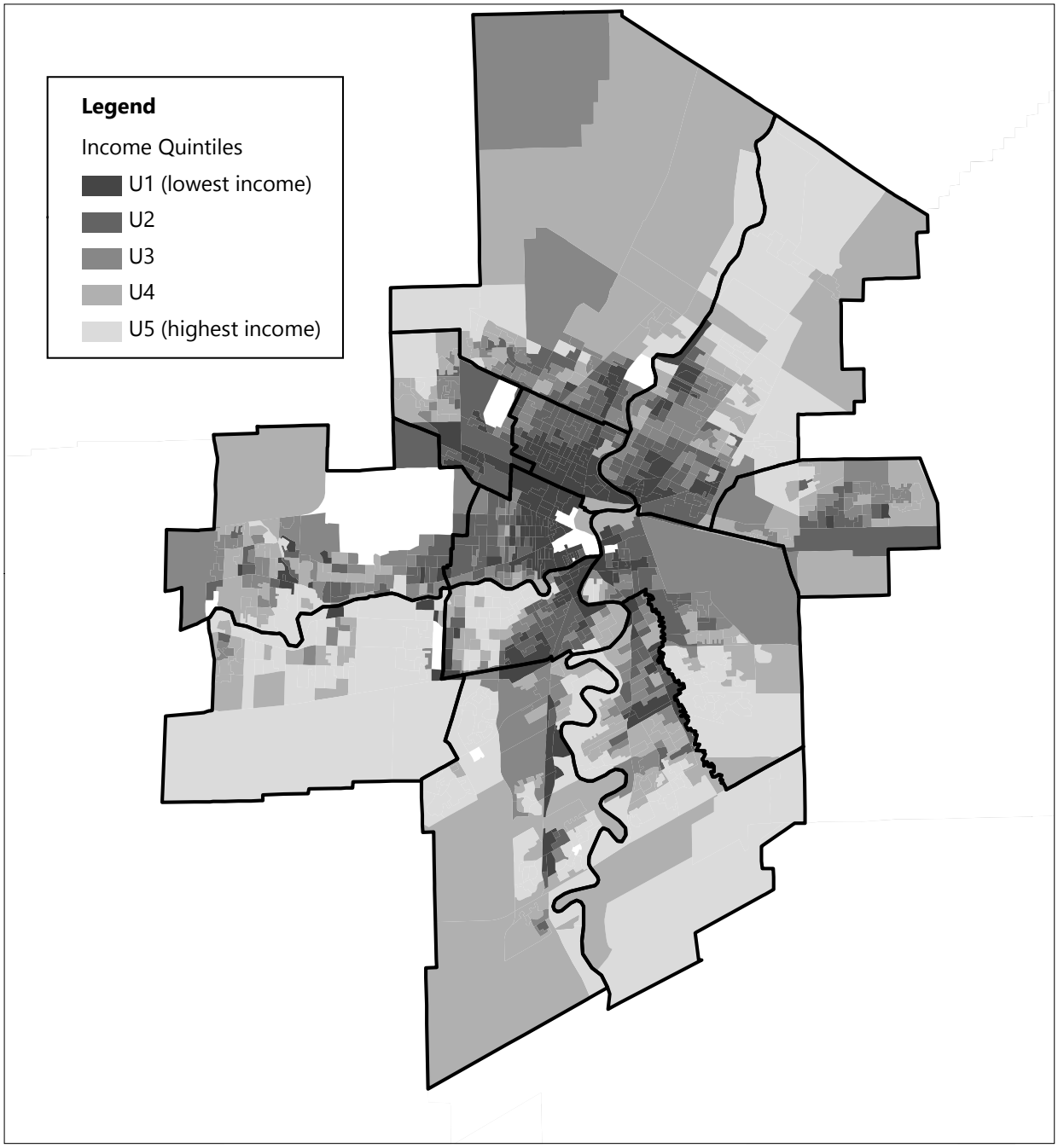
The mental health indicators are presented by area-level income quintiles in urban areas (Winnipeg and Brandon) and rural areas (all other areas) to examine the association between socioeconomic status (SES) and the mental health indicators. The income quintiles were developed using the average household income of small geographical areas called dissemination areas from Canada census data from 2006 and 2011, and ranking incomes in these areas from lowest to highest. The Canada census calculates average income by dividing the aggregate income of a specified group of households (for example, two-person households) by the number of households in that specific group, whether or not they reported income. The dissemination areas are grouped into five groups, or *quintiles*, each containing approximately 20% of the total population. Rural 1 (R1) and Urban 1 (U1) represent the lowest income quintile areas of rural and urban Manitoba, respectively; conversely, R5 and U5 represent the highest rural and urban areas in Manitoba, respectively. These are shown in Figure 1.3 - Figure 1.4 to illustrate the distribution of income quintiles across rural and urban areas. Because of the lower population density in rural communities, a single dissemination area can include several neighbourhoods, each with varying income levels. This is unlike urban areas where a dissemination area is often a single homogenous neighbourhood. This is one reason why the observed income gradient of mental disorders in rural areas may be less pronounced than in urban areas.

Figure 1.3: Distribution of Rural Income Quintiles, 2006 Census Data Dissemination Areas



Note: Map data from 2006 was used because 2011 data has a number of large geographic areas that do not report average household income due to Global Non-Response issues.
Although these areas generally represent smaller populations they produce maps with large missing or blank areas which mask the distribution of income quintiles. The distribution of income quintiles in 2006 is similar to the 2011 distribution. White areas in map indicate Census areas which are not enumerated (such as parks).

Figure 1.4: Distribution of Rural Income Quintiles, 2006 Census Data Dissemination Areas



Note: Map data from 2006 was used because 2011 data has a number of large geographic areas that do not report average household income due to Global Non-Response issues.
Although these areas generally represent smaller populations they produce maps with large missing or blank areas which mask the distribution of income quintiles. The distribution of income quintiles in 2006 is similar to the 2011 distribution. White areas in map indicate Census areas which are not enumerated (such as parks).

In Chapters 4, 5, and 6 we compare the healthcare and social services use, educational outcomes, and physical health of children with disorders to children with no disorders. In these analyses, we have grouped the mental health indicators into externalizing disorders, mood and anxiety disorders, psychotic disorders, suicide and attempted suicide, and developmental disorders. For most indicators, rates and percentages were calculated for the last fiscal year in each of the two time periods (i.e., 2008/09 and 2012/13). We used the same cohort of children as in Chapters 2 and 3, but if a child was older than 19 on October 1 of the last fiscal year of the relevant time period, that child was excluded from the analyses.

In Chapter 7, factors that may lead to mental disorders in children were examined. These include factors from the child's family environment, their area-level socioeconomic status (SES), and measures of child development (the Early Development Instrument) in kindergarten.

Considerations in Defining Mental Health Indicators

This study reports the diagnostic prevalence of mental and developmental disorders, as well as suicidal behaviours. The mental disorders examined in Chapter 2 are ADHD, conduct disorder, substance use disorders, externalizing disorders, mood and anxiety disorders, psychotic disorders, schizophrenia, suicide, and attempted suicide. In Chapter 3, two developmental disorders were examined: developmental disorders (including mental retardation, chromosomal anomalies, FASD, and ASD) and ASD examined separately. The technical appendix provides a detailed definition for each mental health indicator (Appendix 1).

The term *diagnostic prevalence* is used to communicate the fact that the prevalence estimates of mental and developmental disorders are based on diagnoses from medical claims, hospitalization records, and, for some disorders, prescriptions, education data, and the FASD clinic data. These children have been diagnosed by a physician. While the databases at MCHP contain many children with mental health problems, there are still many who will not be included in these analyses, such as children who have never received treatment, children diagnosed by a psychologist (private and publically funded) or children who received services from nurses, social workers, or other counsellors. The MCHP Repository does not have data related to psychologist visits or diagnoses with the possible exception of psychologists who provided a diagnosis to determine special funding in the Education data. Psychologists are highly trained in mental disorders and do provide diagnoses, however, this data is not captured administratively in Manitoba. It should be noted that some disorders are more likely to receive a diagnosis than others. For example, adolescents may not be seeking help from a physician for substance use disorders, but perhaps may be receiving services from the Addictions Foundation of Manitoba, data that are not included in this report. Conduct disorders are more likely to be seen in a school context that may not require special funding and are not captured in this report. As a result, the true prevalence of mental and developmental disorders will be higher than reported in this study.

The definitions used in this deliverable are based on ICD-9-CM and ICD-10-CA codes for diagnosing mental and developmental disorders. These diagnoses are made by psychiatrists, pediatricians, primary care physicians, and other medically trained specialists. The definitions have been discussed with practicing psychiatrists and have face validity, meaning they appear to define the disorders we are measuring. These definitions have not been compared to a "gold standard" to determine how close the definition is to the actual disorder. An example of a gold standard would be a chart review or a clinical database containing patients who have been systematically assessed as having the disorder. Most definitions have been used in previous reports at MCHP (Brownell et al., 2012; Fransoo et al., 2013). The definitions of conduct disorder, externalizing disorders, and psychotic disorders were developed specifically for this report. More detail is found in Chapter 2 and the Technical Appendix (Appendix 1).

In Appendix 3, we present the counts of new diagnosed cases of mental disorders, developmental disorders, and suicidal behaviours by age (0-19 years) and time period. These data are presented to provide background in determining the age groups we chose to examine for each mental health indicator. It also gives a sense of whether the number of new cases is changing over time. Age was determined by age at first diagnosis. For example, if a child received his/her first diagnosis at age 2 during the first time period (2005/06-2008/09), that child's age was set at 2 years old in that time period. To obtain these newly diagnosed mental disorders, we searched the health data from 1986/87 onward for all children aged 0-19.

In Appendix 4, we provide information on how we identified children with mental disorders by showing the type of physician making the diagnosis and the data used to define the disorder for each mental health indicator. Pediatricians and primary care physicians made the majority of mental and developmental disorder diagnoses, with the exception of psychotic disorders and schizophrenia, which are disorders that tend to be diagnosed by psychiatrists. A third of the cases of developmental disorders were captured through the education database, where the student is receiving additional support in school for a disorder. These students are thoroughly assessed before the special funding is allocated, thus providing assurances that the child's functioning is impaired and is likely to have one of the disorders that fall under the *developmental disorder* indicator.

Suicide among adolescents (aged 13-19) is defined as having any death record in Vital Statistics data with self-inflicted injury or poisoning listed as the primary cause of death. It is not always possible to determine if a death was accidental or intentional, and therefore some underreporting is certainly occurring. Attempted suicide is defined as a hospitalization for an accidental poisoning that is followed by a consult to psychiatry or hospitalization for self-inflicted injury. Although the suicide attempts that are captured in this report are arguably the most life threatening, given that a hospitalization was deemed necessary, the attempted suicide rate will be underestimated for a few reasons. Many cases of attempted suicide are not hospitalized. They may present to the emergency department and not be admitted to the hospital. In addition, they may never come to the attention of medical staff at all and be cared for by family or friends. Finally, they may be hospitalized but the suicide attempt is not recognized as an attempt, but rather an accidental injury or poisoning.

For developmental disorders, we calculated *lifetime prevalence* in each of the two four-year periods. As such, any child in either four-year period who had *ever* been diagnosed with a developmental disorder would be considered to have that disorder. The rationale for reporting lifetime prevalence for developmental disorders was because these disorders tend to remain throughout life. Children acquire developmental disorders *in utero* during development but they may not be diagnosed until, for example, the child starts school.

Prevalences, Adjusted Rates, Crude Rates, and Statistical Testing

In this report, *prevalence* refers to the percentage of the population that has a certain condition over a given period of time (period prevalence) or over a lifetime (lifetime prevalence). In this report, lifetime prevalence includes up to age 19. *Prevalence* is calculated using a numerator of children with a given condition (for example, schizophrenia) over a denominator of the child population, which gives the proportion of the population that has the condition during the given time period in a given geographic area. Rates have different definitions across disciplines and even among epidemiologists. We refer to a *rate* as a measure of the frequency with which an event occurs in a defined population over a specified period of time. In this report, we have calculated the rate by using the number of events in the numerator over a denominator of the relevant child population. In the calculation of a rate, a child can contribute more than one event during the time period: for example, one child can have more than one visit to a psychiatrist over a period of time.

The count of events for each indicator was modelled using a statistical technique called generalized linear modelling (GLM) to compare and estimate rates in this report. This method is suitable for non-normally distributed data, such as counts. Various distributions were used for different indicators: for example, Poisson distribution for very rare events; negative binomial distribution for relatively rare, but highly variable events; and binomial distribution for events with two possible outcomes. Age and sex were included in the models to adjust for differences in age and sex distributions across health regions and income quintiles.

All data management, programming, and analyses were performed using SAS® statistical analysis software, version 9.4 (SAS Institute Inc., 2011).

As mentioned above, we present age- and sex-adjusted rates using continuous age. This means that any differences noted among health regions, community areas, or income quintiles are not because of differences in the ages or number of males and females in each area. In Appendix 5, we also present the exact number of children with mental and developmental disorders and suicidal behaviours, as well as crude rates (results with no age and sex adjustments). Because we are reporting the prevalence of disorders in children aged 0-19 years, the differences between crude and age- and sex-adjusted rates are very small.

Wherever a difference between the prevalence of disorders for children is mentioned, this difference is statistically significant. Statistical testing informs us about the degree of confidence we have in the results that we are observing. When we made comparisons between two groups, for example, between two time periods, we used a 0.05 level of significance. If a difference is "statistically significant", we are confident that the difference we are observing is not just due to chance. When we made multiple comparisons, such as examining difference between health regions, we used a stricter 0.01 level of significance.

Methods used for each Objective

Objective 1: What are the diagnostic prevalence estimates of children with mental disorders, developmental disorders, and suicidal behaviours, and do these prevalence estimates differ by factors such as age, sex, geographic region, and income quintile?

Diagnostic prevalence estimates were calculated for the mental health indicators listed below. The method used for calculating the prevalence estimates is described in the sections above.

1. Mental Disorders and Suicidal Behaviours (Chapter 2)

    a. Attention-deficit hyperactivity disorder
    b. Conduct disorder
    c. Substance use disorders
    d. Externalizing disorders
    e. Mood and anxiety disorders
    f. Psychotic disorders
    g. Schizophrenia
    h. Any mental disorder
    i. Suicide
    j. Attempted suicide

2. Developmental Disorders (Chapter 3)

    a. Developmental disorders
    b. Autism spectrum disorder

Objective 2: How do children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to children with no disorders in their healthcare use, social services use, and justice system involvement?

In Chapter 4, the mental health indicators were combined into five groups: externalizing disorders, mood and anxiety disorders, psychotic disorders, suicide and attempted suicide, and developmental disorders. The term "no disorders" refers to children with no mental disorder, no developmental disorder, and no suicidal behaviour. The rates of healthcare and social services use were calculated for each group of children with disorders and compared to children with no disorders. Specifically, rate ratio estimates with confidence intervals were compared when the counts of each event were observed over the study period. This was typically a Poisson or negative binomial model. Service use was examined in the last fiscal year of each time period (2008/09 and 2012/13). The following healthcare and social services were examined. The definition of each of these indicators can be found in the technical appendix (Appendix 1).

1. Physician visits;
2. Psychiatrist visits;
3. Inpatient hospitalizations;
4. Injury hospitalizations;
5. Service use of Manitoba Adolescent Treatment Centre;
6. Child and Family Services contact;
7. Child in care of Child and Family Services;
8. Living in families on income assistance;
9. Young adults on income assistance;
10. Child in social housing;
11. Justice system involvement: accused; and
12. Justice system involvement: victim.

Another analysis was conducted regarding health services use before and after a suicide attempt. Here, we compared the rates of health services use four years before an attempted suicide to rates four years after an attempted suicide. We included only adolescents who had attempted suicide in the first time period (2005/06 and 2008/09) in order to have sufficient years of data to examine health services use after the attempt. If an adolescent had more than one attempt in the time period, only the first attempt was examined. Statistical testing of adjusted rates was done using the same method (generalized linear modelling) as was used elsewhere in this study. The health services examined were physician visits, psychiatrist visits, MATC, and hospitalizations.

Objective 3: How do the educational outcomes of children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to the educational outcomes of children with no disorders?

In Chapter 5, the mental health indicators were combined into five groups as described above. Unlike in previous chapters, the education indicators are positive outcomes, where a high percentage indicates that children are meeting educational expectations for their grade level. The percentage of children assessed with positive educational outcomes was calculated for each group of children with these disorders and compared to children with no disorders. Education outcomes are assessed at certain grade levels. These outcomes were calculated by combining four years of educational data (2009/10-2012/13) to provide a sufficiently large sample size to obtain a stable estimate. Statistical testing of adjusted rates was done using the same method (generalized linear modelling) as was used elsewhere in this study. The education outcomes examined are listed below. The definition of each of these indicators can be found in the technical appendix (Appendix 1).

1. Grade 3: Numeracy Assessment;
2. Grade 3: Reading Assessment;
3. Grade 7: Mathematics Assessment;
4. Grade 7: Student Engagement;
5. Grade 8: Reading and Writing Assessment; and
6. High School Completion.

Objective 4: How does the physical health of children diagnosed with mental disorders, developmental disorders, and suicidal behaviours compare to the physical health of children with no disorders?

In Chapter 6, the mental health indicators were combined into five groups as described above. The rates of health indicators were calculated for each group of children with these disorders and compared to children with no disorders. The time frame used to calculate these indicators varies by indicator. For example, mortality required four years of data to provide a large enough sample size to report the rates. The following health indicators were examined. The definition of each of these indicators can be found in the technical appendix (Appendix 1).

1. Asthma;
2. Diabetes;
3. Atopic Dermatitis; and
4. Mortality.

Objective 5: What early childhood factors are associated with being diagnosed with ADHD, conduct disorder, and mood and anxiety disorders in middle childhood?

In Chapter 7, we examined the complex inter-relationships among early childhood factors that are associated with children's mental disorders, using a statistical method technique known as structural equation modelling (SEM). Details regarding the study cohort, the variables we used, and how we conducted the analyses are found in Chapter 7.

Strengths and Limitations of this Report

It is important to interpret our findings with a good understanding of the strengths and limitations of the methods and datasets we used. This report was meant to provide a picture of the mental health of Manitoba's children from 2005/06 to 2012/13. With the exception of Chapter 7, our efforts were focused on describing the "what" rather than attempting to explain the "why". It is important to note that we did not attempt to control for all confounding factors in our analyses. For example, we included age and sex in the models when examining the association between physician visits and mental disorders; however, we did not include socioeconomic status (SES), distance from major centres, ethnicity, or availability of services. These factors could potentially explain some of the differences we found between children with mental disorders and children with no disorders.

We acknowledge that our diagnostic prevalences are likely underreporting the true prevalence of mental disorders. The diagnostic prevalence that we are reporting tells us the number of children who were diagnosed by a physician or (when using the Education data) a psychologist. Most of the diagnoses were provided by pediatricians and primary care physicians, except for psychotic disorders, which were mainly provided by psychiatrists. With the exception of mental health indicators that used education or FASD clinic data, we did not have access to diagnoses provided by psychologists or services provided by nurses, social workers, and counsellors. Also, many children with mental disorders do not seek treatment. In our indicator of attempted suicide, we captured all cases who were hospitalized for self-inflicted injury or accidental poisoning; however, we recognize that cases who may have presented in the emergency department and were sent home or those who never sought medical treatment will not be included in our estimates. Reassuringly, some authors suggest that those who seek help may be the most affected (Burns et al., 1995).

There is the potential for coding errors when using any data source, but some errors are specific to administrative data. Errors may occur when entering the codes in the databases, although training offered to data entry personnel decreases the chance of this occurring. There is also the potential for incorrect diagnoses being made by physicians. For example, a physician may have diagnosed a child with ADHD when in fact the child did not have the full criteria for ADHD, or diagnosed an adolescent with schizophrenia when the child experienced a drug induced psychosis. Diagnoses made by primary care physicians would be more susceptible to this type of error because most do not receive advanced training in mental disorders.

When comparing prevalence estimates across health regions, it is important to keep in mind that visits to salaried primary care physicians may not all be captured in the Repository as effectively as we would hope. Most physicians in Manitoba are paid by a fee-for-service system, but others are paid by salary. Previous work at MCHP suggested that up to one-third of all visits to salaried primary care physicians are not captured in the Repository (Katz et al., 2014). This conclusion was based on comparisons between prescriptions and physician billings. More recent work found few differences in the expected number of billings between fee-for-service and salaried Winnipeg-based primary care physicians (Katz et al., 2016), suggesting that rural salaried physicians are more susceptible to missing billings than Winnipeg-based physicians. This limitation is particularly true in the Northern Health Region where many primary care physicians are salaried.

Finally, we note that there are some important mental disorders that we were unable to examine, such as eating disorders, tics, oppositional disorders and learning disorders. Four or more digits of the ICD codes are required to be confident that we were defining these disorders specifically. Unfortunately, at this point in time, MHSAL's physician visit claims database only has the first three digits. We were also unable to distinguish self harm from suicide attempt with the available data. Another limitation is grouping mood and anxiety disorders together. We used medication prescriptions to identify children with mood and anxiety disorders, and the same medications are used for both disorders.

Despite the limitations listed above, this report offers a wealth of information and a population-based perspective of the mental health of Manitoba's children. We used the Repository, which has data on virtually all children in the province. We report the diagnostic prevalence of many clinically relevant mental disorders, developmental disorders, and indicators of marked psychological distress: suicide and attempted suicide. An intersectoral perspective is also provided by examining healthcare and social services use, justice system involvement, educational outcomes, and physical health indicators. The modelling in Chapter 7 provides a greater understanding of factors that are associated with the development of mental disorders, giving policy makers the information needed to develop policies and plan services for children in Manitoba.

CHAPTER 2: DIAGNOSTIC PREVALENCE OF MENTAL DISORDERS AND SUICIDE AND ATTEMPTED SUICIDE IN CHILDREN IN MANITOBA

In this chapter, we present the age- and sex-adjusted four-year diagnostic prevalence of mental disorders, as well as rates of suicide and suicide attempts, for children in Manitoba. Prevalence estimates are presented by health region, Winnipeg community area, age group, sex, and income quintile in two time periods: 2005/06-2008/09 and 2009/10-2012/13. A table is presented at the end of the chapter showing the comorbid mental health conditions among children with mental disorders.

The diagnostic prevalence of the following mental disorders are presented in this chapter:

- Attention-deficit hyperactivity disorder (ADHD)
- Conduct disorder
- Substance use disorders
- Externalizing disorders
- Mood and anxiety disorders
- Psychotic disorders
- Schizophrenia
- Any mental disorder
- Suicide
- Attempted suicide

An abridged definition of each mental disorder is provided prior to the presentation of the prevalence estimates. ICD-9-DM and ICD-10-CA codes used to identify the mental health indicators are provided in Appendix 1. *Diagnostic prevalence* is the term used as a reminder that our definitions include only children who have received health or education services for mental disorders. It is likely that many more children live with these disorders and have not received diagnosis or treatment.

The prevalence estimates are expressed as the percent of the population that has been diagnosed with the disorder in each of the time periods. For suicide and attempted suicide, rates per 100,000 children are provided. **All results reported in the text are statistically significant**. For each indicator, the number of children diagnosed for the first time by age (0-19) are found in Appendix 3, and the crude and adjusted prevalence estimates or rates are presented in Appendix 5.

For a small percentage of children, there was no information available on where they lived. These children are likely in the care of Child and Family Services or (for some 18- and 19-year-olds) the Public Trustee Office. The prevalence estimates of mental disorders for children are found in Appendix 5. We note that these children are included in the overall prevalence of Manitoba, but could not be included in the prevalence estimates of health regions or income quintiles.

Attention-Deficit Hyperactivity Disorder

Attention-deficit hyperactivity disorder (ADHD) is a mental disorder that is characterized by a persistent pattern of impulsiveness, hyperactivity, and absence of attention in children. The disorder is often identified during school ages, and symptoms may continue into adulthood (American Psychiatric Association, 2000). The symptoms significantly affect many facets of behaviour and performance, and disrupt both school and home life (Dopfner, Breuer, Wille, Erhart, & Ravens-Sieberer, 2008).

In this study, a child (aged 6-19) is considered to have a diagnosis of ADHD in either time period when he/she meets at least one of the following criteria:

- At least one hospitalization with a diagnosis of hyperkinetic syndrome;
- At least one physician visit with a diagnosis of hyperkinetic syndrome;
- At least two prescriptions for ADHD drugs without a diagnosis of conduct disorder, disturbance of emotions, or cataplexy/narcolepsy; or
- At least one prescription for ADHD drugs and a diagnosis of hyperkinetic syndrome in the previous three years.

Key Findings

Below are listed the key findings for diagnostic ADHD prevalence:

- 5.5% for the first time period and 6.8% for the second time period in Manitoba overall;
- Increased from the first time period to the second time period in Manitoba overall, all health regions except Northern, and all Winnipeg community areas;
- Higher in Winnipeg RHA than in Manitoba overall in both time periods;
- Lower in Southern Health/Santé Sud and Northern than in Manitoba in both time periods, and lower in Interlake Eastern than in Manitoba in the second time period only;
- Lower in Seven Oaks/Inkster and higher in St. James Assiniboia/Assiniboine South than in Winnipeg overall in both time periods; lower in Point Douglas/Downtown than in Winnipeg overall in the first time period only;
- Higher in males than females in all health regions in both time periods; and
- Higher in urban areas compared to rural areas in both time periods.

There was a linear trend across both rural and urban income quintiles. In urban areas, this means that as income increased, there was a lower prevalence of ADHD. Conversely in rural areas, we found that as income increased, so did ADHD prevalence.

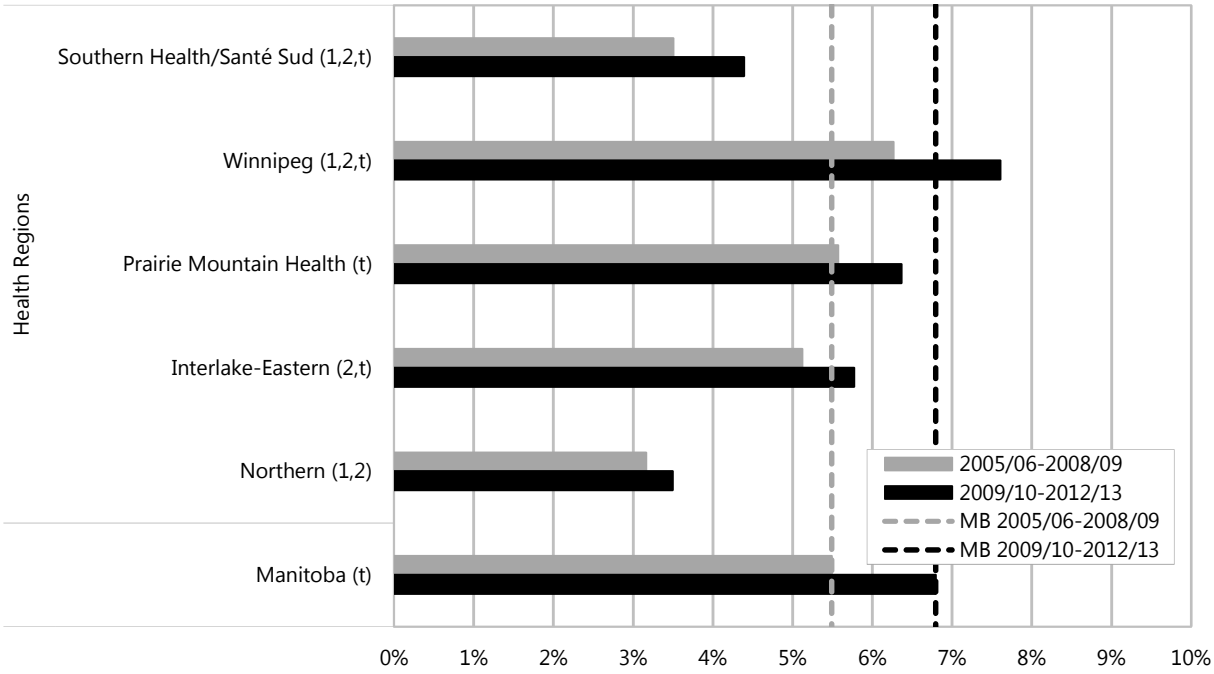
Regional Trends over Time

Figure 2.1 presents the four-year diagnostic prevalence of ADHD for children aged 6-19 by health region. The prevalence in Manitoba was 5.5% and 6.8% in the first and second time periods, respectively. We observed an increase in prevalence over time across all health regions except in the Northern Health Region. In both time periods, the prevalence in the Winnipeg RHA was higher than the Manitoba prevalence. On the other hand, Southern Health/Santé Sud and Northern had lower prevalence estimates than Manitoba in both time periods, and Interlake Eastern had a lower prevalence than Manitoba in the second time period only.

Figure 2.2 presents the four-year diagnostic prevalence of ADHD for children aged 6-19 by Winnipeg community area. It shows an increase in prevalence over time in all community areas and for the Winnipeg prevalence. In both time periods, the prevalence in St. James Assiniboia/Assiniboine South was higher than the Winnipeg prevalence. On the other hand, the diagnostic prevalence in Seven Oaks/Inkster (in both time periods) and Downtown/Point Douglas (in the first time period) was lower than the Winnipeg prevalence.

Figure 2.1: Prevalence of Attention-Deficit Hyperactivity Disorder in Children Aged 6-19 by Health Region

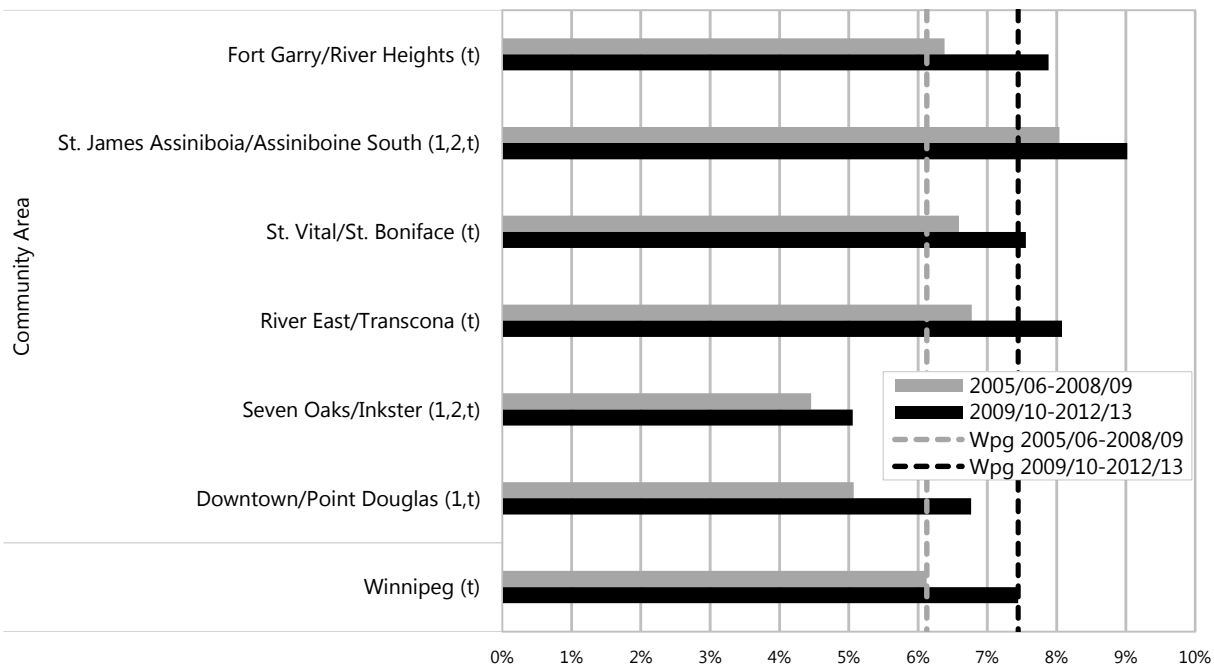
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.2: Prevalence of Attention-Deficit Hyperactivity Disorder in Children Aged 6-19 by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)

Prevalence by Age Groups and Sex

Figure 2.3 and Figure 2.4 present the four-year diagnostic prevalence of ADHD for children and adolescents aged 6-12 and 13-19, respectively. For children aged 6-12, the prevalence in Manitoba was 7.5% and 8.7% in the first and second time period, respectively. Figure 2.5 shows an increase over time in Manitoba overall and across all health regions except Interlake-Eastern and Northern. In both time periods, the prevalence in Winnipeg (8.4% and 9.7%) was higher than the Manitoba prevalence. Conversely, Southern Health/Santé Sud (4.7% and 5.5%) and Northern (4.5% and 5.1%) were lower than the Manitoba prevalence.

For adolescents aged 13-19, the prevalence of ADHD in Manitoba was 3.7% and 4.8% in the first and second time period, respectively. In the first time period, the prevalence of ADHD in Winnipeg (4.3%) was higher than in the Manitoba prevalence. Southern Health/Santé Sud (2.4% and 3.3%) and Northern (1.9% and 2.0%) had lower prevalences than Manitoba in both time periods. An increase over time was observed in Manitoba and across all health regions except Northern.

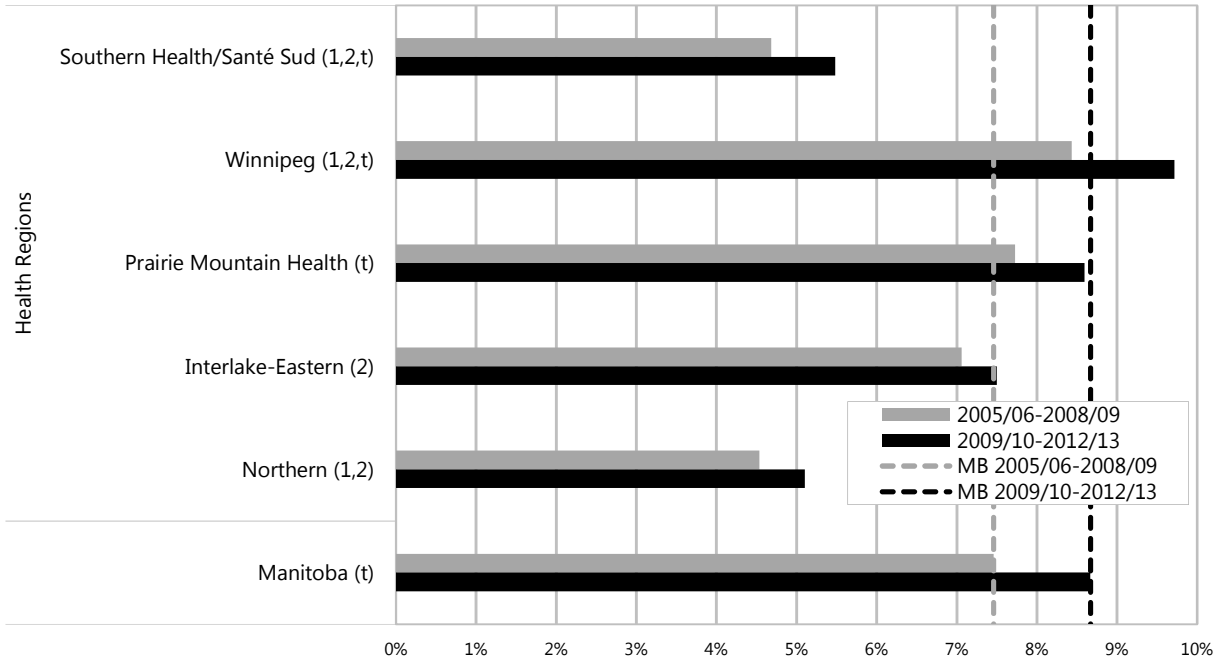
Figure 2.5 shows that the four-year diagnostic prevalence of ADHD was higher in males than females in all health regions in the second time period. The prevalence in Manitoba was 8.7% for males and 3.5% for females. Similar differences were found in the first time period (see Appendix Table 5.3).

Prevalence by Income Quintile

Figure 2.6 presents the four-year diagnostic prevalence of ADHD for children aged 6-19 by income quintile. First of all, we note that the prevalence was higher in urban areas than in rural areas in both time periods. For urban and rural prevalence in both time periods, there was a linear trend across the income quintiles. It is interesting that the trend across the income quintiles is opposite for urban and rural areas: in urban areas, the prevalence increases as income decreases whereas in rural areas, the prevalence increases as income increases.

Figure 2.3: Prevalence of Attention-Deficit Hyperactivity Disorder in Children Aged 6-12 by Health Region

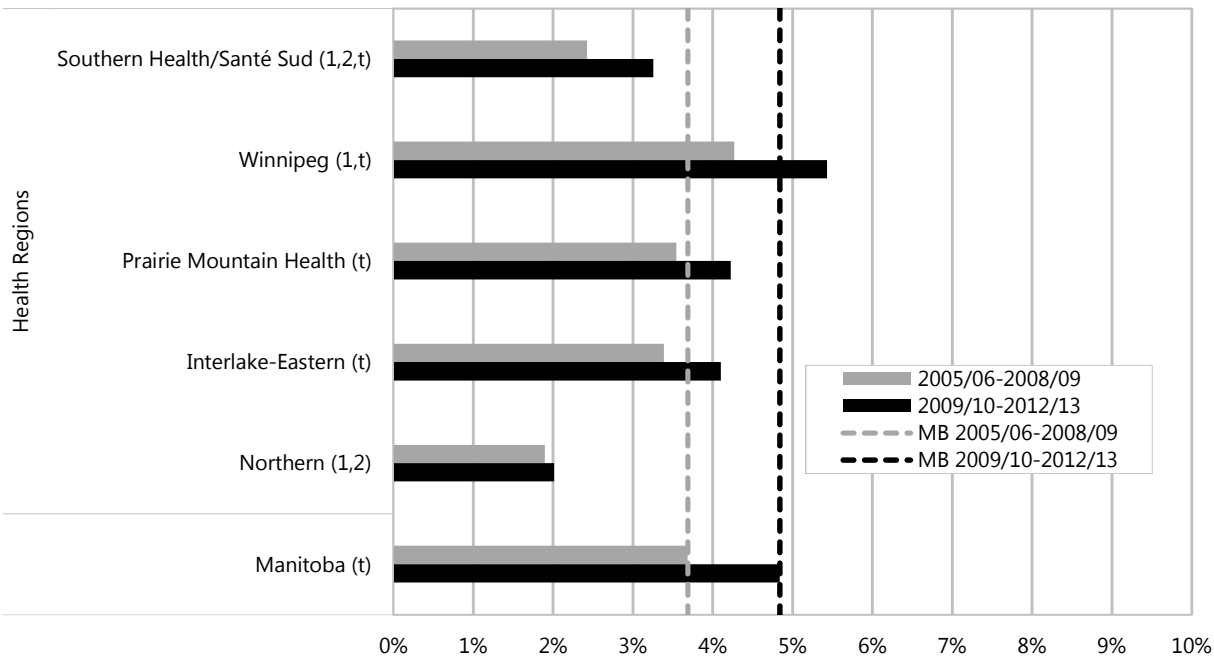
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.4: Prevalence of Attention-Deficit Hyperactivity Disorder in Adolescents Aged 13-19 by Health Region

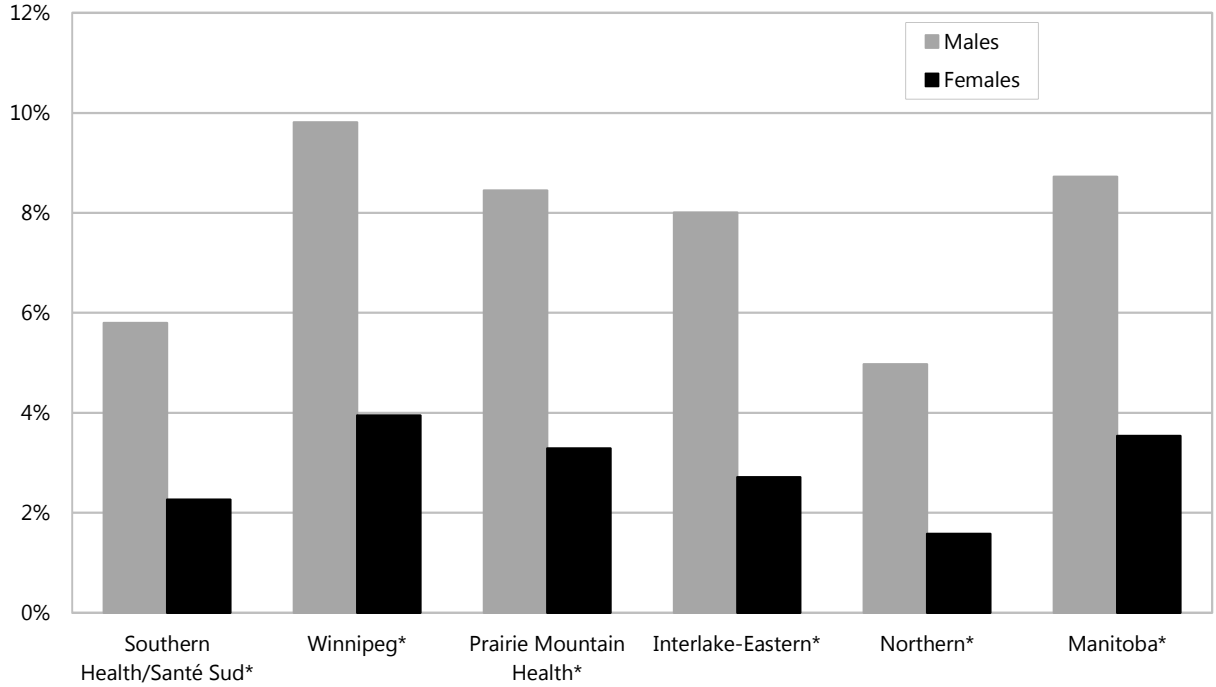
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.5: Prevalence of Attention-Deficit Hyperactivity Disorder in Children Aged 6-19 by Sex and Health Region

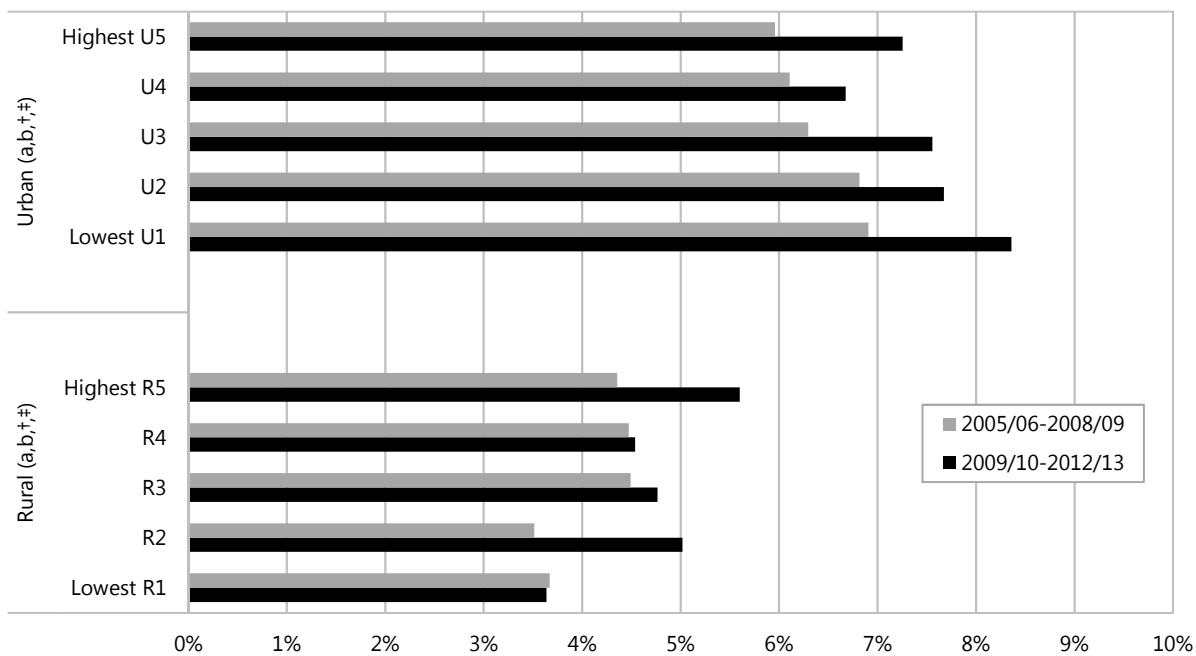
Age-adjusted, children diagnosed with disorder, four-year time period, 2009/10-2012/13



* indicates a statistically significant difference between males and females for that health region (p<0.05)

Figure 2.6: Prevalence of Attention-Deficit Hyperactivity Disorder in Children aged 6-19 by Income Quintile

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period (p<0.01)
b indicates a statistically significant difference across income quintiles for the second time period (p<0.01)
† indicates a statistically significant difference between rural and urban areas in the first time period (p<0.01)
‡ indicates a statistically significant difference between rural and urban areas in the second time period (p<0.01)

What do these results mean?

This report found the age- and sex-adjusted four-year diagnostic prevalence of ADHD for children aged 6-19 was 6.8% in the second time period, which is consistent with other epidemiologic studies. It is worth noting that ADHD prevalence depends on the time frame, survey design, interview guide, and population surveyed (Polanczyk et al., 2015). The 2003 National Survey of Children's Health in the United States found a lifetime ADHD prevalence of 7.8% for children aged 4-17 (Visser, Lesesne, & Perou, 2007). More recently, the 2012 National Health Interview Survey results found a lifetime prevalence of 10% for children aged 3-17 years living in the United States (Bloom et al., 2013), 'lifetime prevalence' meaning that ADHD was diagnosed at some point in their lives. A meta-analysis of the worldwide prevalence of ADHD in children up to 18 years of age found a prevalence of 3.4% (Polanczyk et al., 2015). This meta-analysis included three Canadian studies from the 1980s and 1990s (Breton et al., 1999; Offord et al., 1987; Romano et al., 2001). The time frame for this meta-analysis ranged from 'current' to '12-month' diagnosis of ADHD, which may explain the lower prevalence. The prevalence of ADHD has been found to be higher for boys than girls (Bloom et al., 2013; Dopfner et al., 2008; Merikangas et al., 2010; Visser et al., 2007). There is some evidence that ADHD prevalence in children aged 13-18 is lower in rural areas compared to urban areas (Dopfner et al., 2008; Merikangas et al., 2010) and that the prevalence of ADHD in children in families with lower socioeconomic status is higher (Dopfner et al., 2008; Visser et al., 2007). Conversely, one study found no association between poverty and ADHD in children (Merikangas et al., 2010).

It is noteworthy that the ADHD prevalence in the Northern Health Region was lower than the Manitoba prevalence, and that the prevalence was also lower among low income quintiles than high income quintiles in rural areas. This is inconsistent with previous research that reports higher mental disorder prevalence in lower income areas (Wilkinson & Pickett, 2010). While we cannot confirm it with the available data, the lower Northern prevalence may be due to a lack of physician services required to assess, diagnose, and treat children with ADHD. Services are generally more available in larger urban centres like Winnipeg. A possible explanation for the higher ADHD prevalence in higher income rural areas is that parents with more resources are able to travel to obtain assessment and treatment. Alternatively, it may also be that the lower ADHD rates in the Northern regions is the result of schools in other areas having a greater tendency to identify kids with ADHD and initiate service access.

Conduct Disorder

Conduct disorder is characterized by a repetitive and persistent pattern of antisocial, aggressive, or defiant behaviour. The behaviour is more severe than ordinary childish mischief or adolescent rebelliousness and is enduring (six months or longer). Examples of these behaviours include excessive levels of fighting or bullying, cruelty to other people or animals, severe destructiveness to property, fire-setting, stealing, repeated lying, truancy from school and running away from home, unusually frequent and severe temper tantrums, and disobedience (American Psychiatric Association, 2013).

In this study, a child (aged 6-19) is considered to have a diagnosis of conduct disorder in either time period when he/she meets at least one of the following criteria:

- At least one hospitalization with a diagnosis of conduct disorder; or
- At least one physician visit with a diagnosis of conduct disorder.

Key Findings

Below are listed the key findings for diagnostic conduct disorder prevalence:

- 1.5% for both the first and second time period in Manitoba;
- Decreased from the first time period to the second time period in Prairie Mountain Health;
- Lower in Southern Health/Santé Sud, Prairie Mountain Health, and Northern than the Manitoba prevalence in both time periods;
- Higher in males than females in all health regions in both time periods; and
- Higher in urban areas compared to rural areas in both time periods.

There was a linear trend across urban income quintiles, meaning that as income increased, there was a lower prevalence of conduct disorder.

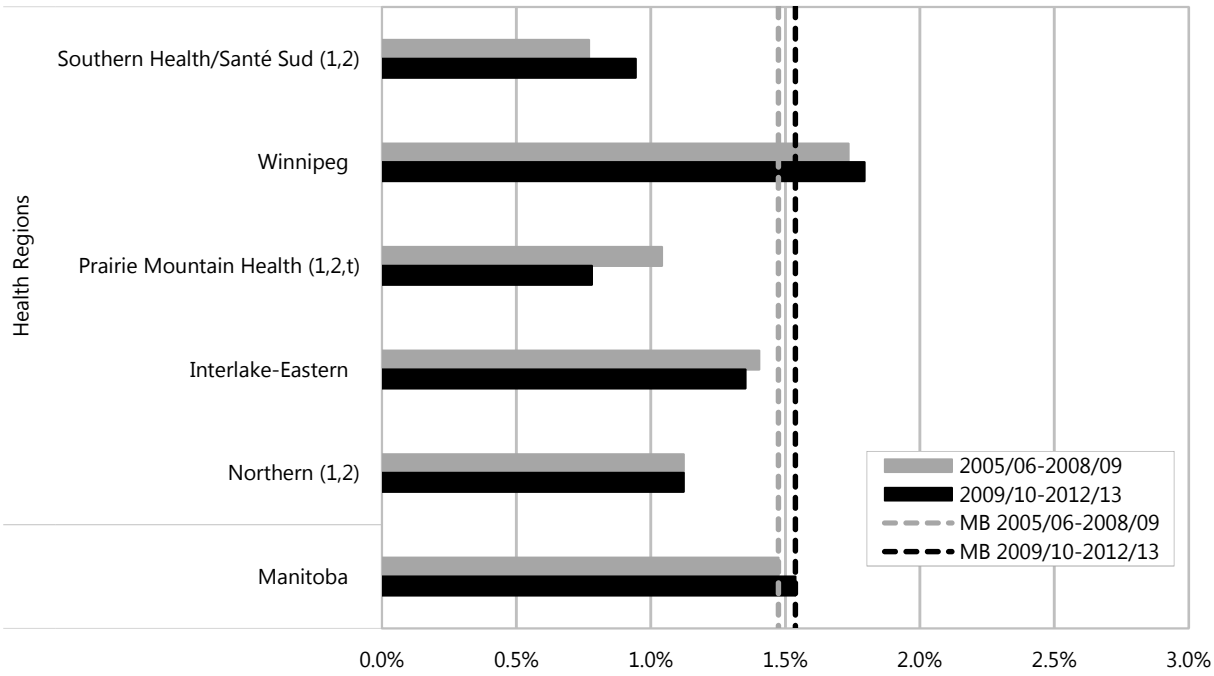
Regional Trends over Time

Figure 2.7 presents the four-year diagnostic prevalence of conduct disorder for children aged 6-19 by health region. The prevalence in Manitoba was 1.5% in both time periods when we rounded the estimate. We observed a decrease in prevalence in Prairie Mountain Health over time. In both time periods, the prevalence of conduct disorder in Southern Health/Santé Sud, Prairie Mountain Health, and Northern was lower than the Manitoba prevalence.

Figure 2.8 presents the four-year diagnostic prevalence of conduct disorder for children aged 6-19 by Winnipeg community area. No changes over time or important differences were observed across the Winnipeg community areas.

Figure 2.7: Prevalence of Conduct Disorder in Children Aged 6-19 by Health Region

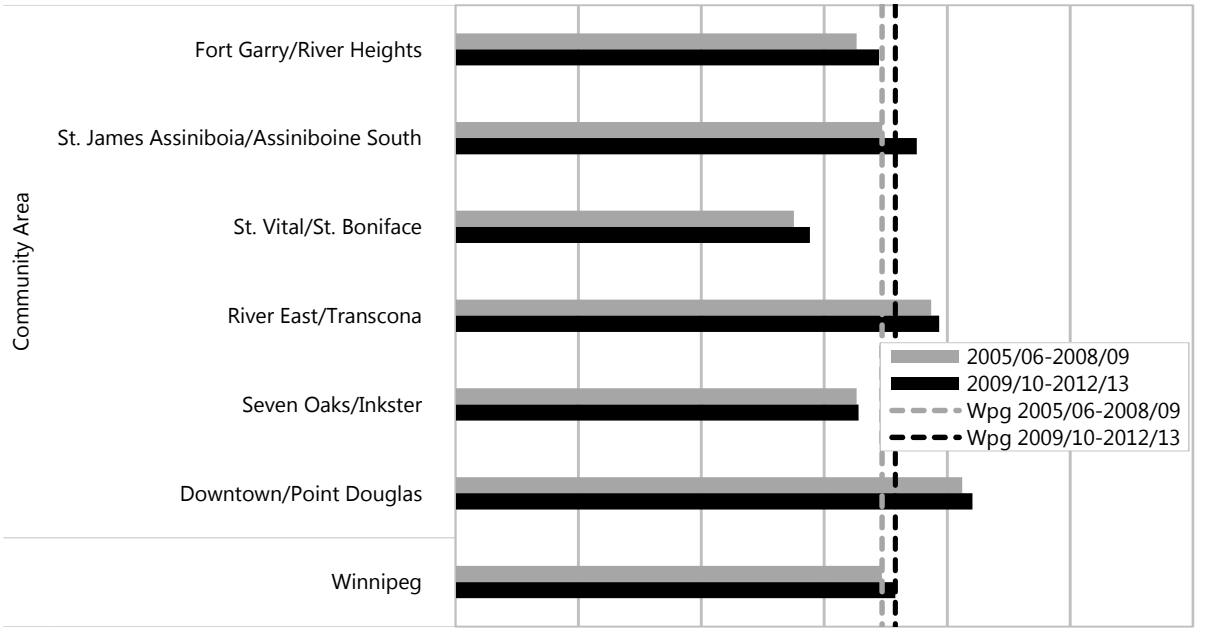
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.8: Prevalence of Conduct Disorder in Children Aged 6-19 by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)

Prevalence by Age Groups and Sex

Figure 2.9 and Figure 2.10 present the four-year diagnostic prevalence of conduct disorder for children and adolescents aged 6-12 and 13-19, respectively. For children aged 6-12, the prevalence in Manitoba was 1.9% in the first time period and 2.1% in the second time period. In both time periods, the prevalence in Winnipeg (2.3% and 2.5%) was higher than the Manitoba prevalence. The prevalence estimates in Southern Health/Santé Sud (1.0% and 1.4%), Prairie Mountain Health (1.4% and 1.0%), and Northern (1.2% and 1.4%) were lower than in Manitoba in both time periods. We observed an increase in prevalence from the first time period to the second time period in Manitoba overall and in Southern Health/Santé Sud, and a decrease over time in Prairie Mountain Health.

For adolescents aged 13-19, the prevalence in Manitoba was 1.1% in both time periods. The prevalence estimates in Southern Health/Santé Sud (0.6% and 0.6%) and Prairie Mountain Health (0.8% and 0.6%) were lower than in Manitoba in both time periods.

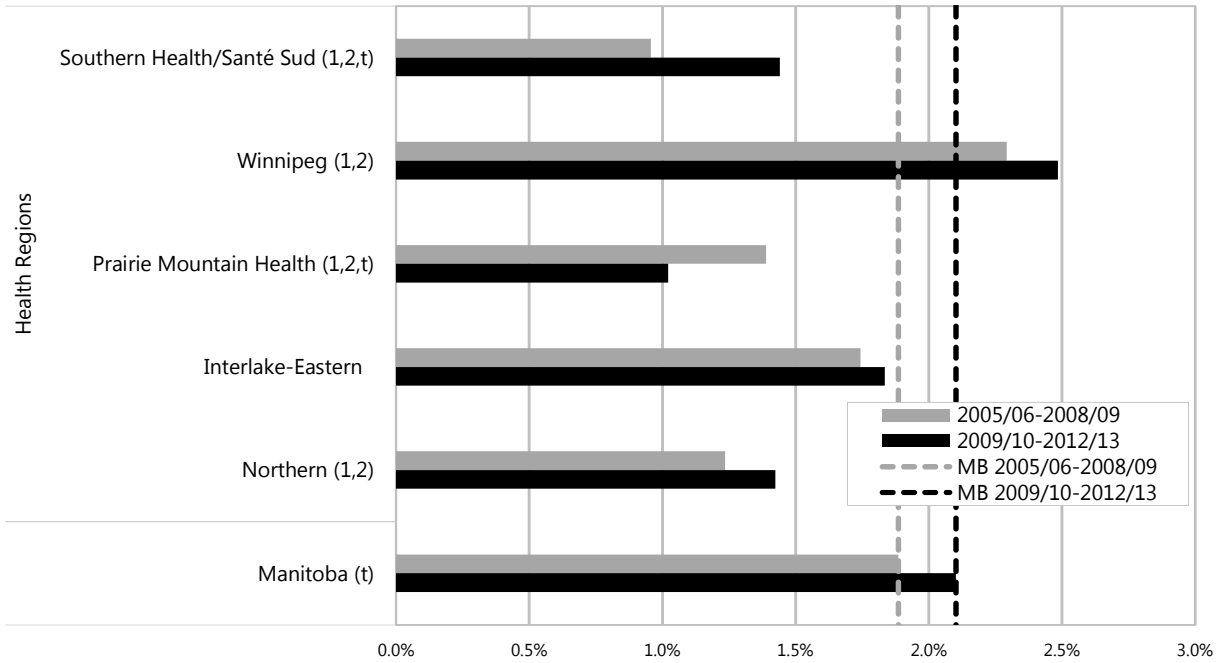
Figure 2.11 shows that the four-year diagnostic prevalence of conduct disorder was higher in males than females in all health regions in the second time period. The prevalence in Manitoba was 1.7% for males and 1.2% for females. Similar differences were found in the first time period (see Appendix Table 5.6).

Prevalence by Income Quintile

Figure 2.12 presents the four-year diagnostic prevalence of conduct disorder for children aged 6-19 by income quintile. Overall, we note that the prevalence was higher in urban areas than in rural areas. For urban areas, there was a linear trend across the income quintiles in both time periods, meaning that generally with each increase in income quintile we find a lower prevalence of conduct disorder. No linear trend in prevalence across the rural income quintiles was found.

Figure 2.9: Prevalence of Conduct Disorder in Children Aged 6-12 by Health Region

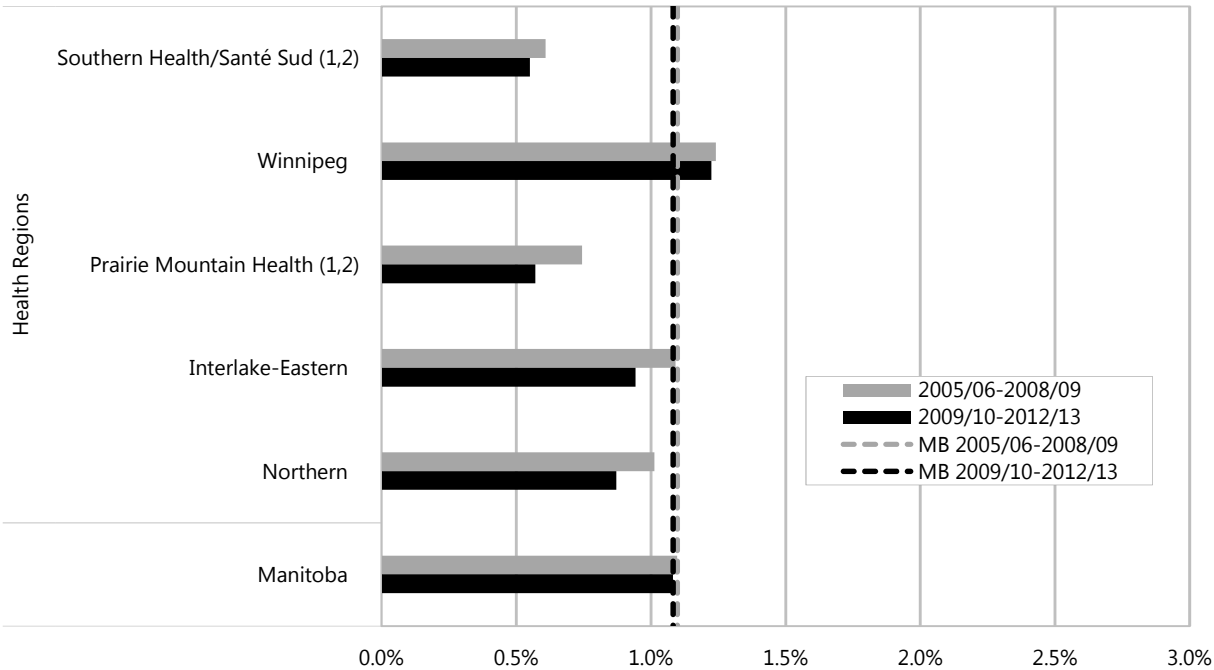
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.10: Prevalence of Conduct Disorder in Adolescents Aged 13-19 by Health Region

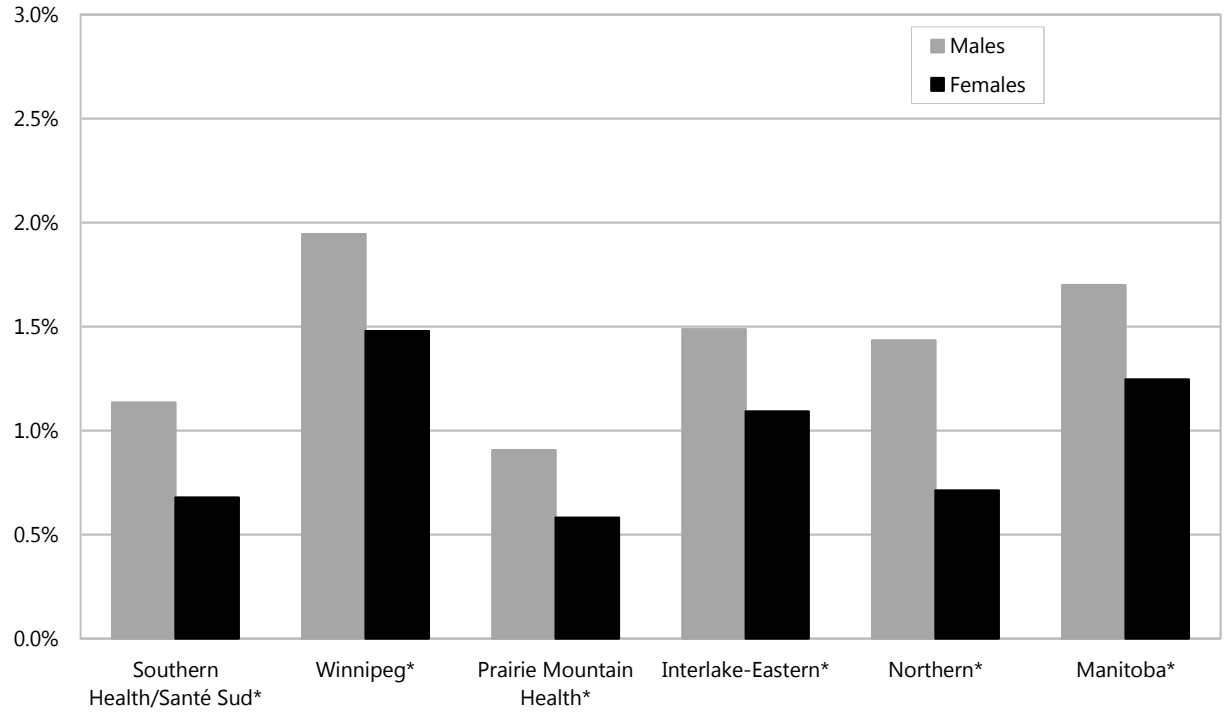
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.11: Prevalence of Conduct Disorder in Children Aged 6-19 by Sex and Health Region

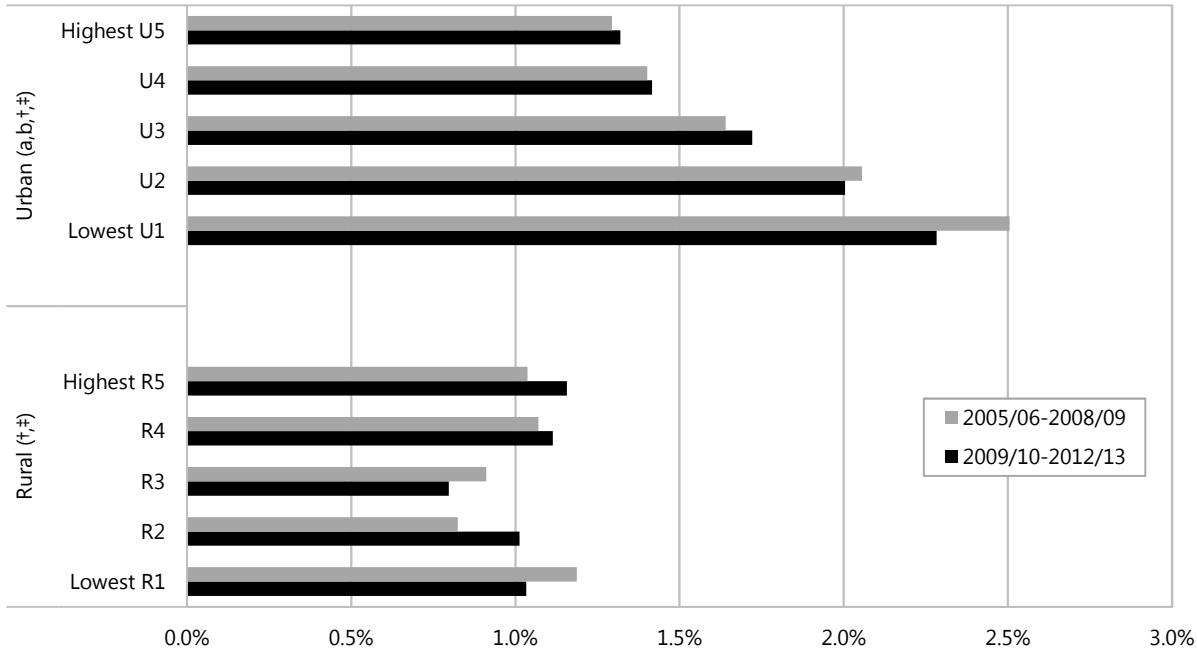
Age-adjusted, children diagnosed with disorder, four-year time period, 2009/10-2012/13



* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Figure 2.12: Prevalence of Conduct Disorder in Children Aged 6-19 by Income Quintile

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period ($p<0.01$)
b indicates a statistically significant difference across income quintiles for the second time period ($p<0.01$)
† indicates a statistically significant difference between rural and urban areas in the first time period ($p<0.01$)
‡ indicates a statistically significant difference between rural and urban areas in the second time period ($p<0.01$)

What do these results mean?

This report found the age- and sex-adjusted four-year diagnostic prevalence of conduct disorder in children aged 6-19 to be 1.5% in the second time period, which is lower than other epidemiologic studies and is likely an underestimate of the true prevalence in Manitoba. This is particularly true in rural areas. The cases we captured were based on diagnoses made by physicians and do not capture diagnoses by other professionals, for instance those in the school system. Given the overt behavioural and disruptive nature of conduct disorder, these children are more likely to be noticed by the education and justice systems than the health system. The conduct disorder indicator used in this study did not use diagnostic data from the education and justice databases, therefore these results should be interpreted with caution.

In reviewing previous studies, we note that conduct disorder prevalence depends on the time frame, survey design, interview guide, and population surveyed (Polanczyk et al., 2015). The National Comorbidity Survey Replication Adolescent Supplement results showed a 12-month prevalence of 5.4% for children aged 13-17 living in the United States (Kessler et al., 2012). In a sample of low-income African American children, the 12-month prevalence was 7.7%. A meta-analysis of the worldwide prevalence of conduct disorder in children up to 18 years of age found a prevalence of 2.1% (Polanczyk et al., 2015). This meta-analysis included three Canadian studies from the 1980s and 1990s (Breton et al., 1999; Offord et al., 1987; Romano et al., 2001). The meta-analysis included conduct disorder prevalence estimates that were calculated over different time periods: some were the current prevalence and others were a 12-month prevalence. Prevalence of behaviour disorders, including conduct disorder, has been found to be higher in boys than girls (Byck, Bolland, Dick, Ashbeck, & Mustanski, 2013; Heiervang et al., 2007).

Previous studies found that lifetime prevalence of conduct disorder is higher among older children than younger children (Merikangas et al., 2010), although we found a higher 4-year prevalence in younger children. We speculate that this difference is due to how we identified our cases of conduct disorder using medical and hospitalization data. Younger children with conduct disorder are more likely to be in contact with a physician, while older children with conduct disorder may be brought to the attention of the education and justice system and not necessarily the health system. As noted earlier, our conduct disorder definition includes health data only. The conduct disorder is not usually used for young adults 18 years and older.

This report found that conduct disorder is more prevalent in urban areas than in rural areas, and in lower income urban areas than in higher income urban areas. This could reflect that children are less likely to have conduct disorder in rural areas or that they are not being diagnosed due to access to services. One study found that the prevalence of conduct disorder in children aged 13-15 is higher in rural areas compared to urban areas (Gau, Chong, Chen, & Cheng, 2005), while others have not found a difference in the rate of conduct disorder between urban and rural areas (Merikangas et al., 2010). Previous studies provide mixed results regarding the association between family income and conduct disorder. No difference in prevalence was found between children aged 13-18 living on $20,000 or more per year compared to living on less than $20,000 per year (Byck et al., 2013). Another study demonstrated that behaviour disorders, including conduct disorder, are more prevalent in children living in families with a household income less than $30,000 per year (Heiervang et al., 2007).

Substance Use Disorders

Substance use disorders are characterized by excess use of and reliance on a drug, alcohol, or other chemicals that leads to severe negative effects on an individual's health and well-being or on the welfare of others. In children, it not only affects their current health and functioning, but also negatively influences their development and can have longer term consequences (Monasterio, 2014).

In this study, an adolescent (aged 13-19) is considered to have a diagnosis of substance use disorders in either time period when he/she meets at least one of the following criteria:

- At least one hospitalization with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs; or
- At least one physician visit with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs.

Key Findings

Below are listed the key findings for the diagnostic prevalence of substance use disorders:

- 3.0% for the first time period and 2.6% for the second time period in Manitoba overall;
- Decreased from the first time period to the second time period in Winnipeg RHA including Seven Oaks/Inkster and Downtown/Point Douglas;
- Lower in Southern Health/Santé Sud than the Manitoba prevalence in both time periods and lower in Winnipeg than the Manitoba prevalence in the second time period only;
- Higher in Northern than the Manitoba prevalence in both time periods;
- Lower in Fort Garry/River Heights and St. James Assiniboia/Assiniboine South in the first time period, lower in Seven Oakes/Inkster in the second time period and higher in Downtown/Point Douglas in both time periods than the Winnipeg prevalence;
- The same for males and females in Manitoba overall and in most health regions, although differences were found between sexes in Southern Health/Santé Sud (higher for males) and Northern (higher for females); and
- Higher in rural areas compared to urban areas in both time periods.

In both rural and urban areas, there was a linear trend across the income quintiles. This means that as income increased, there was a lower prevalence of substance use disorders.

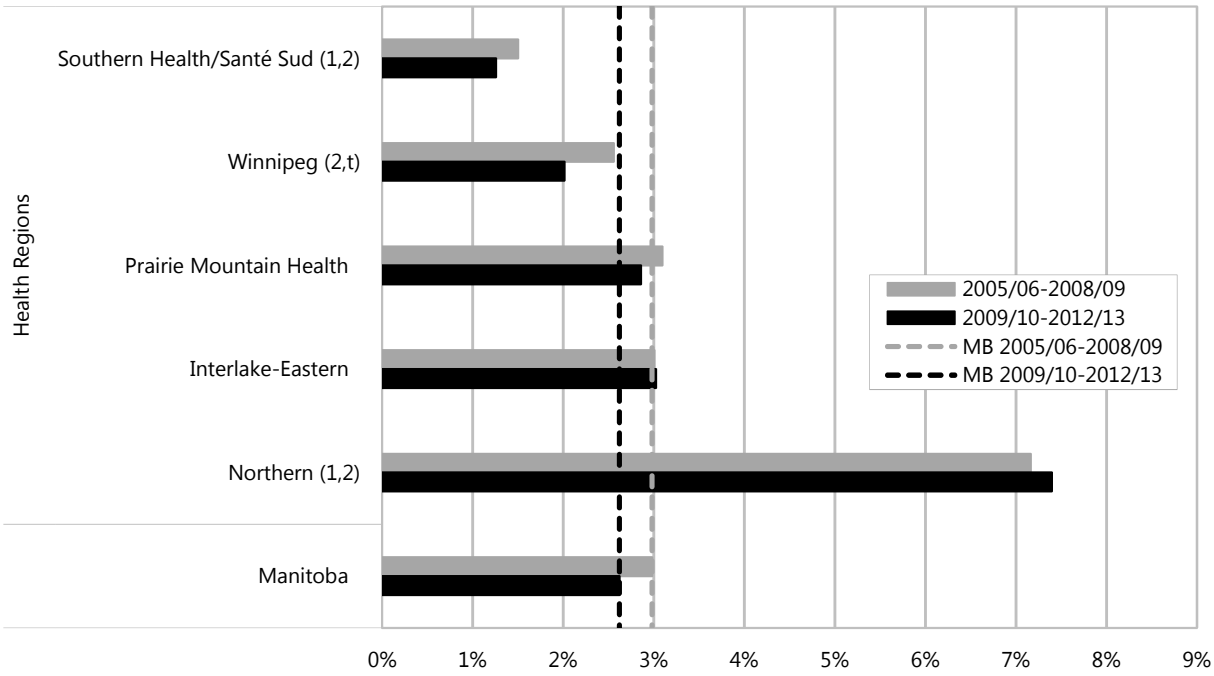
Regional Trends over Time

Figure 2.13 presents the four-year diagnostic prevalence of substance use disorders for adolescents aged 13-19 by health region. The prevalence in Manitoba was 3.0% and 2.6% in the first and second time periods, respectively. In both time periods, the prevalence of substance use disorders in Southern Health/Santé Sud was lower than the Manitoba prevalence and in the second time period, it was lower in Winnipeg than the Manitoba prevalence. Conversely, the prevalence was higher in Northern than in Manitoba. The prevalence of substance use disorders decreased from the first time period to the second time period in the Winnipeg RHA.

Figure 2.14 presents the four-year diagnostic prevalence of substance use disorders for adolescents aged 13-19 by Winnipeg community area. It shows a decrease in prevalence over time in Winnipeg, Seven Oaks/Inkster, and Downtown/Point Douglas. In the first time period, the prevalence in Fort Garry/River Heights and St. James Assiniboia/Assiniboine South was lower than Winnipeg, and in the second time period, it was lower in Seven Oaks/Inkster. Conversely, in both time periods, the prevalence was higher in Downtown/Point Douglas than in Winnipeg.

Figure 2.13: Prevalence of Substance Use Disorders in Adolescents Aged 13-19 by Health Region

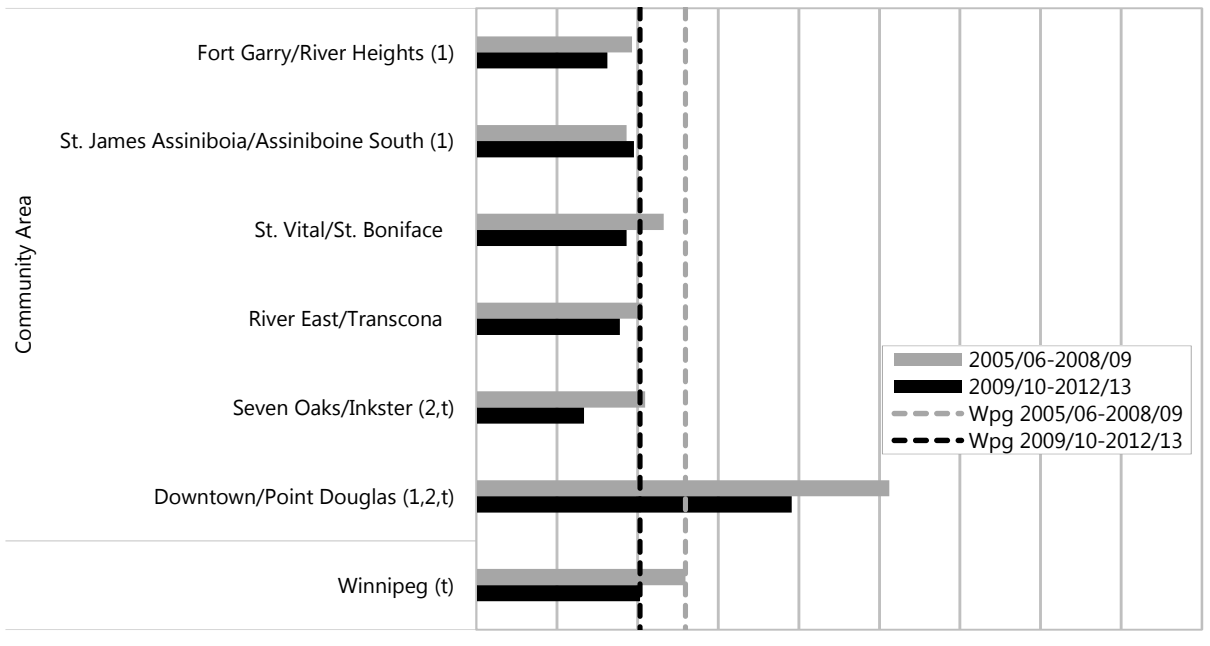
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.14: Prevalence of Substance Use Disorders in Adolescents Aged 13-19 by Winnipeg Community Area

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)

Prevalence by Sex

Figure 2.15 shows that the four-year diagnostic prevalence of substance use disorders was similar for males and females in all health regions in the second time period except in Southern Health/Santé Sud (higher in males) and in Northern (higher in females). The prevalence in Manitoba was 2.4% for males and 2.9% for females. Similar differences were found in the first time period (see Appendix Table 5.9).

Prevalence by Income Quintile

Figure 2.16 presents the four-year diagnostic prevalence of substance use disorders for adolescents aged 13-19 by income quintile. A higher prevalence was found in rural than in urban areas in both time periods. For both rural and urban areas, there was a linear trend across the income quintiles, meaning that generally with each increase in income, we found a lower prevalence of substance use disorders. The linear trend appears to be more defined in the urban areas. The rural quintile R3, representing middle income rural areas, appears to not be following the trend.

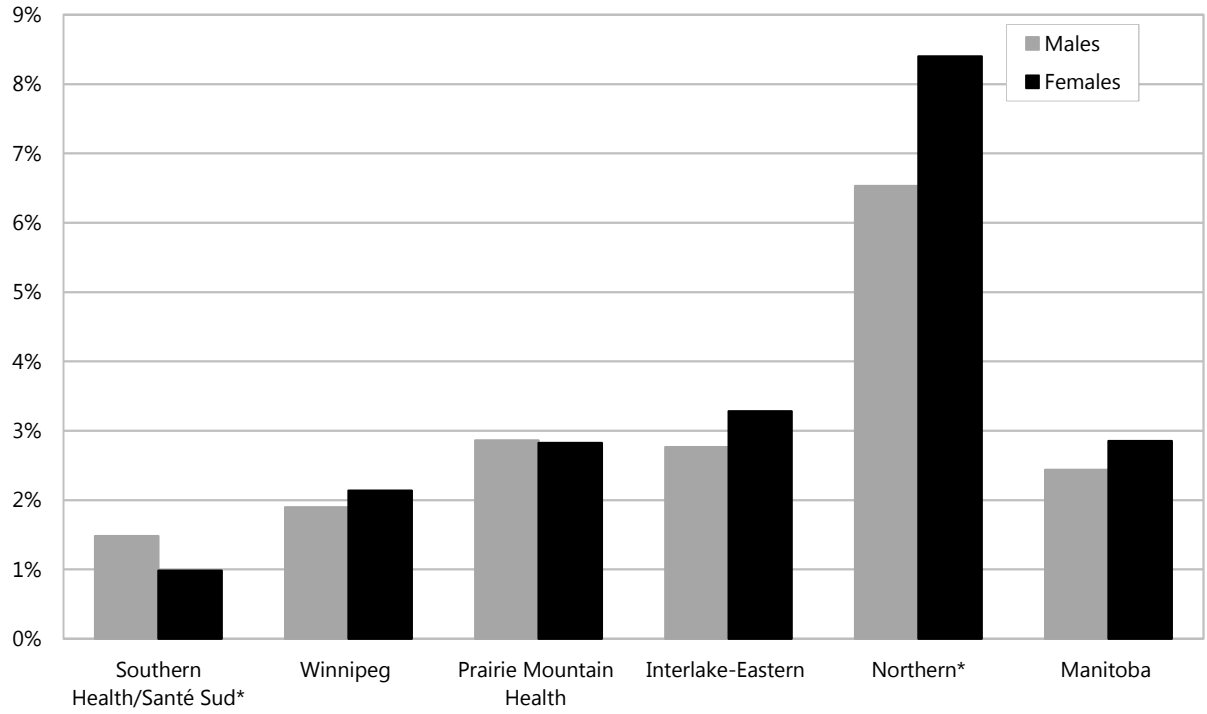
What do these results mean?

This report found the age- and sex-adjusted four-year diagnostic prevalence of substance use disorders for adolescents aged 13-19 to be 2.6% in the second time period, which is lower than in other epidemiologic studies. Our data are based on children being seen by a physician and diagnosed with substance use disorder while epidemiologic studies are surveying a representative sample of adolescents. Therefore, it is very likely that our prevalence is underestimating the true prevalence. We observed considerable differences in substance use disorders prevalence in the Northern Health Region compared to other health regions; and, contrary to previous research, we found a higher prevalence among girls than boys in this health region.

Prevalence depends on the time frame, survey design, interview guide, and population surveyed (Polanczyk et al., 2015). Two studies of US children found a lifetime prevalence of substance use disorders of 11.4% for children aged 13-18 (Merikangas et al., 2010) and a 12-month prevalence of 8.3% for children aged 13-17 (Kessler et al., 2012). In a study of Taiwanese children, prevalence was 2.2%, 4.2%, and 5.3% for students in grades 7, 8, and 9 (Gau et al., 2005). The Taiwanese study found higher prevalence among rural children compared to those living in urban areas (Gau et al., 2005). Although we found few differences in prevalence of substance use disorders between males and females, previous research has found that it is higher in boys than girls (Kessler et al., 2012; Merikangas et al., 2010). The lack of a difference between males and females found in our analysis was surprising and may be explained by fewer help-seeking behaviours in boys than girls. This report is likely underreporting substance use disorders in boys. Strategies to reach adolescent boys with substance use disorders and link them to mental health services are needed, particularly in Northern Manitoba.

Figure 2.15: Prevalence of Substance Use Disorders in Adolescents Aged 13-19 by Sex and Health Region

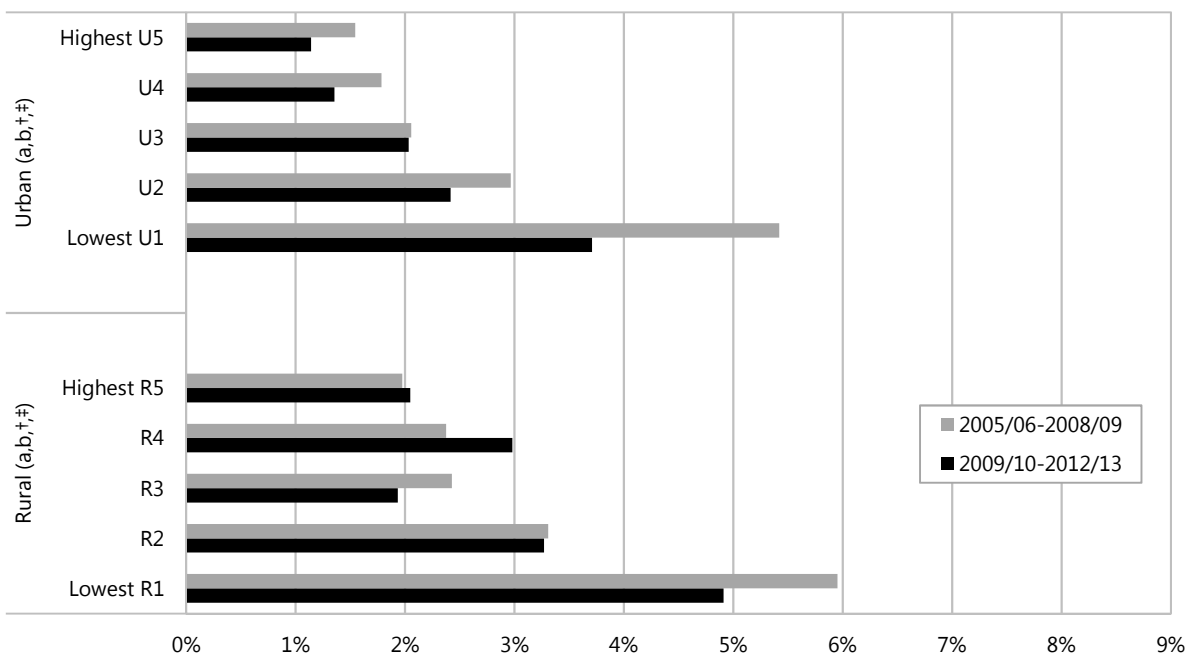
Age-adjusted, adolescents diagnosed with disorder, four-year time period, 2009/10-2012/13



* indicates a statistically significant difference between males and females for that health region (p<0.05)

Figure 2.16: Prevalence of Substance Use Disorders in Adolescents Aged 13-19 by Income Quintile

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period (p<0.01)
b indicates a statistically significant difference across income quintiles for the second time period (p<0.01)
† indicates a statistically significant difference between rural and urban areas in the first time period (p<0.01)
‡ indicates a statistically significant difference between rural and urban areas in the second time period (p<0.01)

Externalizing Disorders

In Chapters 4, 5 and 6, we examine numerous indicators (service use, educational outcomes and physical health conditions) by disorder. For ease of reporting, rather than describing outcomes for each mental disorder separately, we created a group of disorders named "externalizing disorders". In psychology, the term "externalizing" refers to a grouping of problems that are manifested in a child's outward behaviour and reflect the child acting negatively on the *external* environment (Liu, 2004). For the purposes of this study, externalizing disorders include children (aged 6-19) who were diagnosed with at least one of the following three mental disorders: ADHD, conduct disorder, and substance use disorder. In the group of children aged 6-12, externalizing disorders includes only ADHD and conduct disorder. The definitions of these specific disorders are found in the previous sections of this chapter.

Key Findings

Below are listed the key findings for the diagnostic prevalence of externalizing disorders:

- 7.7% for the first time period and 8.5% in the second time period in Manitoba overall;
- Increased from the first time period to the second time period in Southern Health/Santé Sud and in the Fort Garry/River Height community area in Winnipeg;
- Lower in Southern Health/Santé Sud than the Manitoba prevalence in both time periods;
- Lower in Seven Oaks/Inkster than the Winnipeg prevalence in both time periods;
- Higher in males than females in all health regions in both time periods and;
- Higher in urban areas compared to rural areas in both time periods.

In urban areas in both time periods, there was a linear trend across the income quintiles. This means that as income increased, there was a lower prevalence of externalizing disorders. In the first time period only, this linear trend was also found in rural areas.

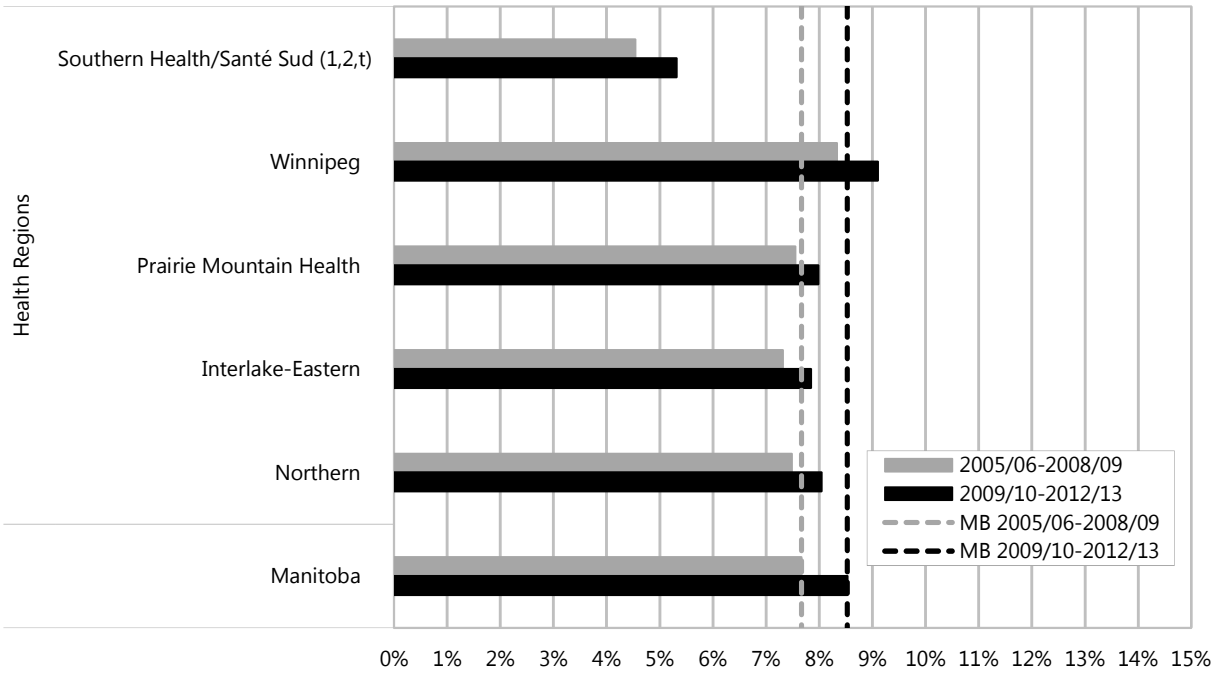
Regional Trends over Time

Figure 2.17 presents the four-year diagnostic prevalence of externalizing disorders for children aged 6-19 by health region. The prevalence in Manitoba was 7.7% and 8.5% in the first and second time period, respectively. In both time periods, the prevalence of externalizing disorders in Southern Health/Santé Sud was lower than the Manitoba prevalence and increased from first time period to the second.

Figure 2.18 presents the four-year diagnostic prevalence of externalizing disorders for children aged 6-19 by Winnipeg community area. In both time periods, the prevalence of externalizing disorders in Seven Oaks/Inkster was lower than the Winnipeg prevalence. In Fort Garry/River Heights, the prevalence increased from the first to the second time period.

Figure 2.17: Prevalence of Externalizing Disorders in Children Aged 6-19 by Health Region

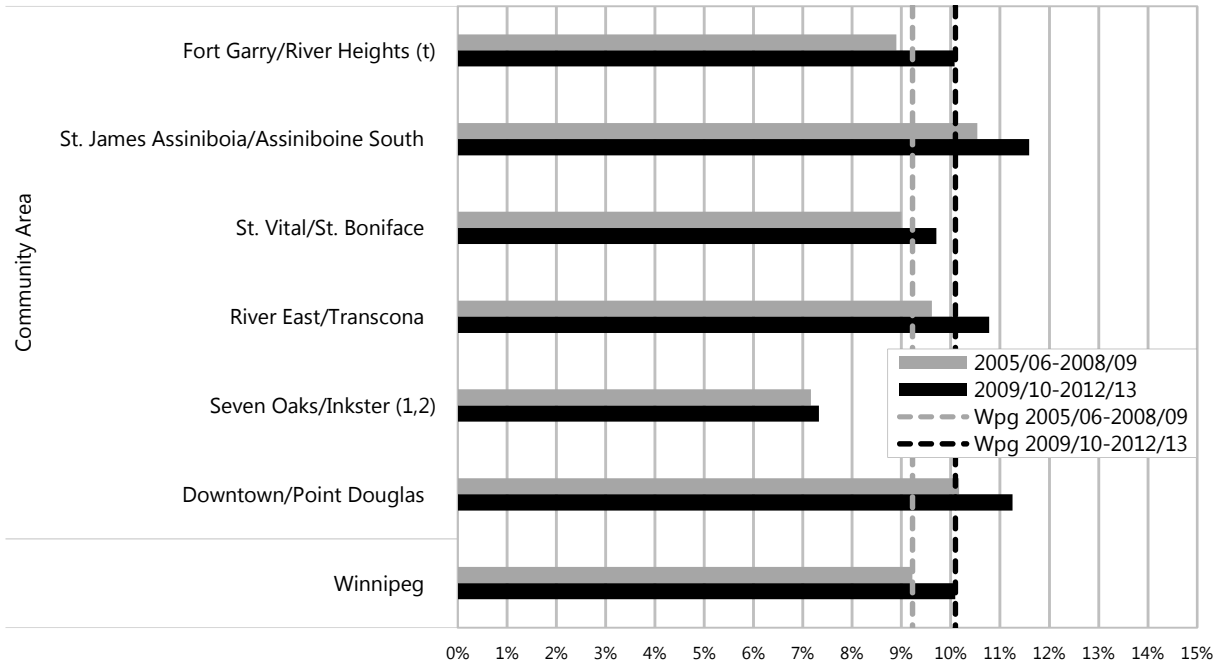
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period ($p<0.01$)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that health region ($p<0.05$)

Figure 2.18: Prevalence of Externalizing Disorders in Children Aged 6-19 by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period ($p<0.01$)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that community area ($p<0.05$)

Prevalence by Age Groups and Sex

Figure 2.19 and Figure 2.20 present the four-year diagnostic prevalence of externalizing disorder for children and adolescents aged 6-12 and 13-19, respectively. Because we limited diagnoses of substance abuse disorder to adolescents aged 13-19, it should be noted that Figure 2.19 (ages 6-12) excludes diagnoses of substance use disorder. For children aged 6-12, the prevalence in Manitoba of externalizing disorders increased from 8.4% in the first time period to 9.7% in the second time period. The externalizing disorders prevalence in the Winnipeg RHA (9.7% and 11.0%) was higher than in Manitoba in both time periods and increased over time. In the second time period, Interlake-Eastern (8.5%) had a lower prevalence than Manitoba. Southern Health/Santé Sud (5.2% and 6.3%) and Northern (5.2% and 5.7%) had a lower prevalence than Manitoba in both time periods. The prevalence in Southern Health/Santé Sud increased over time.

For adolescents aged 13-19, the prevalence of externalizing disorders in Manitoba was 7.0% and 7.5% in the first and second time periods, respectively. In both time periods, Northern (9.2% and 9.8%) had a higher prevalence than the Manitoba prevalence and Southern Health/Santé Sud (4.1% and 4.5%) had a lower prevalence than the Manitoba prevalence.

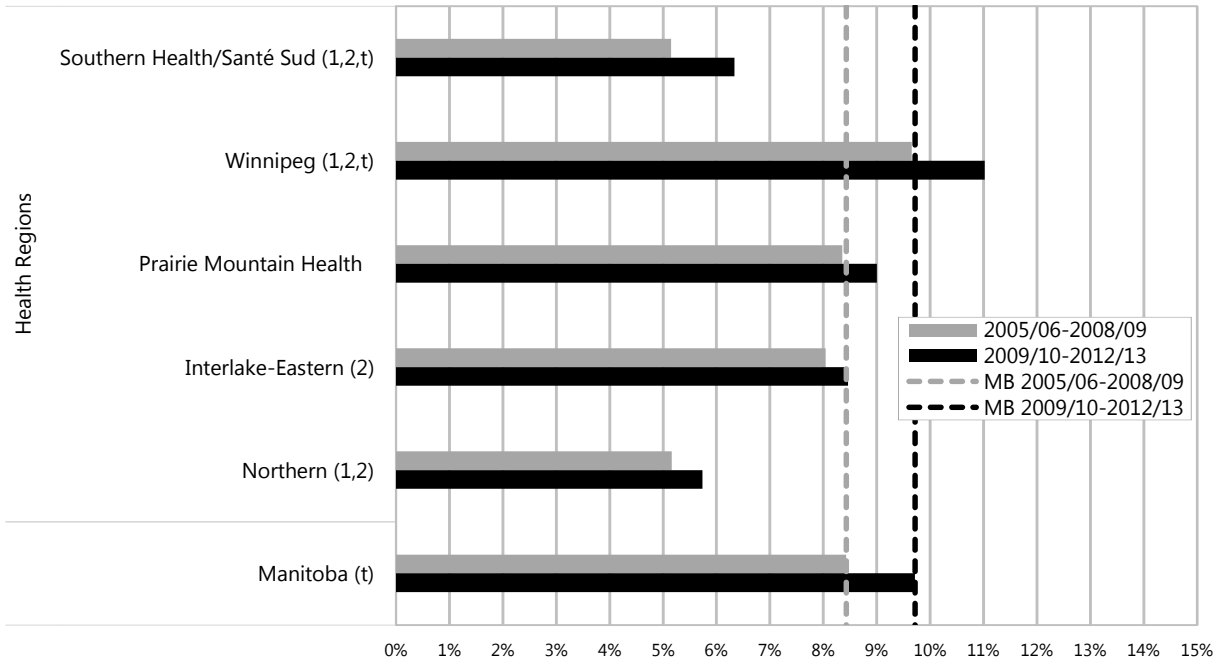
Figure 2.21 shows that the four-year diagnostic prevalence of externalizing disorders was higher in males than females in all health regions in the second time period. The prevalence in Manitoba was 11.0% for males and 5.7% for females. Similar results were found in the first time period (see Appendix Table 5.12).

Prevalence by Income Quintile

Figure 2.22 presents the four-year diagnostic prevalence of externalizing disorders for children aged 6-19 by income quintile. We note that the prevalence is higher in urban areas than in rural areas in both time periods. For urban areas in both the time periods, there was a linear trend across the income quintiles, meaning that with each increase in income we found a lower prevalence of externalizing disorders. Although less pronounced, this trend was also found for rural areas in the first time period only.

Figure 2.19: Prevalence of Externalizing Disorders in Children Aged 6-12 by Health Region

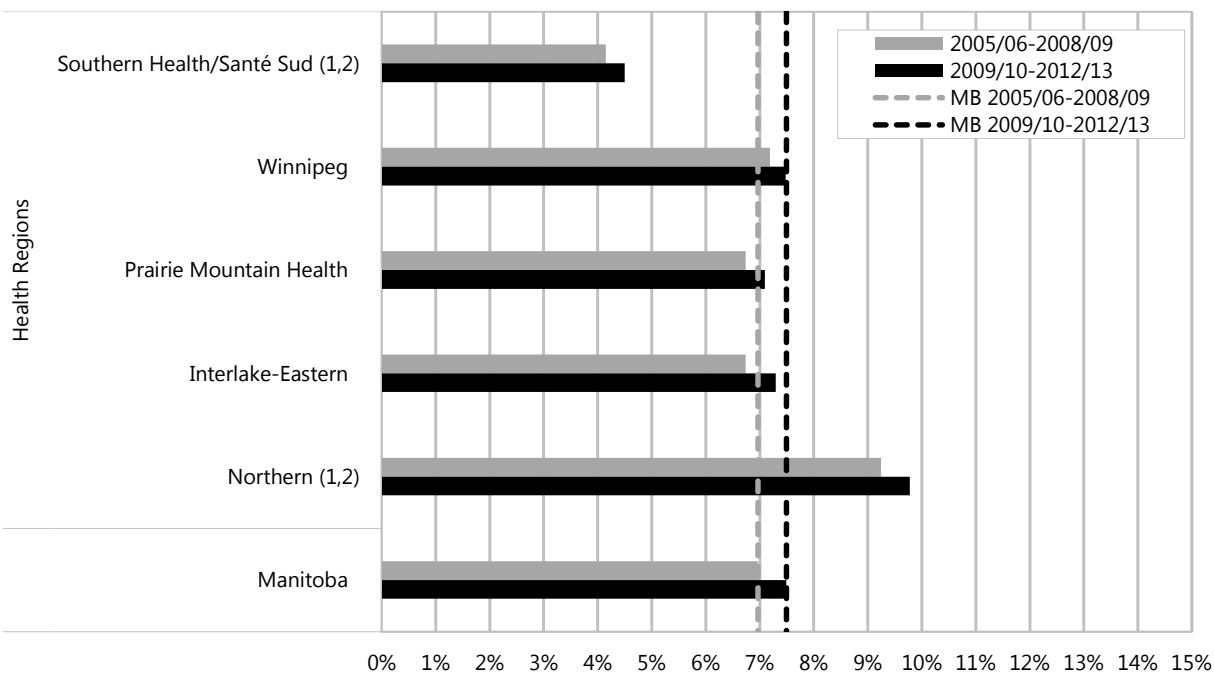
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.20: Prevalence of Externalizing Disorders in Adolescents Aged 13-19 by Health Region

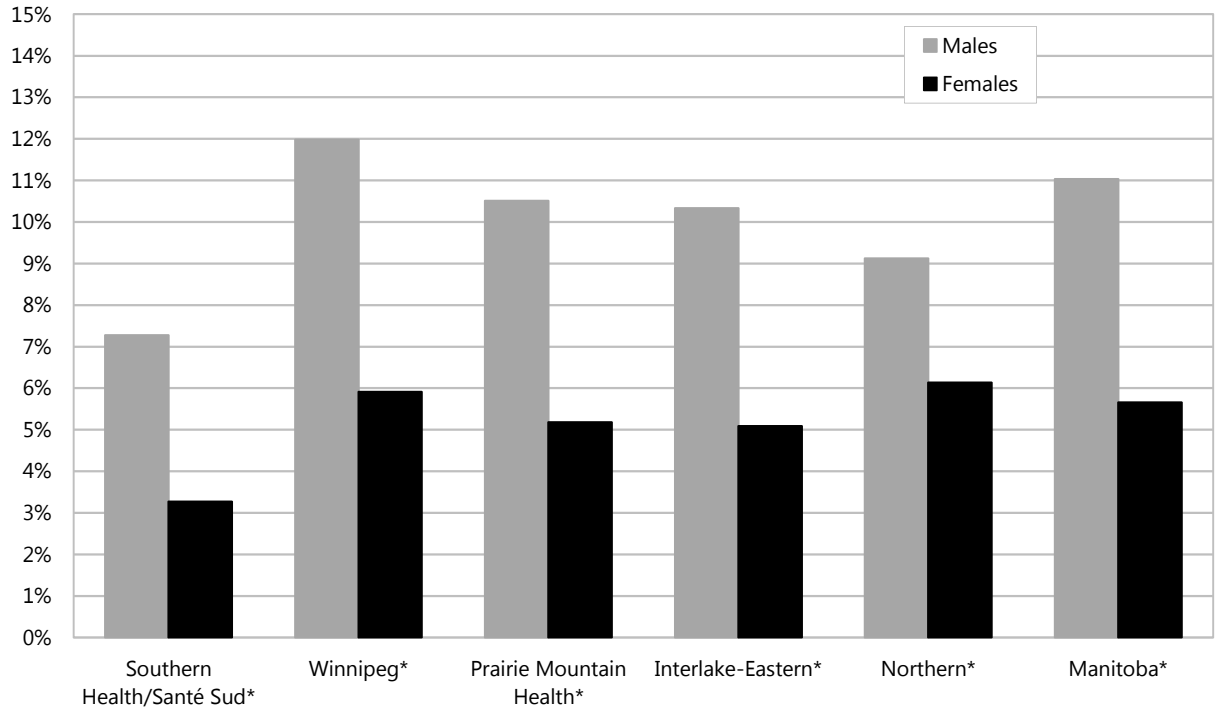
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.21: Prevalence of Externalizing Disorders in Children Aged 6-19 by Sex and Health Region

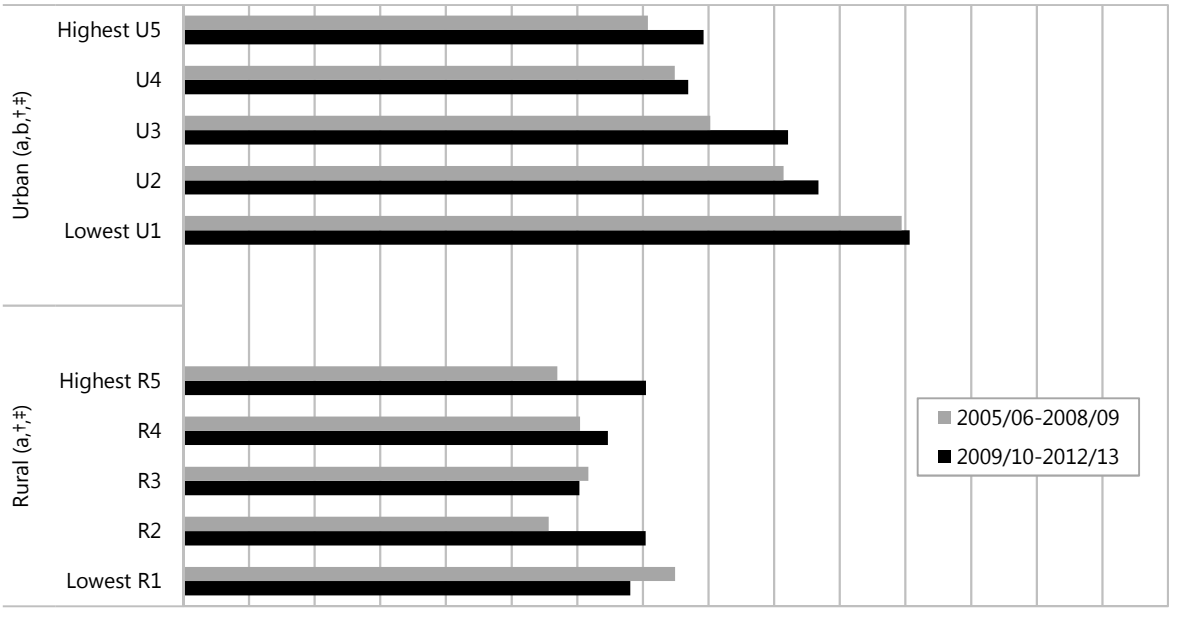
Age-adjusted, children diagnosed with disorder, four-year time period, 2009/10-2012/13



* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Figure 2.22: Prevalence of Externalizing Disorders in Children Aged 6-19 by Income Quintile

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period ($p<0.01$)
b indicates a statistically significant difference across income quintiles for the second time period ($p<0.01$)
† indicates a statistically significant difference between rural and urban areas in the first time period ($p<0.01$)
‡ indicates a statistically significant difference between rural and urban areas in the second time period ($p<0.01$)

What do these results mean?

As previously defined, externalizing disorders refers to a grouping of problems that are manifested in a child's outward behaviour and reflect the child acting negatively on the *external* environment (Liu, 2004). We discussed the results of ADHD, conduct disorder, and substance use disorders in previous sections of this chapter.

We note that a lower prevalence of externalizing disorders in the Northern Health Region was found compared to the Manitoba prevalence for children aged 6-12.Conversely, a higher prevalence than the provincial prevalence was found for adolescents aged 13-19. This is likely because the younger age group included only ADHD and conduct disorder (which were lower in Northern compared to the provincial prevalence) and the adolescent age group additionally included substance use disorders (which was higher in Northern compared to Manitoba overall).

Mood and Anxiety Disorders

Mood and anxiety disorders consist of a large group of distressing mental disorders. Depressive disorders are characterized by depressed mood and diminished interest in almost all activities. Symptoms of bipolar disorders include elevated mood and increased energy that may or may not occur along with symptoms of depression. The main characteristics of anxiety disorders are excessive fear, anxiety, or worry and often avoidance of situations that provoke these strong emotions. Mood and anxiety disorders interfere with relationships with family and peers, cognitive abilities, and performance at school (Birmaher, Arbelaez, & Brent, 2002; Youngstrom, Birmaher, & Findling, 2008). For the purposes of this study, these disorders were grouped together because they often occur together and medications used to treat them are similar.

In this study, a child (aged 6-19) is considered to have a diagnosis of mood and/or anxiety disorders in either time period when he/she meets at least one of the following criteria:

- At least one hospitalization with any of the following diagnoses over four years: depressive disorder, affective psychoses, neurotic depression or adjustment reaction, anxiety state, phobic disorders, or obsessive-compulsive disorders;
- At least one hospitalization with a diagnosis of anxiety disorders AND one or more prescriptions for an antidepressant or mood stabilizer over four years;
- At least one physician visit with a diagnosis of depressive disorder or affective psychoses over four years;
- At least one physician visit with a diagnosis of anxiety disorders AND one or more prescriptions for an antidepressant or mood stabilizer over four years; or
- Three or more physician visits with a diagnosis of anxiety disorders or adjustment reaction over four years.

Key Findings

Below are listed the key findings for the diagnostic prevalence of mood and anxiety disorders:

- 6.2% for the first time period and 7.3% for the second time period in Manitoba overall;
- Increased from the first time period to the second time period in Manitoba overall, all health regions except Southern Health/Santé Sud and Northern and all Winnipeg community areas except River East/Transcona and Seven Oaks/Inkster;
- Lower in Southern Health/Santé Sud and in Northern than the Manitoba prevalence;
- Lower in Seven Oaks/Inkster and higher in St. James Assiniboia/Assiniboine South than the Winnipeg prevalence;
- Higher in females than males in all health regions in both time periods; and
- Higher in urban compared to rural areas in both time periods.

There was a linear trend across urban income quintiles only, meaning that as income increased, there was a lower prevalence in mood and anxiety disorders.

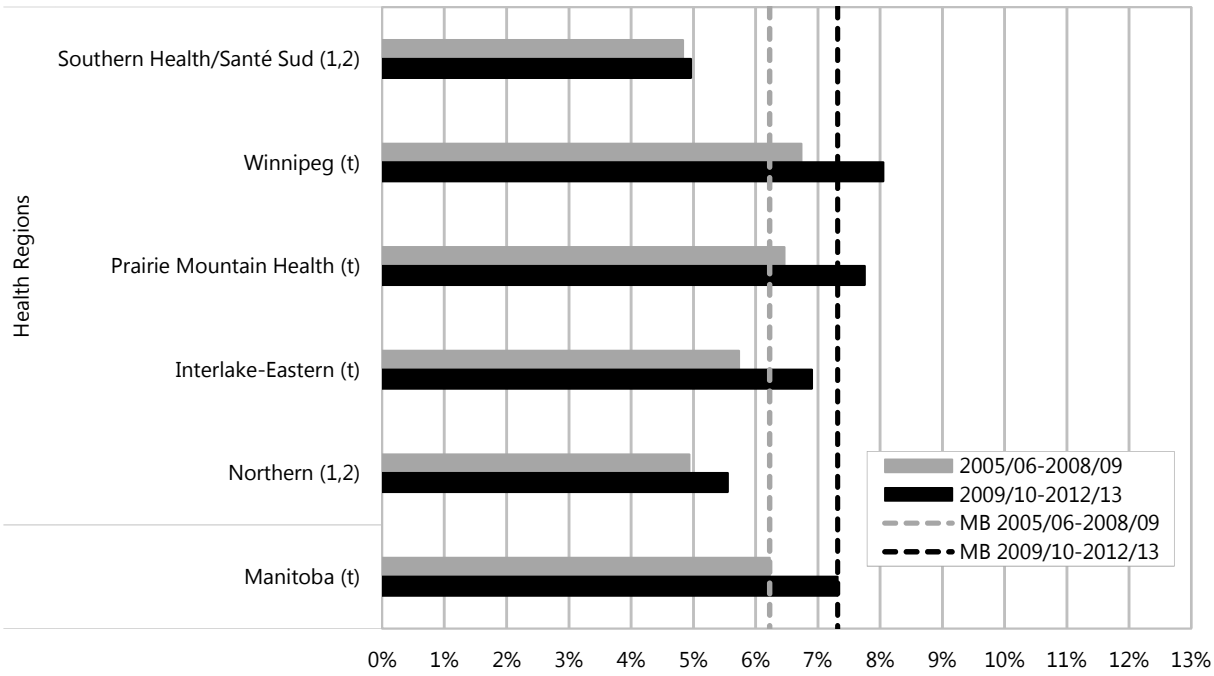
Regional Trends over Time

Figure 2.23 presents the four-year diagnostic prevalence of mood and anxiety disorders for children aged 6-19 by health region. The prevalence in Manitoba increased from 6.2% in the first time period to 7.3% in the second time period. The prevalence also increased over time in the Winnipeg RHA, Prairie Mountain Health, and Interlake-Eastern. In both time periods, the prevalence in Southern Health/Santé Sud and Northern was lower than in Manitoba.

Figure 2.24 presents the four-year diagnostic prevalence of mood and anxiety disorders for children aged 6-19 by Winnipeg community area. With the exception of River East/Transcona and Seven Oaks/Inkster, there was an increase in prevalence over time across all community areas and Winnipeg. In the second time period, the prevalence in St. James Assiniboia/Assiniboine South was higher than in Winnipeg. On the other hand, Seven Oaks/Inkster had a lower diagnostic prevalence than Winnipeg in both time periods.

Figure 2.23: Prevalence of Mood and Anxiety Disorders in Children Aged 6-19 by Health Region

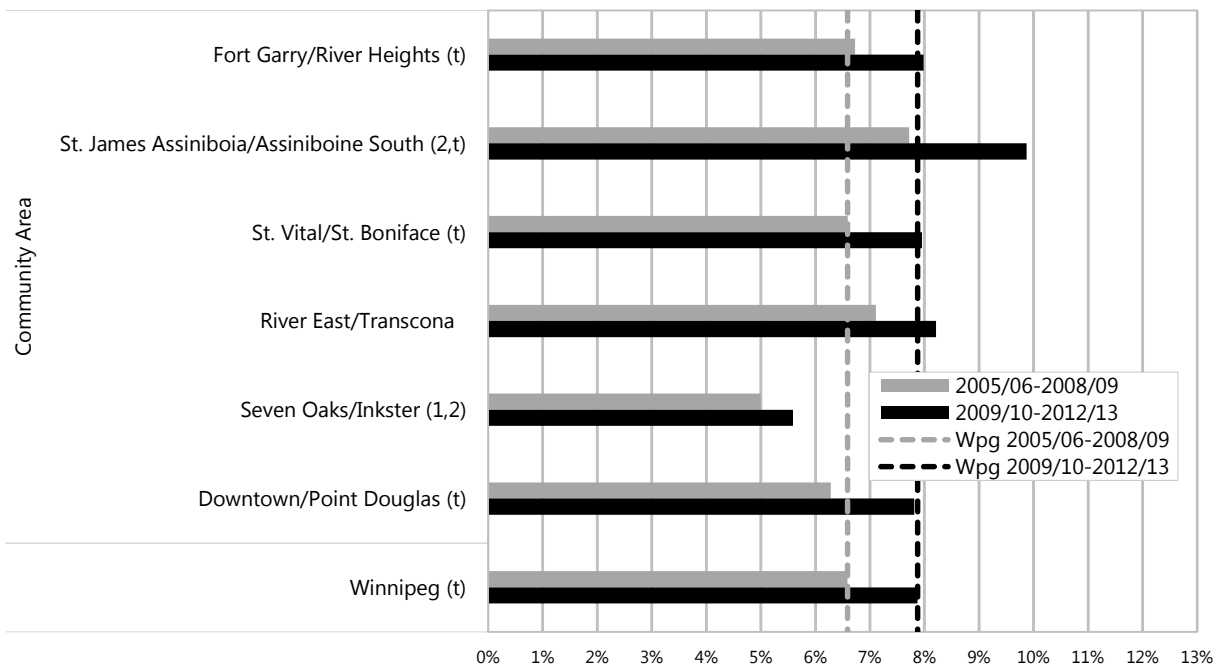
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.24: Prevalence of Mood and Anxiety Disorders in Children Aged 6-19 by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)

Prevalence by Age Groups and Sex

Figure 2.25 and Figure 2.26 present the four-year diagnostic prevalence of mood and anxiety disorders for children and adolescents aged 6-12 and 13-19, respectively. For children aged 6-12, the prevalence in Manitoba increased over time from 1.8% to 2.2%. Northern (1.1% and 1.2%) had a lower prevalence than Manitoba in both time periods, while Southern Health/Santé Sud (1.4%) had a lower prevalence in the second time period only. The prevalence in the Winnipeg RHA and Prairie Mountain Health increased over time.

For adolescents aged 13-19, the prevalence in Manitoba increased from 10.2% in the first time period to 12.0% in the second time period. Southern Health/Santé Sud (7.9% and 8.5%) had a lower prevalence than Manitoba in both time periods, while Northern (10.5%) had a lower prevalence only in the second time period. In the first time period, the prevalence in Prairie Mountain Health (11.5%) was higher than in Manitoba. The prevalence in Winnipeg RHA, Prairie Mountain Health, Interlake-Eastern, and Northern increased over time.

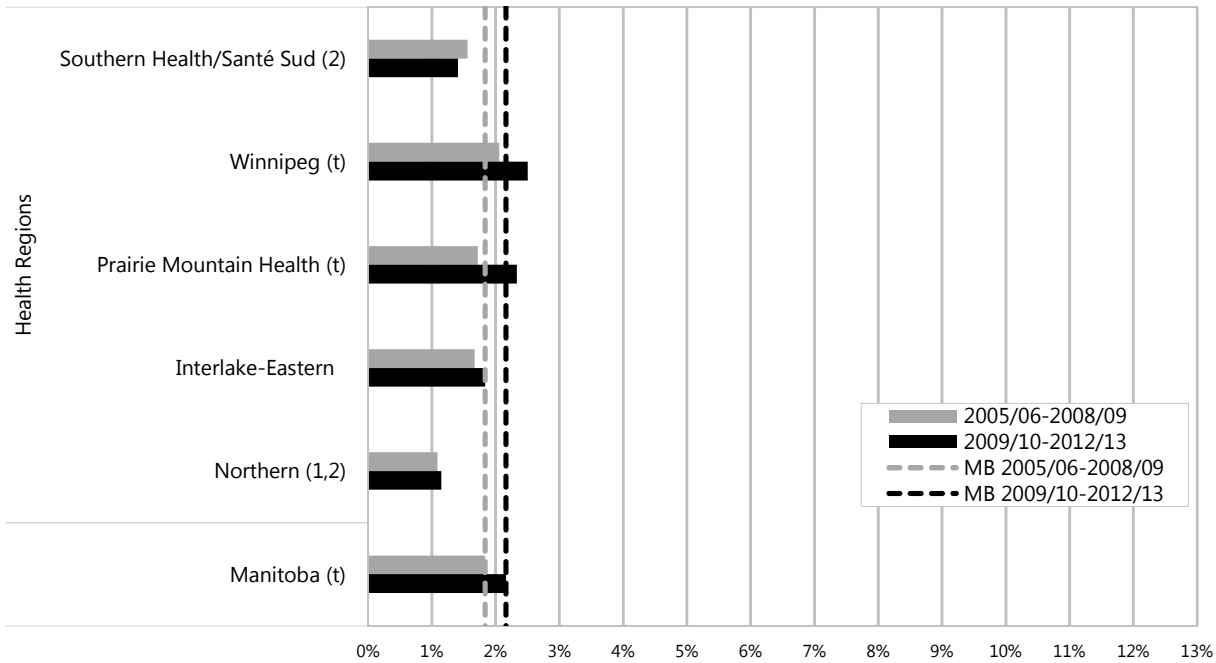
Figure 2.27 shows that the four-year diagnostic prevalence of mood and anxiety disorders was higher in females than males in the second time period in all health regions. The prevalence in Manitoba was 7.2% for males and 9.5% for females. Similar results were found in the first time period (see Appendix Table 5.15).

Prevalence by Income Quintile

Figure 2.28 presents the four-year diagnostic prevalence of mood and anxiety disorders for children aged 6-19 by income quintile. Overall, we note that the prevalence was higher in urban areas than in rural areas in both time periods. In urban areas in both time periods, there was a linear trend across the income quintiles, meaning that as income increased, we found a lower prevalence in mood and anxiety disorders.

Figure 2.25: Prevalence of Mood and Anxiety Disorders in Children Aged 6-12 by Health Region

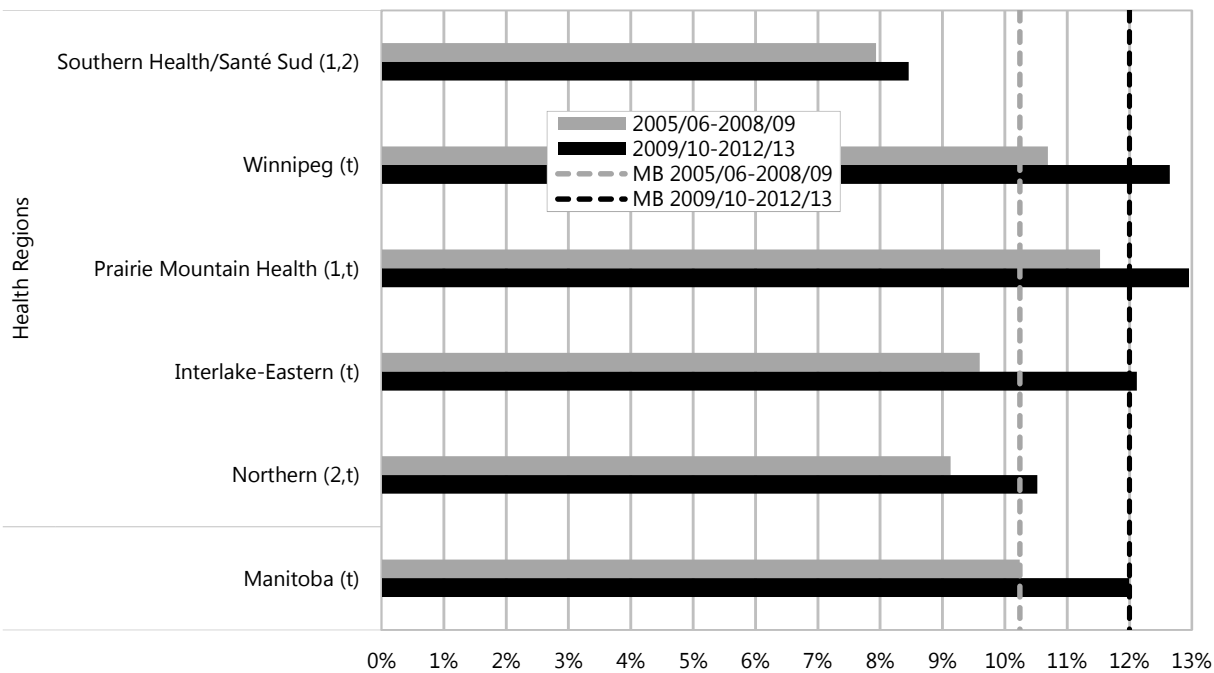
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.26: Prevalence of Mood and Anxiety Disorders in Adolescents Aged 13-19 by Health Region

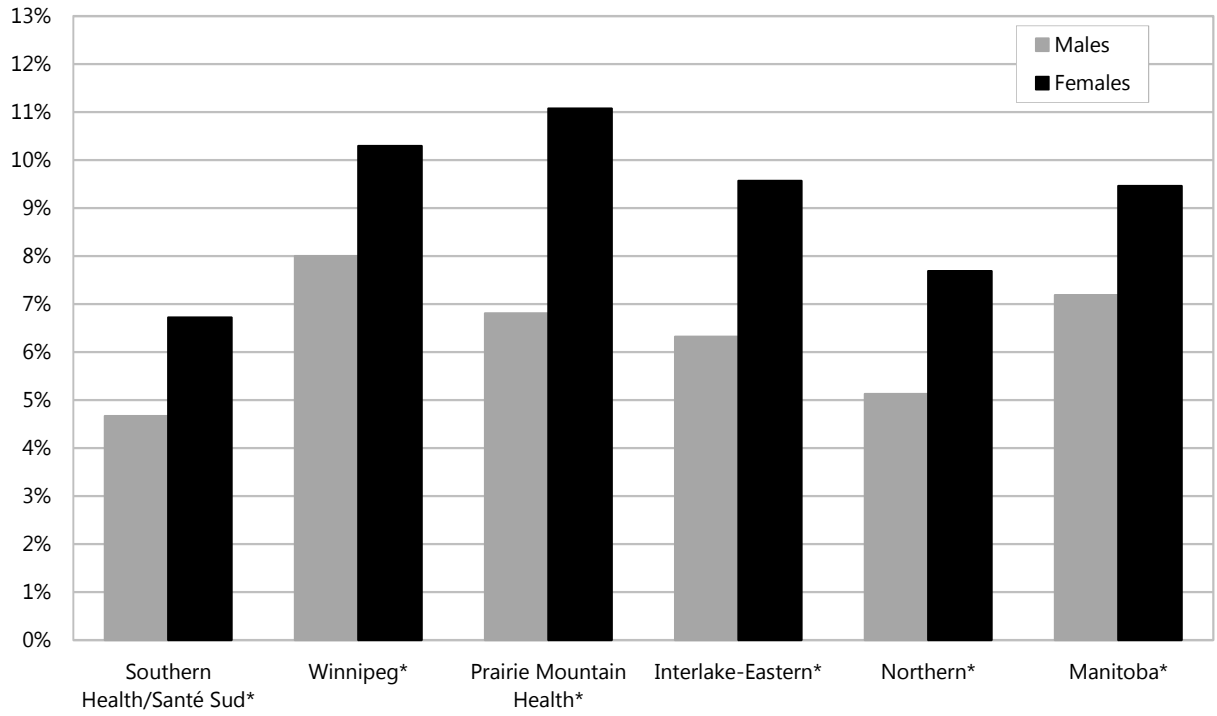
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.27: Prevalence of Mood and Anxiety Disorders in Children Aged 6-19 by Sex and Health Region

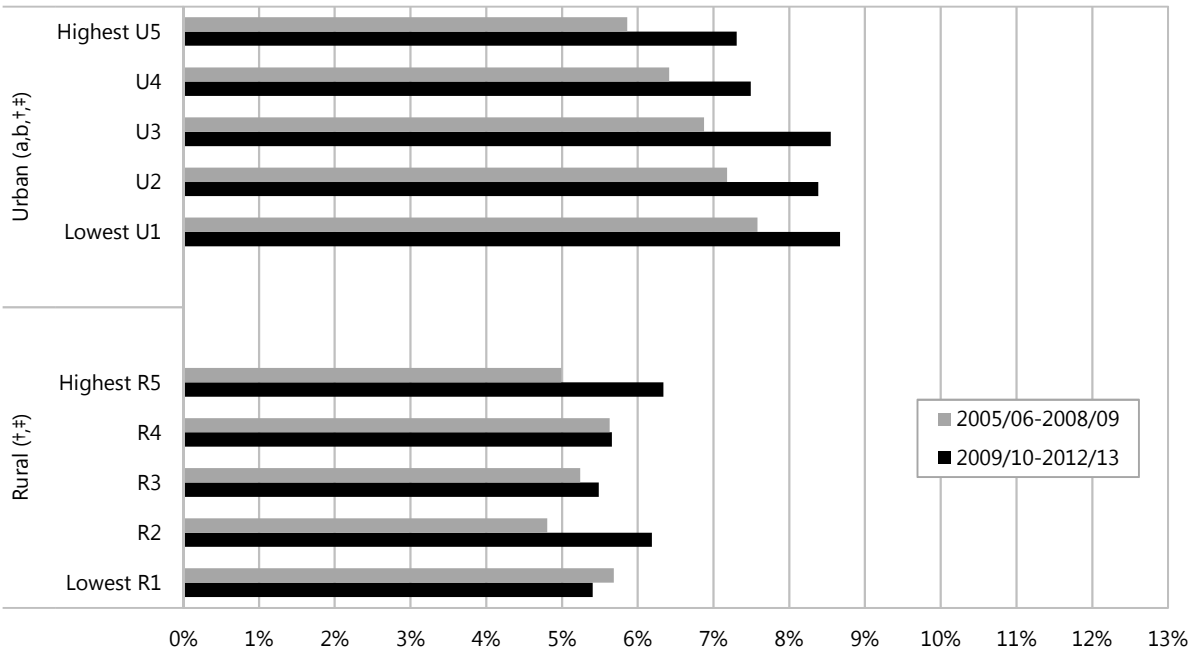
Age-adjusted, children diagnosed with disorder, four-year time period, 2009/10-2012/13



* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Figure 2.28: Prevalence of Mood and Anxiety Disorders in Children Aged 6-19 by Income Quintile

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period ($p<0.01$)
b indicates a statistically significant difference across income quintiles for the second time period ($p<0.01$)
† indicates a statistically significant difference between rural and urban areas in the first time period ($p<0.01$)
‡ indicates a statistically significant difference between rural and urban areas in the second time period ($p<0.01$)

What do these results mean?

This report found the age- and sex-adjusted four-year diagnostic prevalence of mood and anxiety disorders for children aged 6-12 to be 2.2% and adolescents aged 13-19 to be 12.0%, which may be an underestimate. The National Comorbidity Survey – Adolescent Supplement NCS-A, a nationally representative survey of 10,123 children aged 13-18 years in the continental United States, found that over their lifetime, 14.3% had mood disorders and 31.9% had anxiety disorders (Merikangas et al., 2010). Results from a Dutch study of children found a 12-month mood disorders and anxiety disorders prevalence of 10.2% and 18.4%, respectively (Ormel et al., 2014). A meta-analysis of 41 studies of mental disorders in children reported a 12-month depressive disorders and anxiety disorders prevalence of 2.6% and 6.5%, respectively. A Norwegian study found that 3.2% of children aged 8-10 years old had emotional disorders defined mainly as mood and anxiety disorders (Heiervang et al., 2007). Consistent with our report, we note that studies that include older children have a higher prevalence of mood and anxiety disorders than studies including younger children.

Consistent with the findings in this report, females tend to have higher rates of mood and anxiety disorders than males (Steel et al., 2014). Generally, there is evidence that mood and anxiety disorders are more prevalent among children from low income families (Heiervang et al., 2007; Kessler et al., 2012; Ormel et al., 2014); however, some US studies have found no evidence that poverty is associated with these disorders (Merikangas et al., 2010). Based on the representative US survey data, one study reported that once parent education was accounted for, no association was found between poverty and children's mood and anxiety disorders (Kessler et al., 2012). Kessler found that mood and anxiety disorders were more common in older children than in younger children.

We suspect that prevalence of mood and anxiety disorders is underestimated in the Northern Health Region. The lower prevalence of these disorders in the North compared to other health regions is inconsistent with the high rates of suicide and substance use disorders that we found in this health region. Suicide behaviours and substance use disorders often co-occur with mood and anxiety disorders. Mood and anxiety disorders put children at increased risk for suicide and suicide attempts. The age of onset of mood and anxiety disorders is often before substance use disorders and may also be a risk factor for developing substance use disorders (Chartier, Walker, & Stein, 2003; Kessler et al., 2005). The lower prevalence of mood and anxiety disorders in the North may be related to challenges with access, not providing culturally safe services or with salaried physicians not submitting information about visits to Manitoba Health. The symptoms of mood and anxiety disorders in children are often not apparent to parents, teachers, and healthcare providers and may explain the lower than expected diagnosed prevalence.

Psychotic Disorders

Psychotic disorders in children is a broad term used to describe a group of disorders that are characterized by extreme impairment of the ability to think clearly, respond emotionally, communicate effectively, understand reality, and behave appropriately. Symptoms associated with psychotic disorders include delusions, hallucinations, and disorganized speech or behaviour (American Psychiatric Association, 2013; Sikich, 2013). Included in our definition of 'psychotic disorders' are schizophrenia and delusional disorders.

In this study, an adolescent (aged 13-19) is considered to have a diagnosis of psychotic disorders in either time period when they meet at least one of the following criteria:

- At least one hospitalization with a diagnosis for one of the following over four years: psychotic disorders due to opioids, cannabinoids, etc., acute and transient psychotic disorders, induced delusional disorders, schizoaffective disorders, other nonorganic psychotic disorders, or unspecified nonorganic psychosis; or
- At least one physician visit with a diagnosis of one of the following: schizophrenic disorders, delusional disorders, or other nonorganic psychoses.

Key Findings

Below are listed the key findings for the diagnostic prevalence of psychotic disorders:

- 0.68% for the first time period and 0.75% for the second time period in Manitoba overall;
- Lower in Southern Health/Santé Sud than the Manitoba prevalence in both time periods;
- Higher in Northern than in Manitoba in both time periods;
- Lower in Seven Oaks/Inkster and higher in Downtown/Point Douglas than in Winnipeg in the both time periods, and;
- Higher in males than females in all health regions except Prairie Mountain Health.

There was a linear trend across both rural and urban income quintiles, meaning that as income increased, there was a lower prevalence of psychotic disorders.

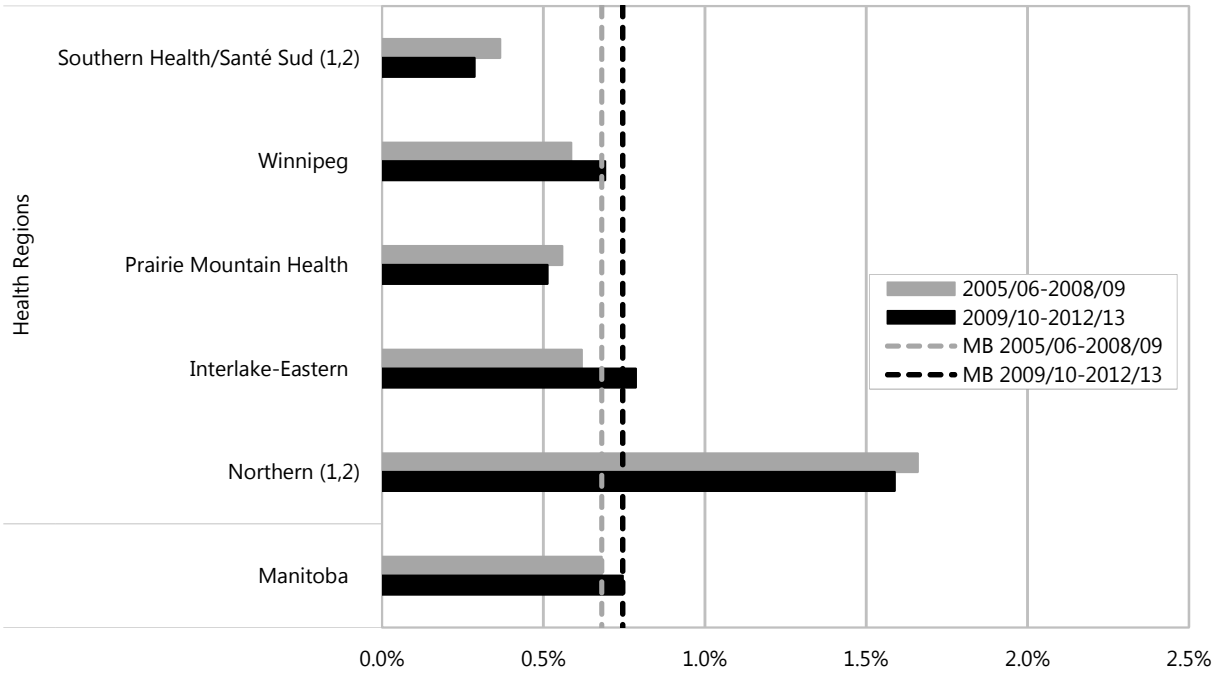
Regional Trends over Time

Figure 2.29 presents the four-year diagnostic prevalence of psychotic disorders for adolescents aged 13-19 by health region. The prevalence in Manitoba was 0.68% in the first time period and 0.75% in the second time period. Compared to Manitoba in both time periods, the prevalence was lower in Southern Health/Santé Sud and alarmingly higher in Northern.

Figure 2.30 presents the four-year diagnostic prevalence of psychotic disorders for adolescents aged 13-19 by Winnipeg community area. Compared to Winnipeg in both time periods, the psychotic disorders prevalence was lower in Seven Oaks/Inkster and higher in Downtown/Point Douglas.

Figure 2.29: Prevalence of Psychotic Disorders in Adolescents Aged 13-19 by Health Region

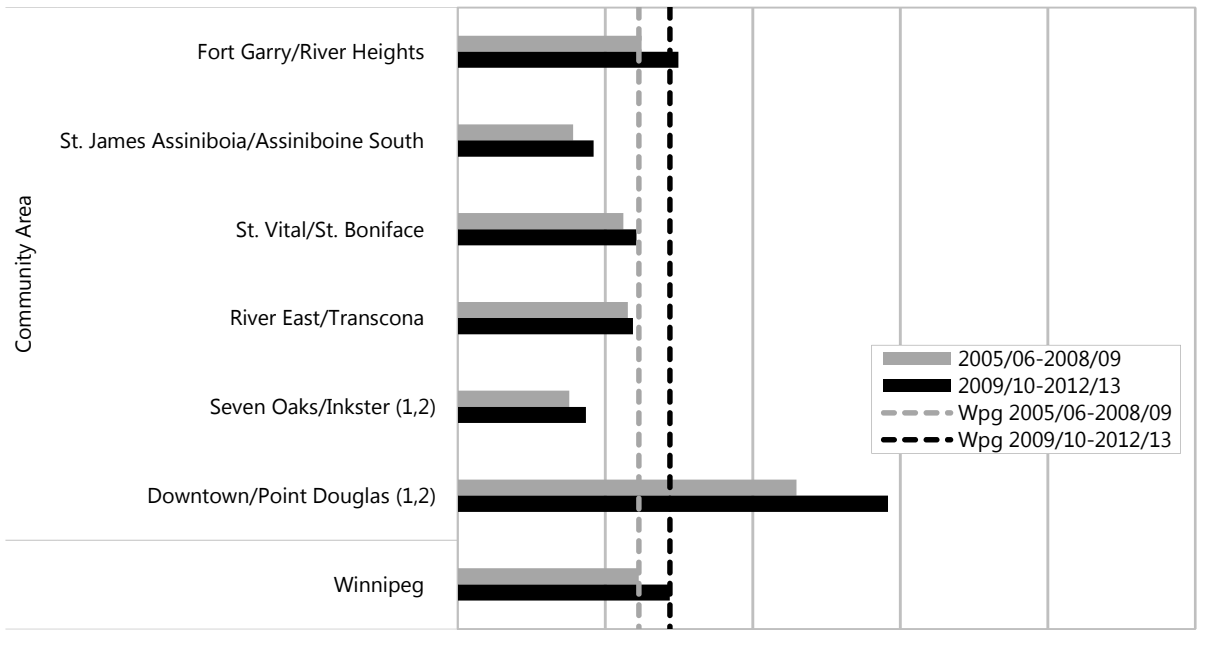
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.30: Prevalence of Psychotic Disorders in Adolescents Aged 13-19 by Winnipeg Community Area

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



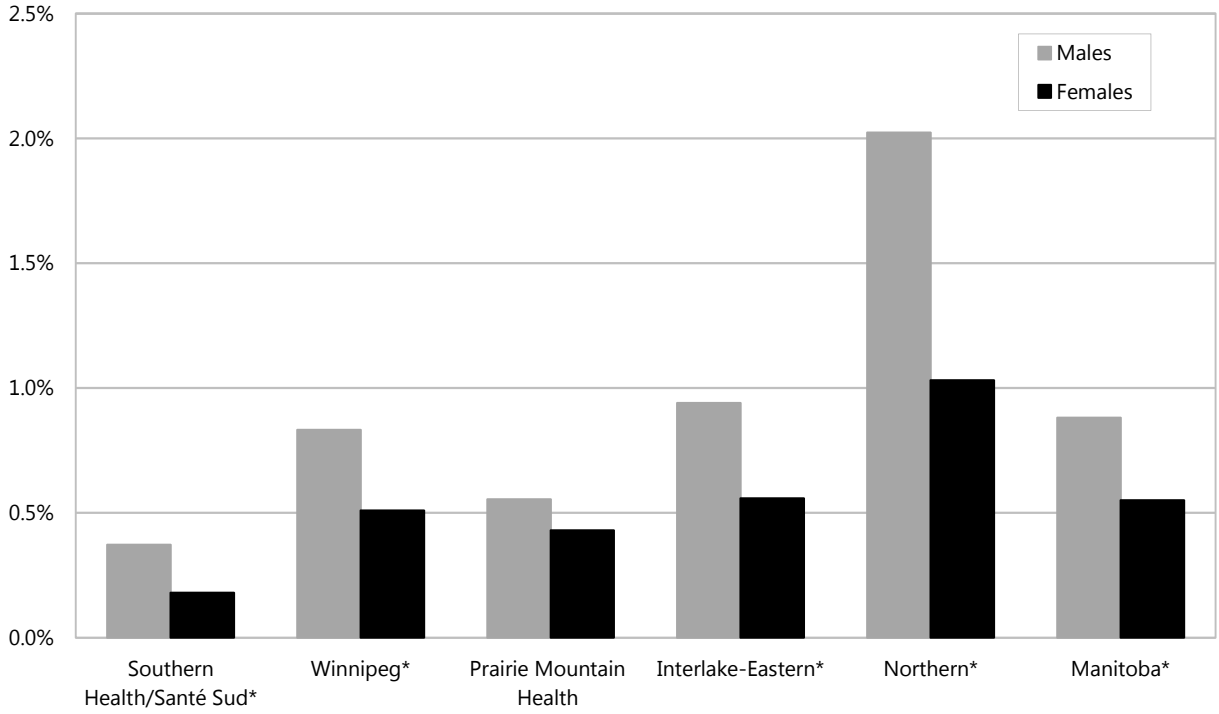
1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)

Prevalence by Sex

Figure 2.31 shows that the four-year diagnostic prevalence of psychotic disorders was higher in males than females in the second time period in all health regions except Prairie Mountain Health. The prevalence in Manitoba was 0.88% for males and 0.55% for females. Similar differences are found in the first time period (see Appendix Table 5.18).

Figure 2.31: Prevalence of Psychotic Disorders in Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, adolescents diagnosed with disorder, four-year time period, 2009/10-2012/13



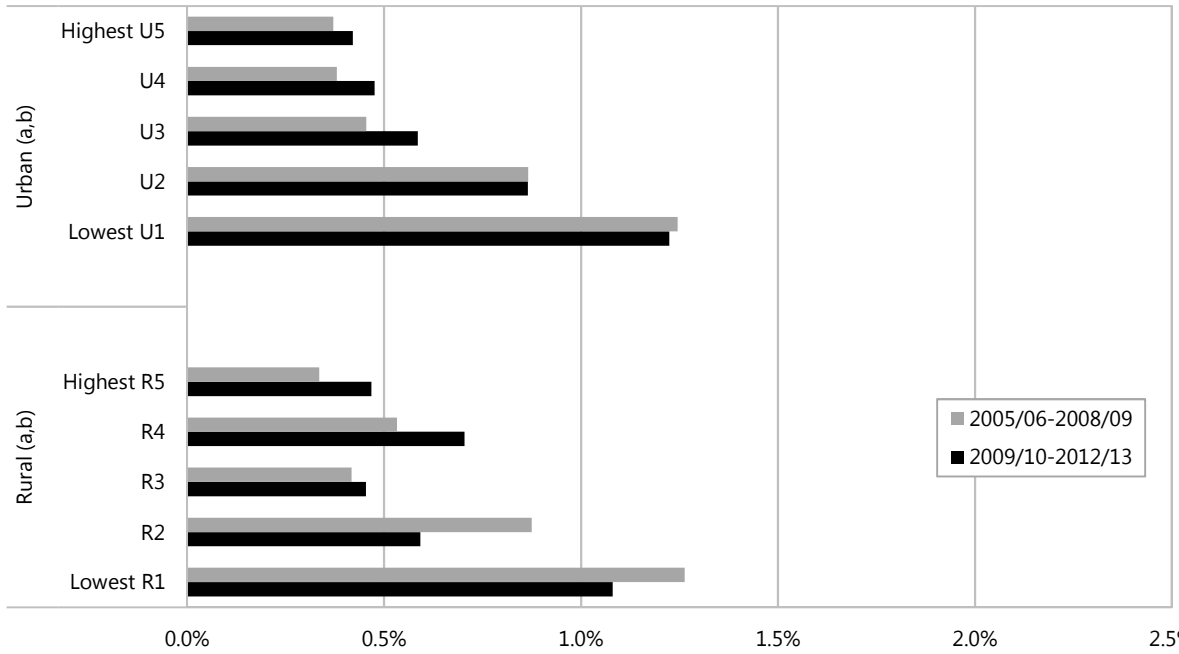
* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Prevalence by Income Quintile

Figure 2.32 presents the four-year diagnostic prevalence of psychotic disorders for adolescents aged 13-19 by income quintile. In both time periods, there was a linear trend across the rural and urban income quintiles, meaning that generally with each increase in income we find a lower prevalence of psychotic disorders. Unlike other mental disorders, no difference in prevalence was found between urban and rural areas.

Figure 2.32: Prevalence of Psychotic Disorders in Adolescents Aged 13-19 by Income Quintile

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period (p<0.01)
b indicates a statistically significant difference across income quintiles for the second time period (p<0.01)
† indicates a statistically significant difference between rural and urban areas in the first time period (p<0.01)
‡ indicates a statistically significant difference between rural and urban areas in the second time period (p<0.01)

What do these results mean?

This report found the age- and sex-adjusted four-year diagnostic prevalence of psychotic disorders for adolescents aged 13-19 to be 0.75% in the second time period, which is higher than found in epidemiologic studies. We suspect that the prevalence found here may be an overestimation. Psychotic symptoms are not uncommon among older children and may be mistaken for the full disorder. For example, a birth cohort study in the UK found that 13.7% of 12-year-old children reported psychotic symptoms in the previous 6 months (Horwood et al., 2008). While psychotic symptoms are associated with impairment and distress (Hollis, 2003), they do not necessarily indicate that the child has a psychotic disorders. The higher prevalence of psychotic disorders in the Northern region may be related to the higher rates of substance use. Some of the psychotic symptoms may be drug or alcohol induced.

Psychotic disorders, including delusional disorders, and schizophrenia (schizotypal and schizoaffective disorders) are rare disorders in the general population, particularly in children. A Scottish study reported a prevalence of psychotic disorders of 5.9 per 100,000 youths aged 13-21 (Boeing et al., 2007). The Great Smoky Mountain Study found a prevalence of 0.1% among 9- to 13-year-old children (Costello et al., 1996). Among 18- to 64-year-old people in the Netherlands, a prevalence of 0.4% was found among males and 0.3% among females (Bijl, Ravelli, & van Zessen, 1998).

Schizophrenia

Schizophrenia is a severe mental disorder characterized by difficulty in distinguishing between real and unreal experiences (delusions and hallucinations), thinking logically, having normal emotional responses to others, and behaving normally in social situations. To obtain a diagnosis of schizophrenia, the symptoms must have been present for at least one month (American Psychiatric Association, 2013). The indicator used in this report consists of several types of schizophrenia, schizotypal and schizoaffective disorder. Schizotypal disorder is defined as having eccentric behaviour and anomalies of thinking and mood, which resemble those seen in schizophrenia. Schizoaffective disorder is characterized by both symptoms of a mood disorder and schizophrenia (American Psychiatric Association, 2013).

Schizophrenia is included in our definition of psychotic disorders. We have chosen to examine this disorder separately because schizophrenia is believed to be more accurately diagnosed by physicians, therefore, it may provide a more accurate picture compared to the broader group of psychotic disorders.

In this study, an adolescent (aged 13-19) is considered to have a diagnosis of schizophrenia in either time period when he/she meets at least one of the following criteria:

- At least one hospitalization with a diagnosis of one of following over four years: schizophrenia, schizotypal disorder, or schizoaffective disorder; or
- At least one physician visit with a diagnosis of schizophrenia, schizotypal disorder, or schizoaffective disorder.

Key Findings

Below are listed the key findings for schizophrenia prevalence:

- 0.32% in the first time period and 0.34% in the second time period in Manitoba;
- Lower in Southern Health/Santé Sud than in Manitoba in the second time period;
- Considerably higher in Northern than in Manitoba in both time periods;
- Considerably higher in Downtown/Point Douglas than in Winnipeg in both time periods; and
- Higher in males than females in Manitoba overall and all health regions except Prairie Mountain Health and Interlake-Eastern.

There was a linear trend across urban income quintiles in both time periods, meaning that as income increased, there was a lower prevalence of schizophrenia. In rural areas, this trend was found in the first time period only.

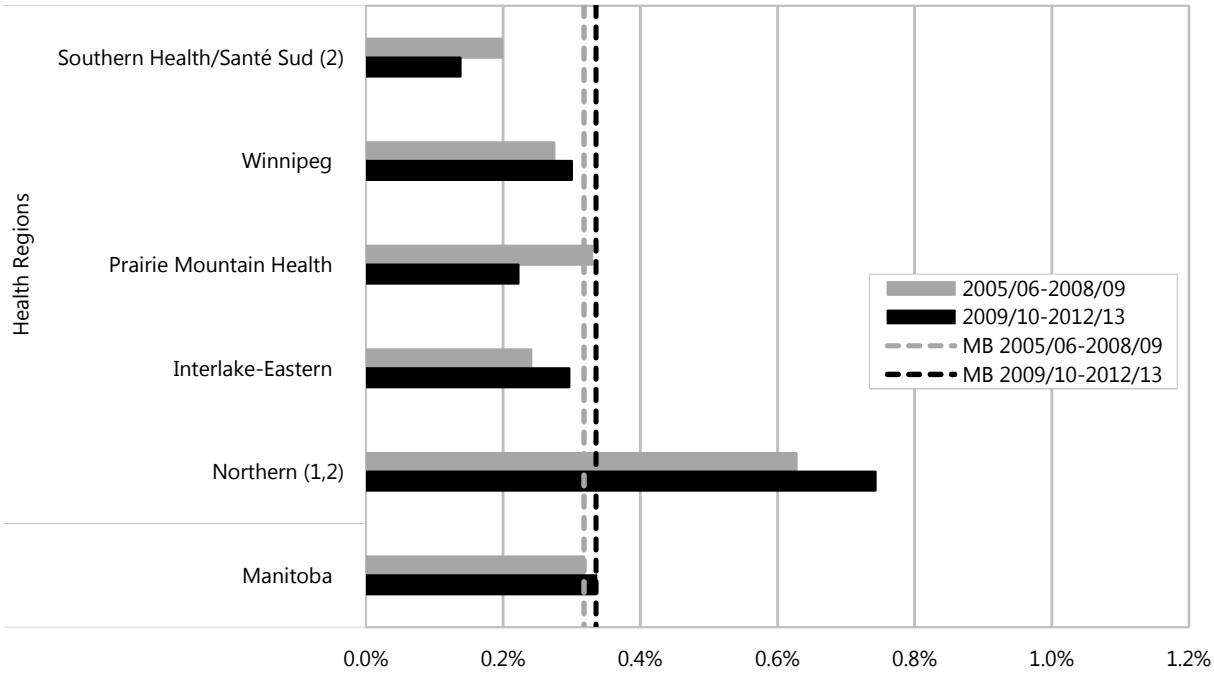
Regional Trends over Time

Figure 2.33 presents the four-year diagnostic prevalence of schizophrenia for adolescents aged 13-19 by health region. The prevalence in Manitoba was 0.32% in the first time period and 0.34% in the second time period. In both time periods, the prevalence in Northern was dramatically higher than the Manitoba prevalence; in the second time period, Southern Health/Santé Sud had a lower prevalence than the Manitoba prevalence.

Figure 2.34 presents the four-year diagnostic prevalence of schizophrenia for adolescents aged 13-19 by Winnipeg community area. The prevalence was dramatically higher in Downtown/Point Douglas than the Winnipeg prevalence in both time periods.

Figure 2.33: Prevalence of Schizophrenia in Adolescents Aged 13-19 by Health Region

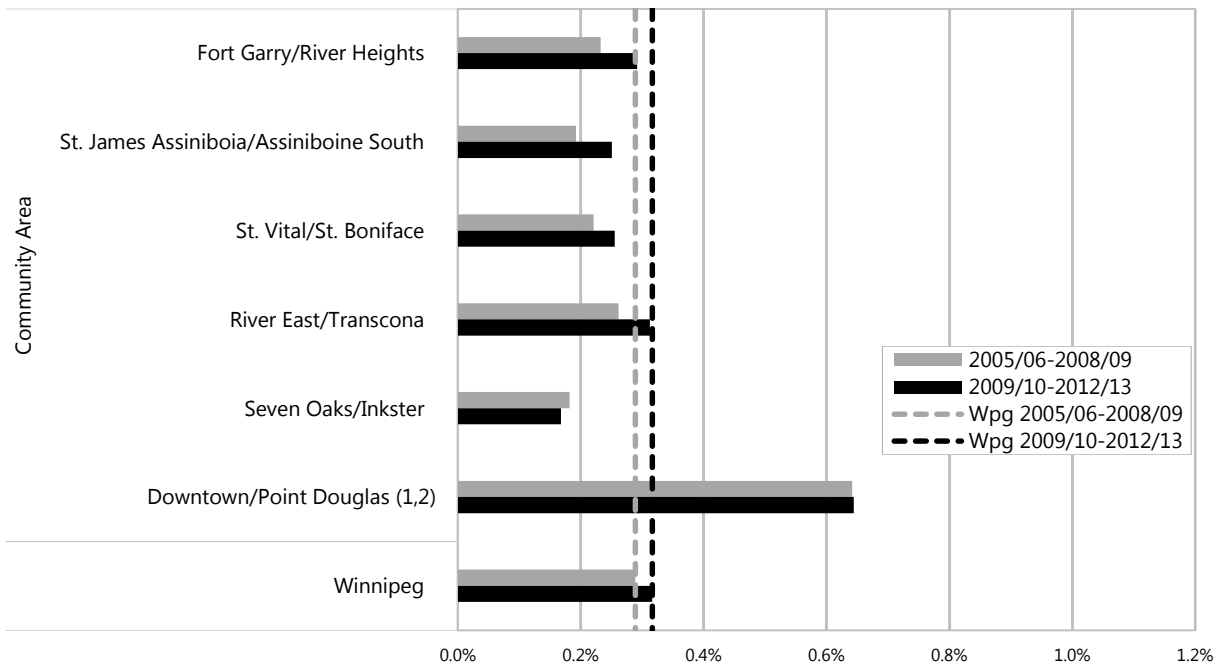
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.34: Prevalence of Schizophrenia in Adolescents Aged 13-19 by Winnipeg Community Area

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



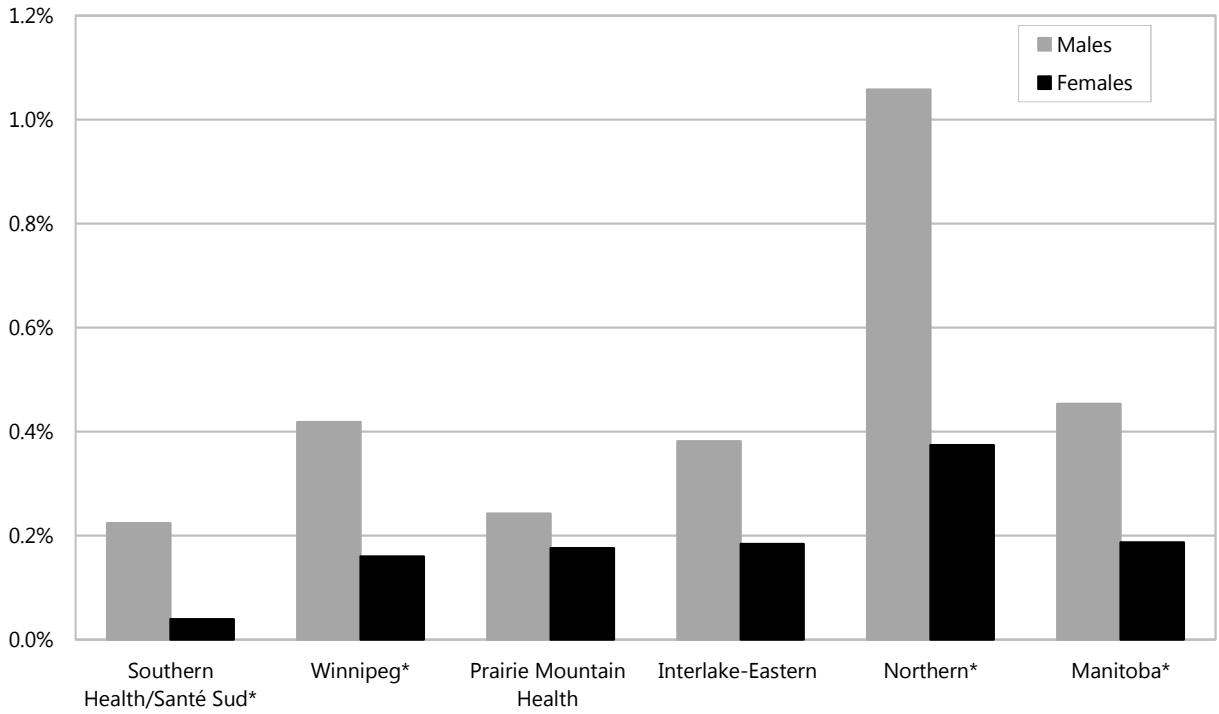
1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)

Prevalence by Sex

Figure 2.35 shows that the four-year diagnostic prevalence of schizophrenia was higher in males than females in the second time period in all health regions except Prairie Mountain Health and Interlake-Eastern. The prevalence in Manitoba was 0.45% for males and 0.19% for females. Similar differences between the sexes were found in the first time period (see Appendix Table 5.21).

Figure 2.35: Prevalence of Schizophrenia in Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, adolescents diagnosed with disorder, four-year time period, 2009/10-2012/13



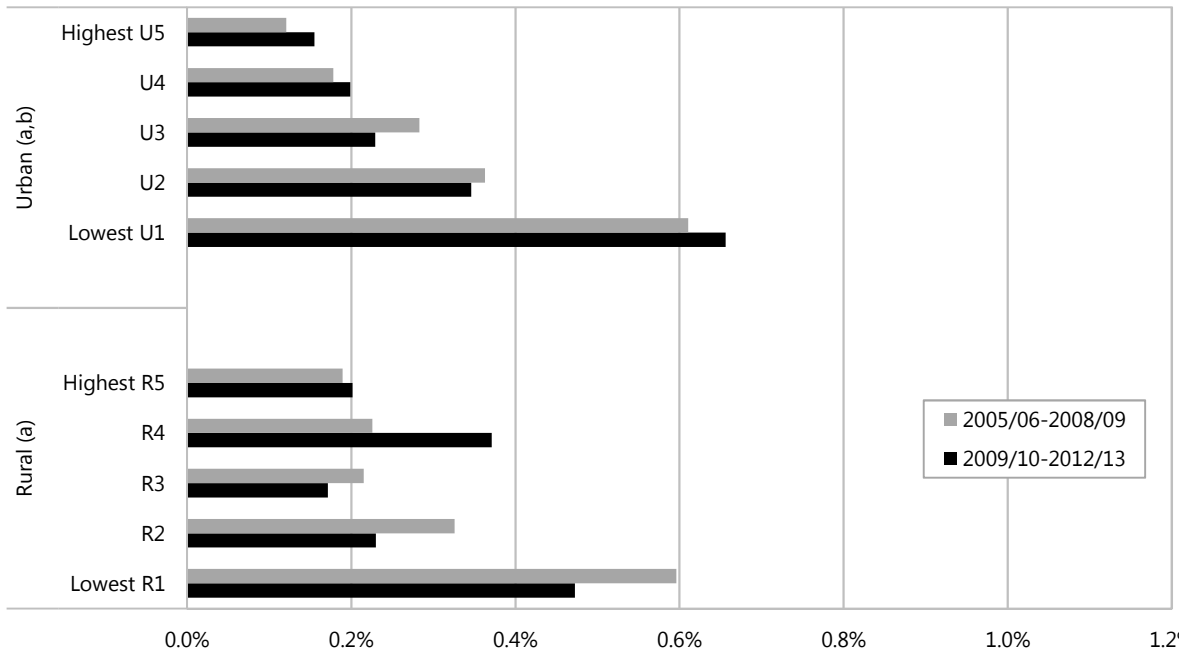
* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Prevalence by Income Quintiles

Figure 2.36 presents the four-year diagnostic prevalence of schizophrenia for adolescents aged 13-19 by income quintile. For urban areas in both time periods, there was a linear trend across the income quintiles, meaning that with each increase in income we find a lower prevalence of schizophrenia. This trend was also observed in rural areas in the first time period.

Figure 2.36: Prevalence of Schizophrenia in Adolescents Aged 13-19 by Income Quintile

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period (p<0.01)
b indicates a statistically significant difference across income quintiles for the second time period (p<0.01)
† indicates a statistically significant difference between rural and urban areas in the first time period (p<0.01)
‡ indicates a statistically significant difference between rural and urban areas in the second time period (p<0.01)

What do these results mean?

This report found that the age- and sex-adjusted four-year diagnostic prevalence of schizophrenia for adolescents aged 13-19 was 0.34% in the second time period. Given that schizophrenia is one of the diagnoses included in our definition of psychotic disorder, we expect the diagnostic prevalence of schizophrenia to be lower than the prevalence for psychotic disorders, which is what we see (Figure 2.33). We have more confidence in the reported prevalence of schizophrenia than the psychotic disorder prevalence for several reasons. First, the diagnosis of schizophrenia is given more sparingly than the diagnosis of psychotic disorders and tends to be given after having observed a patient for several months. Second, the diagnosis of schizophrenia is not given lightly as it has major implications for the child. Treatments, which include antipsychotic medications that carry the risk of serious side effects, are usually required for long periods of time and the diagnosis can be associated with considerable stigma (Rapoport & Gogtay, 2011). Comparing the schizophrenia prevalence with other studies is difficult because there is a paucity of good population-based prevalence figures (Hollis, 2008).

Clinical studies report that more males are diagnosed with schizophrenia than females (Hollis, 2008), as was found in this study. Studies from population-based surveys tend to report equal sex ratios, suggesting the possibility that males with schizophrenia are brought to the attention of healthcare providers more often than females with this illness (Hollis, 2008). In this study, a higher prevalence of schizophrenia was found in low income areas compared to high income areas. A study by Dohrenwend et al. (1992) found that young adults with schizophrenia are more likely living in poverty due to downward mobility because of their illness rather than the stress of being of low socioeconomic status influencing their illness. Other authors offer alternative explanation, proposing that children in lower income areas are exposed to more risk factors associated with schizophrenia than children in higher income area. These risk factors include complications during pregnancy and at birth (Kendell, McInneny, Juszczak, & Bain, 2000), exposure to cannabis (Arseneault, Cannon, Witton, & Murray, 2004), and social adversity (Broome et al., 2005).

Any Mental Disorder

In this study, a child (aged 6-19) is considered to have 'any mental disorder' when he/she has been diagnosed with at least one of the following mental disorders we examined in this report. These mental disorders have been described previously:

- Attention-deficit hyperactivity disorder (ADHD);
- Conduct disorder;
- Substance use disorders;
- Mood and anxiety disorders; and
- Psychotic disorders (including schizophrenia).

Given that we did not examine substance use disorders and psychotic disorders in children aged 6-12, these children are considered to have "any mental disorder" if they have been diagnosed with at least one of the following disorders:

- Attention-deficit hyperactivity disorder (ADHD);
- Conduct disorder;
- Mood and anxiety disorders.

Key Findings

Below are listed the key findings for the prevalence of any mental disorder:

- 12.5% in the first time period and 14.0% in second time period in Manitoba overall;
- No increases over time were found in children aged 6-19 as a group; however, increases were found when the age groups were divided:
  - Among children aged 6-12, prevalence increased from the first time period to the second time period in Manitoba overall and in all health regions except Northern and Interlake Eastern;
  - Among adolescents aged 13-19, prevalence increased from the first time period to the second time period in Manitoba overall, Winnipeg RHA and Interlake Eastern;
- Lower in Southern Health/Santé Sud than the Manitoba prevalence in both time periods;
- Lower in Seven Oaks/Inkster than the Winnipeg prevalence in both time periods;
- Higher in males than females, in all health regions except Prairie Mountain Health and Northern; and
- Higher in urban areas compared to rural areas in both time periods.

There was a linear trend across urban income quintiles, meaning that as income increased, there was a lower prevalence of any mental disorder.

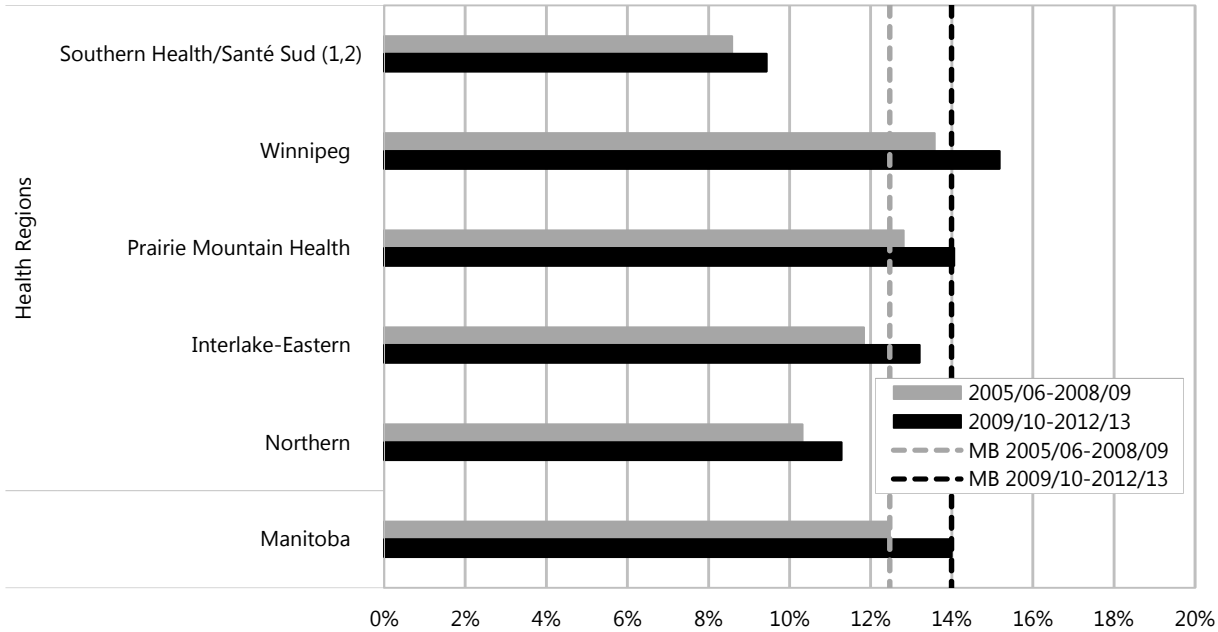
Regional Differences over Time

Figure 2.37 presents the four-year diagnostic prevalence of any mental disorder for children aged 6-19 by health region. The prevalence in Manitoba was 12.5% in the first time period and 14.0% in the second. In both time periods, the prevalence of any mental disorder in Southern Health/Santé Sud was lower than the Manitoba prevalence.

Figure 2.38 presents the four-year diagnostic prevalence of any mental disorder for children aged 6-19 by Winnipeg community area. The prevalence in Seven Oaks/Inkster was lower than in Winnipeg in both time periods.

Figure 2.37: Prevalence of Any Mental Disorder in Children Aged 6-19 by Health Region

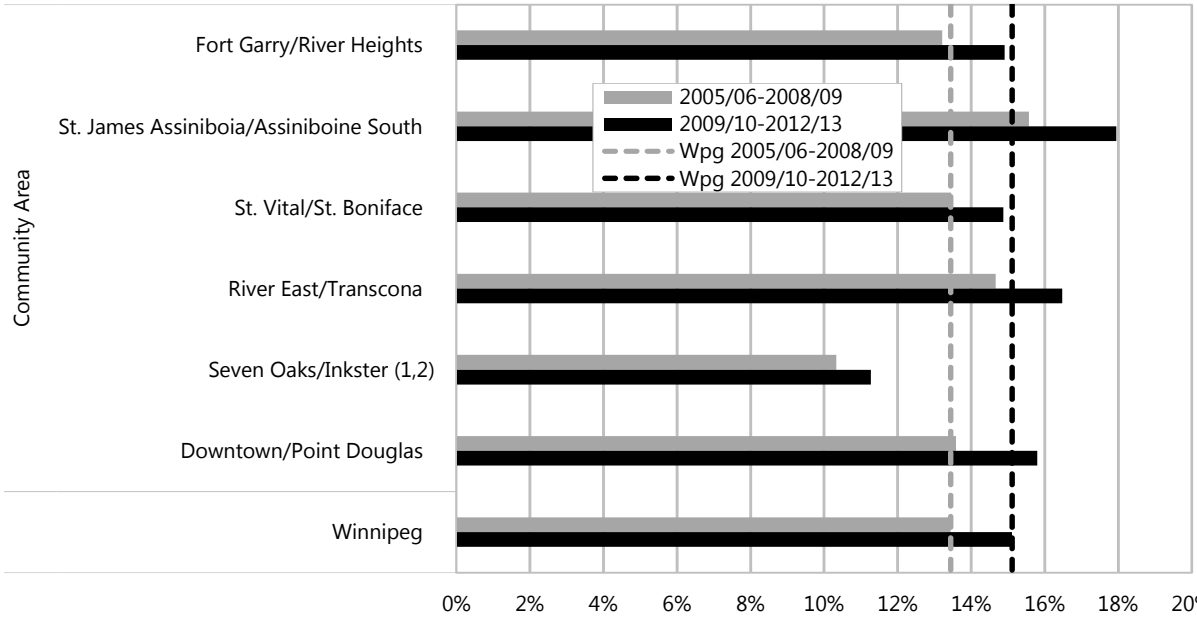
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period ($p<0.01$)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that health region ($p<0.05$)
Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

Figure 2.38: Prevalence of Any Mental Disorder in Children Aged 6-19 by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period ($p<0.01$)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that community area ($p<0.05$)
Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

Prevalence by Age and Sex

Figure 2.39 and Figure 2.40 presents the four-year diagnostic prevalence of any mental disorder for children and adolescents aged 6-12 and 13-19, respectively. For children aged 6-12, the prevalence of any mental disorder increased over time from 9.4% to 10.8% in Manitoba. In both time periods, Southern Health/Santé Sud and Northern had a lower prevalence than in Manitoba. Interlake-Eastern had a lower prevalence than Manitoba in the second time period. Conversely, Winnipeg RHA had a higher prevalence than the Manitoba prevalence in both time periods. Increases in the prevalence over time were observed in all regions except Interlake-Eastern and Northern.

For adolescents aged 13-19, the prevalence of any mental disorder in Manitoba increased over time from 15.3% to 17.0%. In both time periods, the prevalence of any mental disorder in Southern Health/Santé Sud was lower than in Manitoba (11.1% and 11.7%). The prevalence increased over time in Winnipeg RHA and Interlake-Eastern.

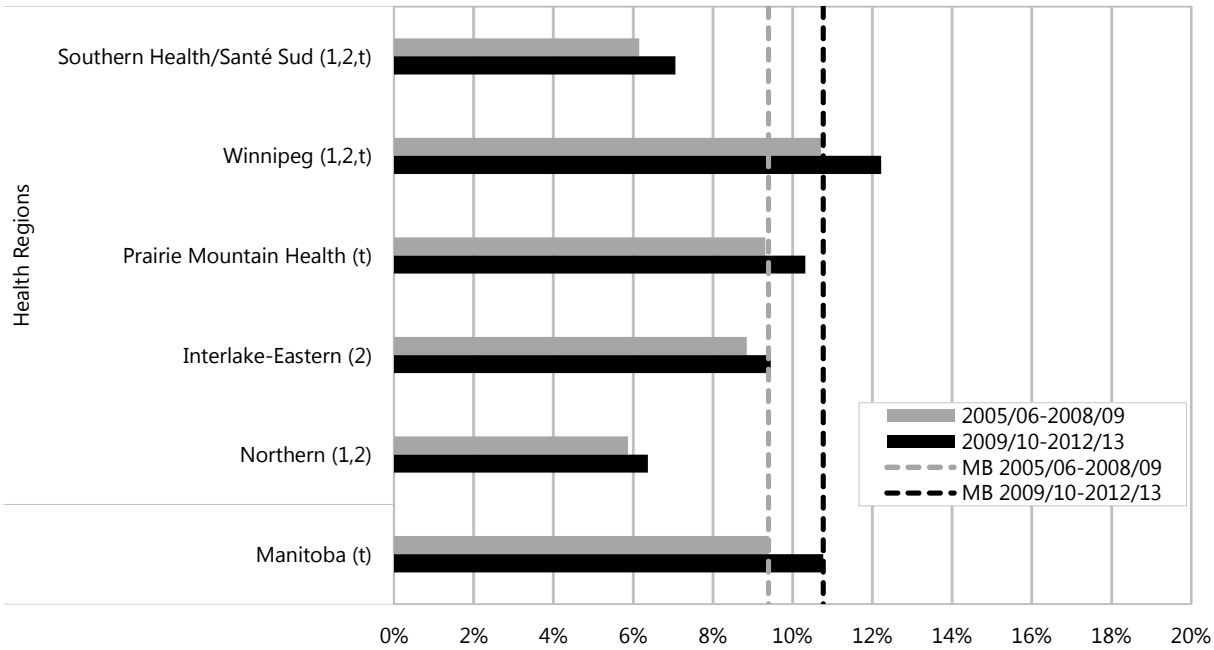
Figure 2.41 shows that the four-year diagnostic prevalence of any mental disorder was higher in males than females in the second time period in all health regions except Prairie Mountain Health and Northern. The prevalence in Manitoba was 17.6% for males and 13.3% for females (13.3%). Similar differences between males and females are found in the first time period (see Appendix Table 5.24).

Prevalence by Income Quintile

Figure 2.42 presents the four-year diagnostic prevalence of any mental disorder for children aged 619 by income quintile. The prevalence was higher in urban areas than in rural areas in both time periods. In urban areas, there was a linear trend across the income quintiles in both time periods, meaning that as income increased, we found a lower prevalence of any mental disorder.

Figure 2.39: Prevalence of Any Mental Disorder in Children Aged 6-12 by Health Region

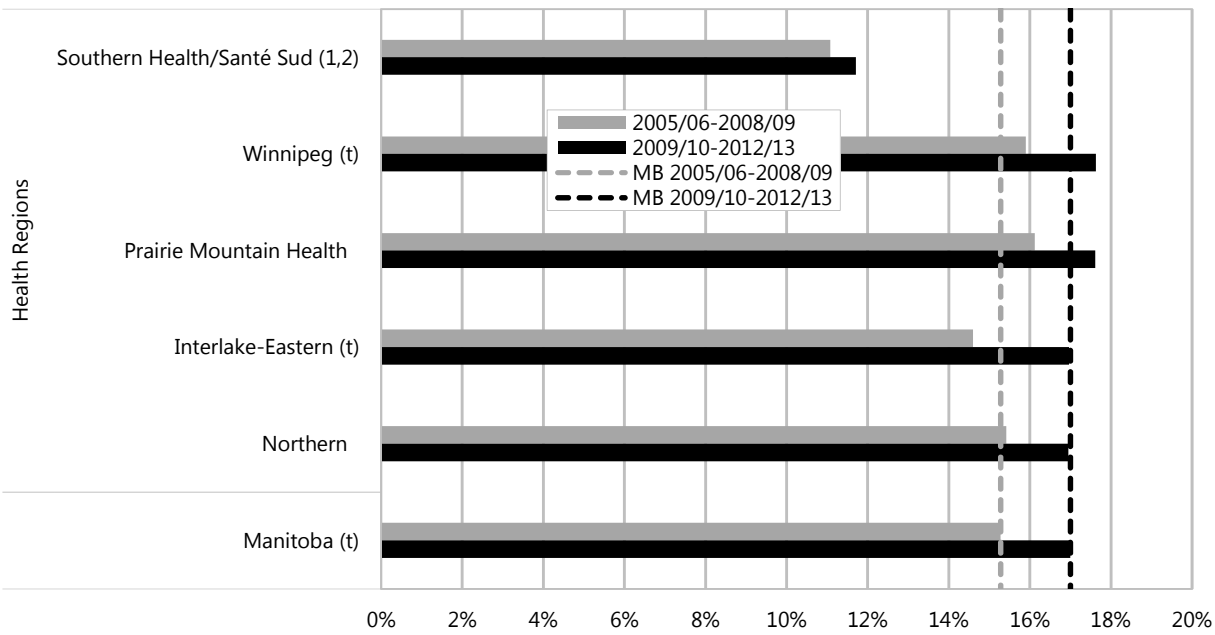
Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)
Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, and mood and anxiety disorders

Figure 2.40: Prevalence of Any Mental Disorder in Adolescents Aged 13-19 by Health Region

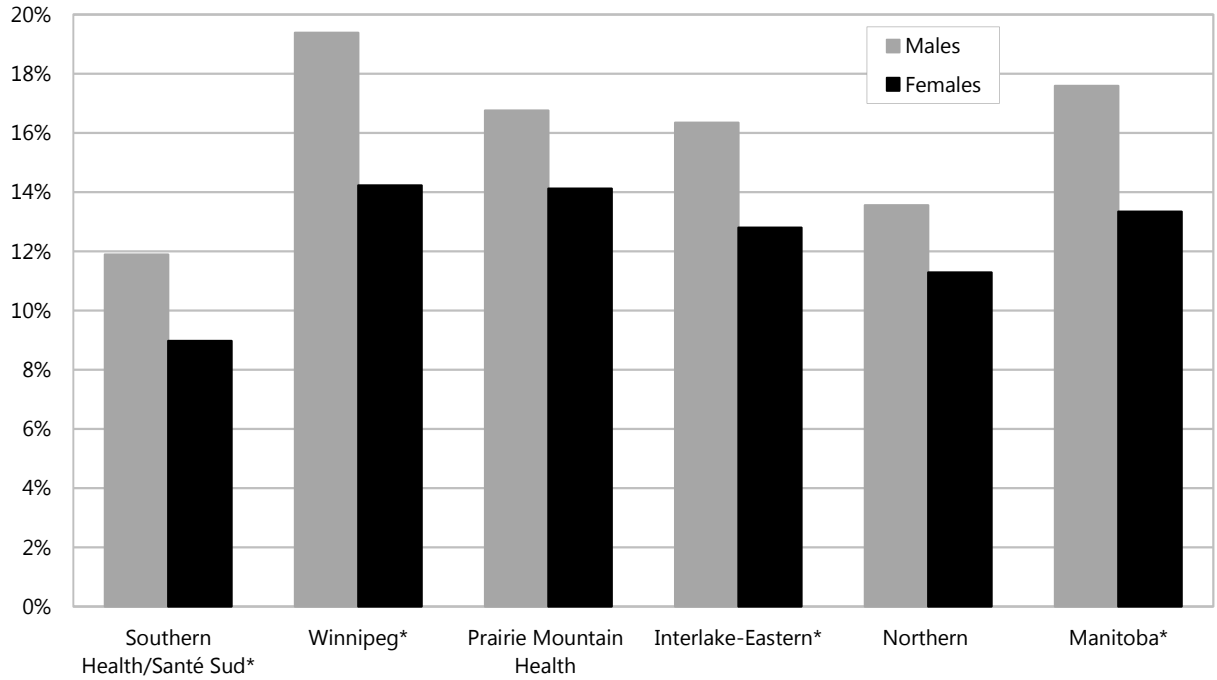
Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)
Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

Figure 2.41: Prevalence of Any Mental Disorder in Children Aged 6-19 by Sex and Health Region

Age-adjusted, children diagnosed with disorder, four-year time period, 2009/10-2012/13

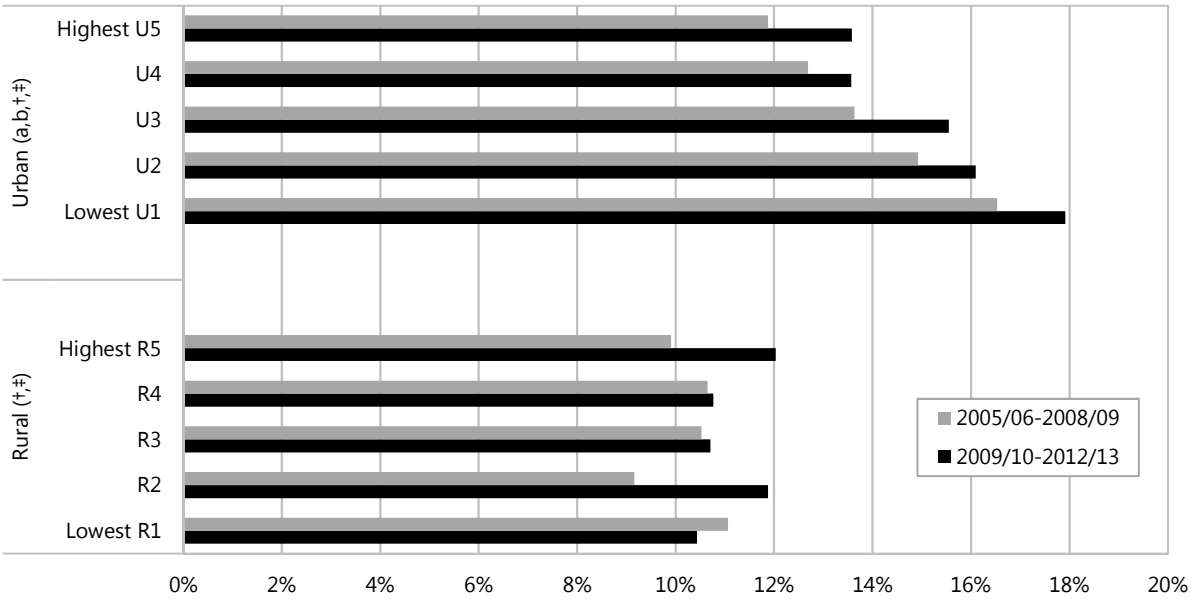


* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

Figure 2.42: Prevalence of Any Mental Disorder in Children Aged 6-19 by Income Quintile

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period ($p<0.01$)

b indicates a statistically significant difference across income quintiles for the second time period ($p<0.01$)

† indicates a statistically significant difference between rural and urban areas in the first time period ($p<0.01$)

‡ indicates a statistically significant difference between rural and urban areas in the second time period ($p<0.01$)

Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

What do these results mean?

This report found the age- and sex-adjusted four-year diagnostic prevalence of having at least one diagnosis of a mental disorder (any mental disorder) to be 14.0% in Manitoba in the second time period. This finding reflects the cumulative burden of mental disorders on children because we included a broad range of mental disorders in this indicator. Our analysis found that the prevalence of any mental disorder in children in both age groups increased over time. This is consistent with findings reported in the National Research Council report (2009), which suggests that these rates are rising in North America.

Given that our definition of any mental disorder includes several disorders, it is not surprising that the prevalence is high, relative to other childhood illnesses, particularly among adolescents aged 13-19. The prevalence of any mental disorder will vary depending on the number of diagnoses included in the definition and the length of time allowed for capturing the diagnoses (e.g., four-year prevalence versus lifetime prevalence). For example, Copeland et al. (2011), using the Great Smoky Mountain Study, reported that by 21 years of age, 61% of respondents had met criteria for a psychiatric disorder. In a Canadian context, at any point in time (rather than a lifetime prevalence as per other epidemiologic studies), Waddell et al. (2005) found that 12.6% of Canadian children experience a mental disorder. Mental health problems are the most common childhood illnesses and yet until recently these illnesses have received relatively little attention. Previous sections in this report contrast our findings of the specific mental disorders with findings in previous studies.

We observe that males are being diagnosed with a mental disorder more frequently than females and that children in urban areas are more likely to be diagnosed than in rural areas. An income gradient was found in urban areas but not rural areas, likely because of the heterogeneity of geographical areas in rural areas. Income gradients are normally found in many illnesses, including mental disorders (Wilkinson & Pickett, 2010). Costello et al. (1996) found that the prevalence of mental disorders in children living in poverty was three times higher than in children not living in poverty. The lower prevalence in rural areas may be because of barriers to health services, given that our prevalence estimates are largely dependent on being seen by a physician. When the mental disorders are broken down by specific disorders, we observed relative differences by type of disorders. We find that the most severe and noticeable disorders (such as schizophrenia) are higher in rural areas compared to urban areas. On the other hand, disorders where children are emotionally distressed and not likely to be noticed by teachers and parents, such as mood and anxiety disorders, were lower in rural areas compared to urban areas.

Suicide and Attempted Suicide

This section will examine the indicators *suicide* and *attempted suicide* separately.

Suicide is the act of intentionally killing oneself. In this study, we defined suicide among adolescents (aged 13-19) in both time periods using death records in Vital Statistics data that list self-inflicted injury or poisoning as the primary cause of death.

An attempted suicide is defined by any hospitalization for self-inflicted injury, or for accidental poisoning where the poisoning is followed by a consult to psychiatry. It was not possible to distinguish self-harm from attempted suicide in this indicator. An adolescent (aged 13-19) is considered to have attempted suicide in either time period if they were hospitalized for the reasons described above.

For both suicide and attempted suicide, rates were calculated as the rate per 100,000 adolescents (rather than percentages) because of the small numbers of individuals in this cohort.

Key Findings - Suicide

Below are listed the key findings for rates of suicide:

- 73 suicides per 100,000 adolescents for the first time period and 74 suicides per 100,000 in the second time period in Manitoba overall;
- Higher in the Northern Health Region than in Manitoba in both time periods;
- Higher in Downtown/Point Douglas than in Winnipeg in both time periods;
- No differences between males and females in both time periods;
- Higher in the lowest income quintile than in the four higher income quintiles.

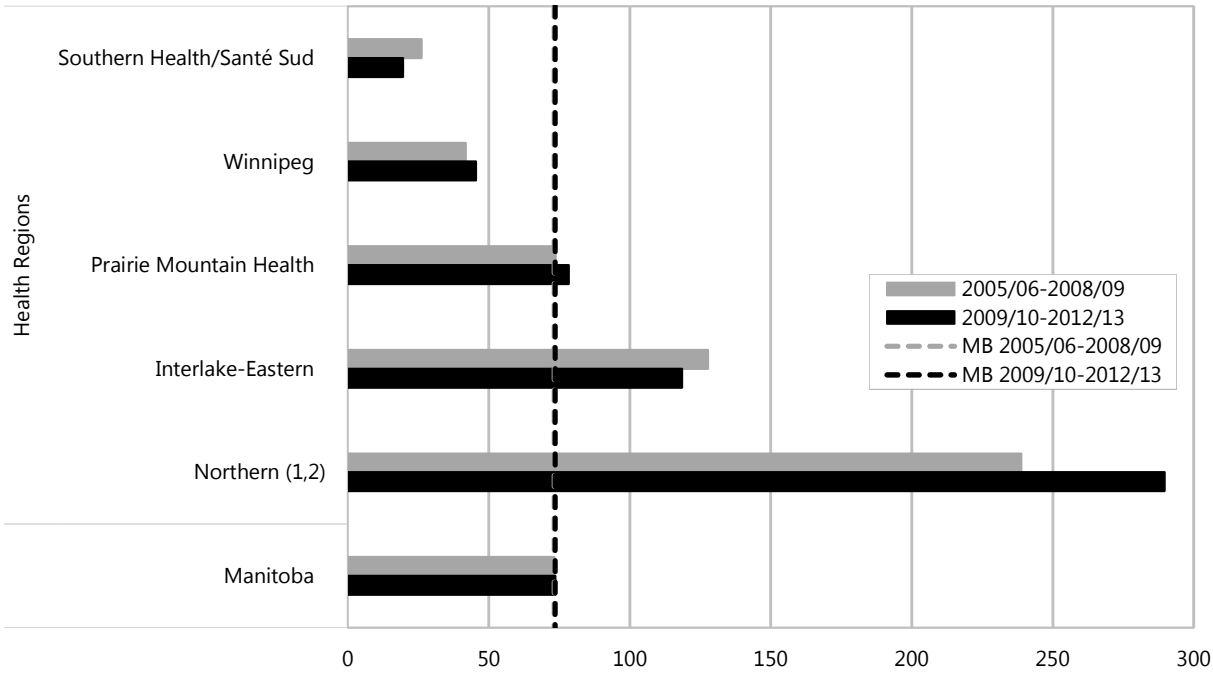
Regional Trends over Time - Suicide

Figure 2.43 presents the four-year rates of suicide for adolescents aged 13-19 by health region. The suicide rate in Manitoba was 73 and 74 per 100,000 adolescents for the first and second time period, respectively. The rate was higher in the Northern Health Region than in Manitoba in both time periods.

Figure 2.44 presents the four-year rates of suicide for adolescents aged 13-19 by Winnipeg community area. The rate was higher in the Downtown/Point Douglas community area than in Winnipeg.

Figure 2.43: Rate of Suicide Among Adolescents Aged 13-19 by Health Region

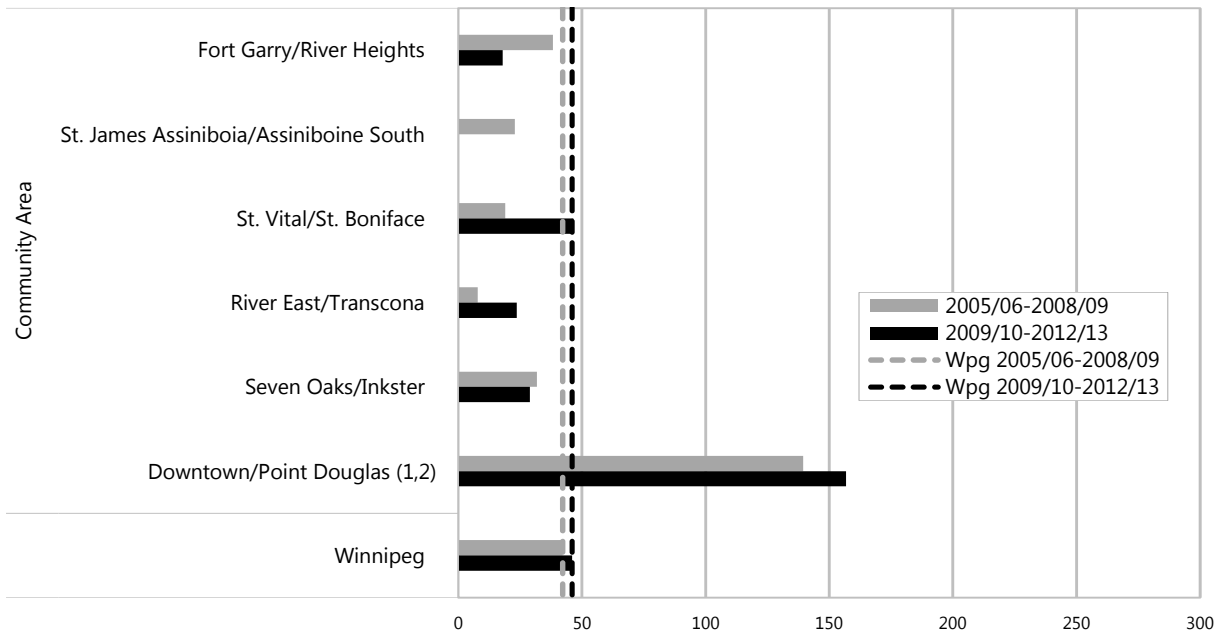
Age- and sex-adjusted, per 100,000 adolescents, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.44: Rate of Suicide Among Adolescents Aged 13-19 by Winnipeg Community Area

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods



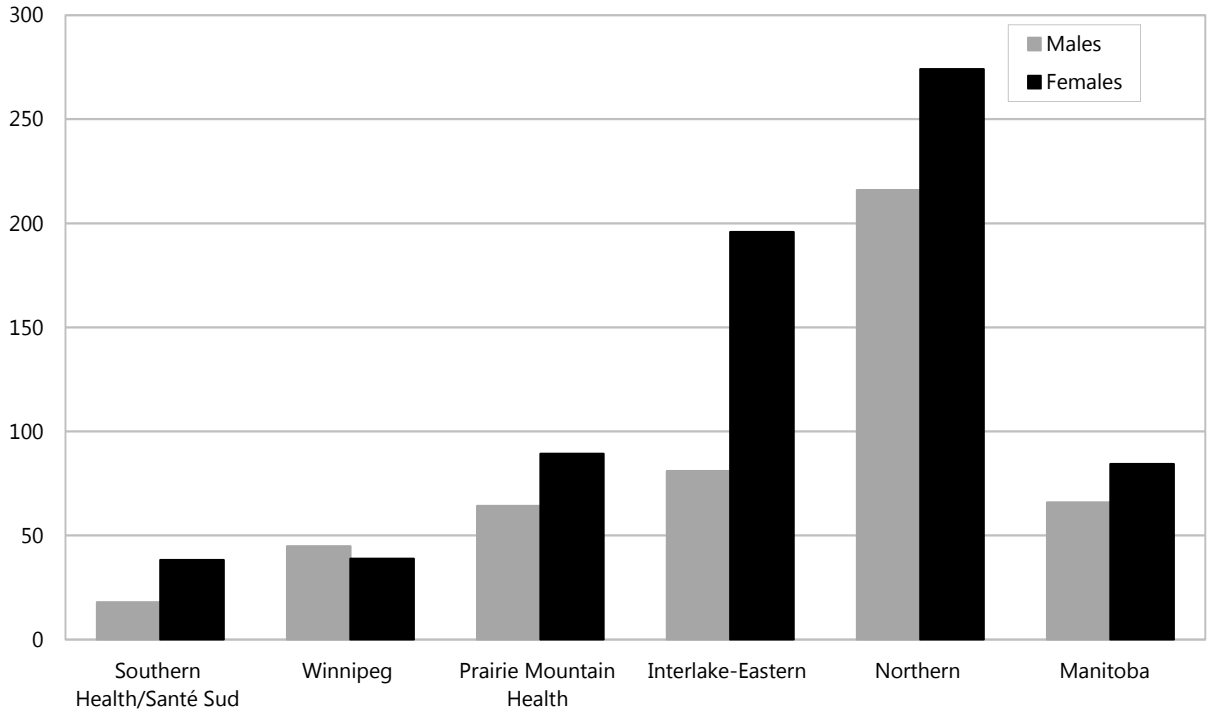
1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)
Note: no suicides occured in St. James Assiniboia/Assiniboine South in the second time period

Prevalence by Sex - Suicide

Figure 2.45 shows that the four-year rate of suicide was not different for males and females. Although there appear to be differences in some regions, for example, Northern and Interlake-Eastern, statistically significant differences could not be detected because of the low numbers of suicides. The suicide rate in Manitoba was 66 per 100,000 adolescents for males and 84 per 100,000 adolescents for females. Similar results are found in the first time period (see Appendix Table 5.27).

Figure 2.45: Rate of Suicide Among Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, per 100,000 adolescents, four-year time period, 2009/10-2012/13



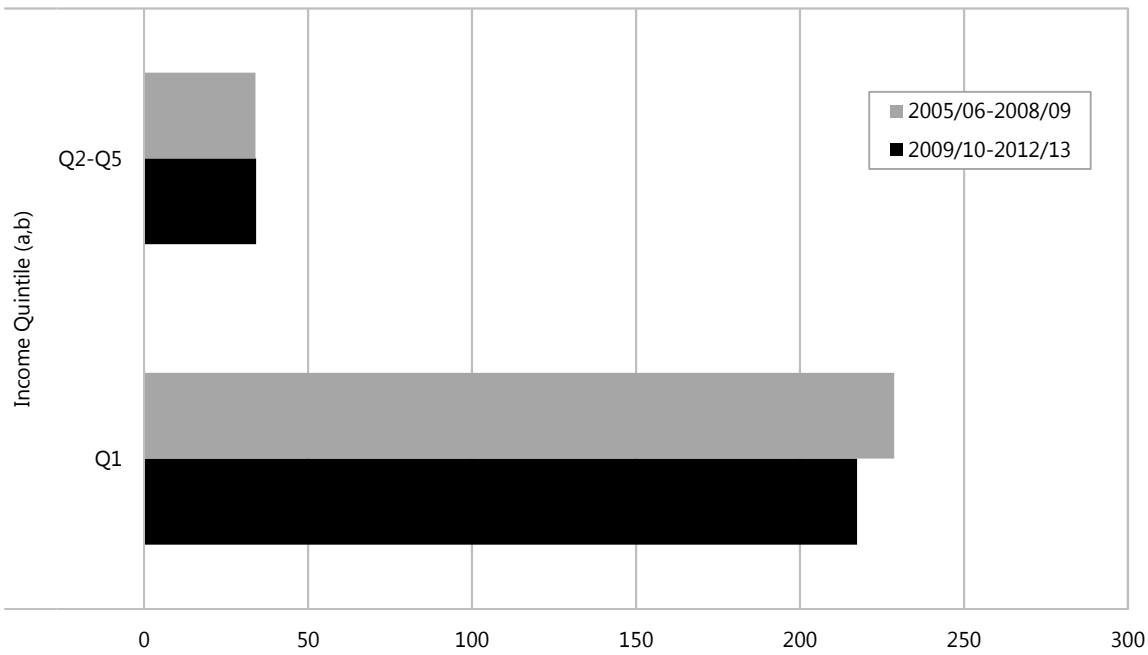
* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Prevalence by Income Quintile - Suicide

Figure 2.46 shows that the four-year rates of suicide for adolescents aged 13-19 in the lowest income quintile were considerably higher than the four higher income quintiles combined. Due to a small number of suicides, urban and rural income quintiles were combined, as were higher income quintiles (i.e., income quintiles Q2-Q5).

Figure 2.46: Rate of Suicide Among Adolescents Aged 13-19 by Income Quintile

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods



a indicates a statisticallly significant difference across income quintiles for the first time period (p<0.01)
b indicates a statistically significant difference across income quintiles for the second time period (p<0.01)

Key Findings - Attempted Suicide

Below are listed the key findings for rates of attempted suicide:

- 424 suicide attempts per 100,000 adolescents for the first time period and 459 suicide attempts per 100,000 adolescents in the second time period in Manitoba; this increase was not statistically significant;
- Compared to the Manitoba rate, the rate was lower in Southern Health/Santé Sud in both time periods and lower in Winnipeg RHA in the first time period;
- Compared to the Manitoba rate, the rate was higher in Prairie Mountain Health in the first time period and higher in Northern in both time periods;
- Higher in Downtown/Point Douglas than in Winnipeg in both time periods;
- Higher in females than males in Manitoba overall and in all health regions except Southern Health/Santé Sud in both time periods;
- Higher in rural areas compared to urban areas in both time periods.

There was a linear trend across the income quintiles in both urban and rural areas, meaning that as income increased, there was a lower rate of attempted suicide.

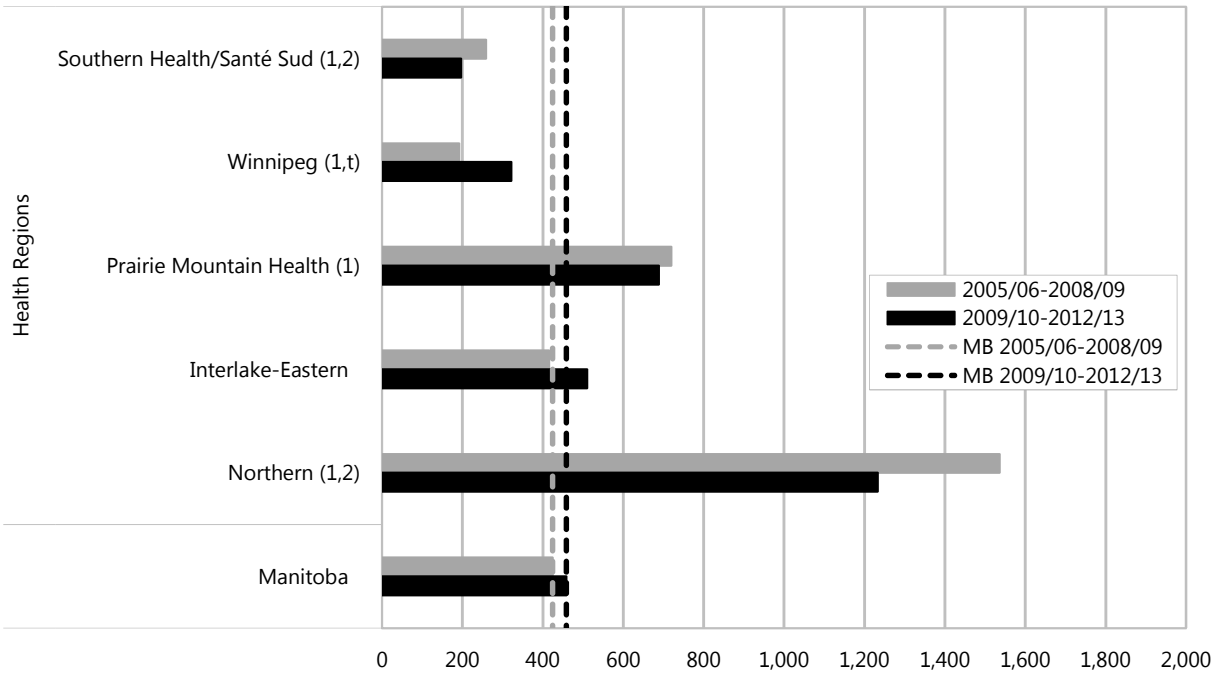
Regional Trends over Time - Attempted Suicide

Figure 2.47 presents the four-year rates of attempted suicide for adolescents aged 13-19 by health region. The rate in Manitoba was 424 and 459 suicide attempts per 100,000 adolescents for the first and second time period, respectively. Compared to Manitoba, the rate of attempted suicide was lower in Southern Health/Santé Sud in both time periods and lower in Winnipeg RHA in the first time period. Conversely, compared to the Manitoba rate, the rate was considerably higher in Northern in both time periods and higher in Prairie Mountain Health in the first time period. The rate of suicide attempts in Winnipeg RHA increased from the first to second time period.

Figure 2.48 presents the four-year rates of attempted suicide for adolescents aged 13-19 by Winnipeg community area. In Winnipeg, the rate of attempted suicide increased from the first to the second time period. The rate was higher in Downtown/Point Douglas than in Winnipeg in both time periods. Four community areas saw an increase from the first to the second time period: Fort Garry/River Heights, St. James/Assiniboine South, River East/ Transcona, and Downtown/Point Douglas.

Figure 2.47: Rate of Attempted Suicide Among Adolescents Aged 13-19 by Health Region

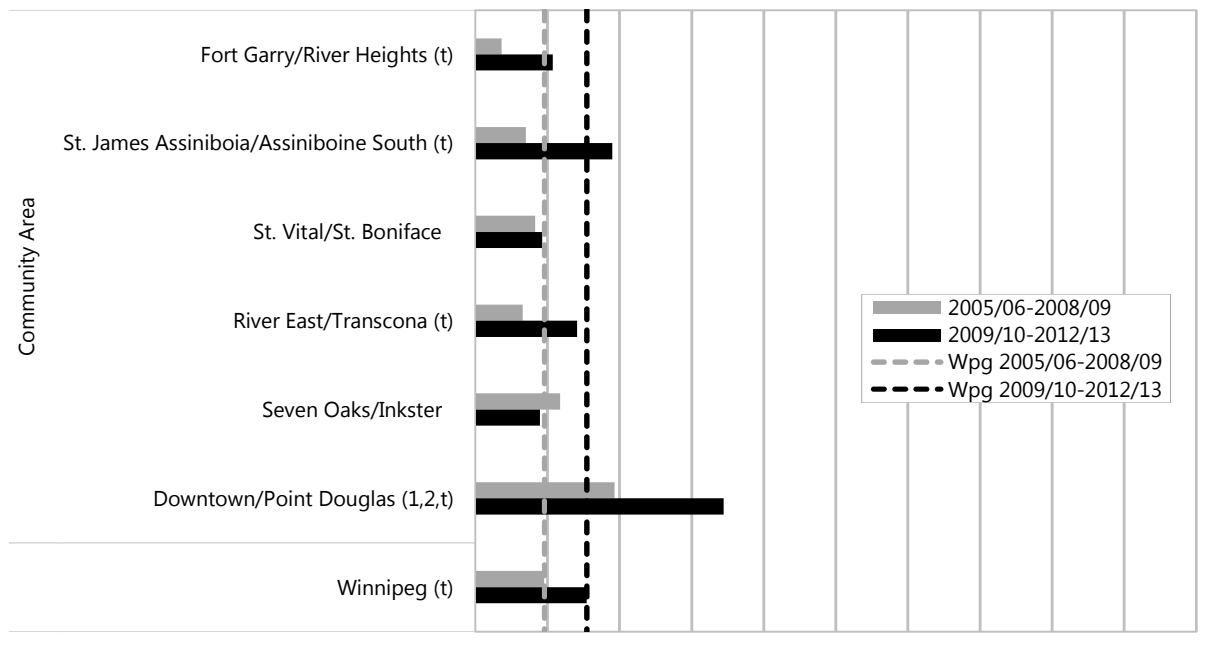
Age- and sex-adjusted, per 100,000 adolescents, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)

Figure 2.48: Rate of Attempted Suicide Among Adolescents Aged 13-19 by Winnipeg Community Area

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods



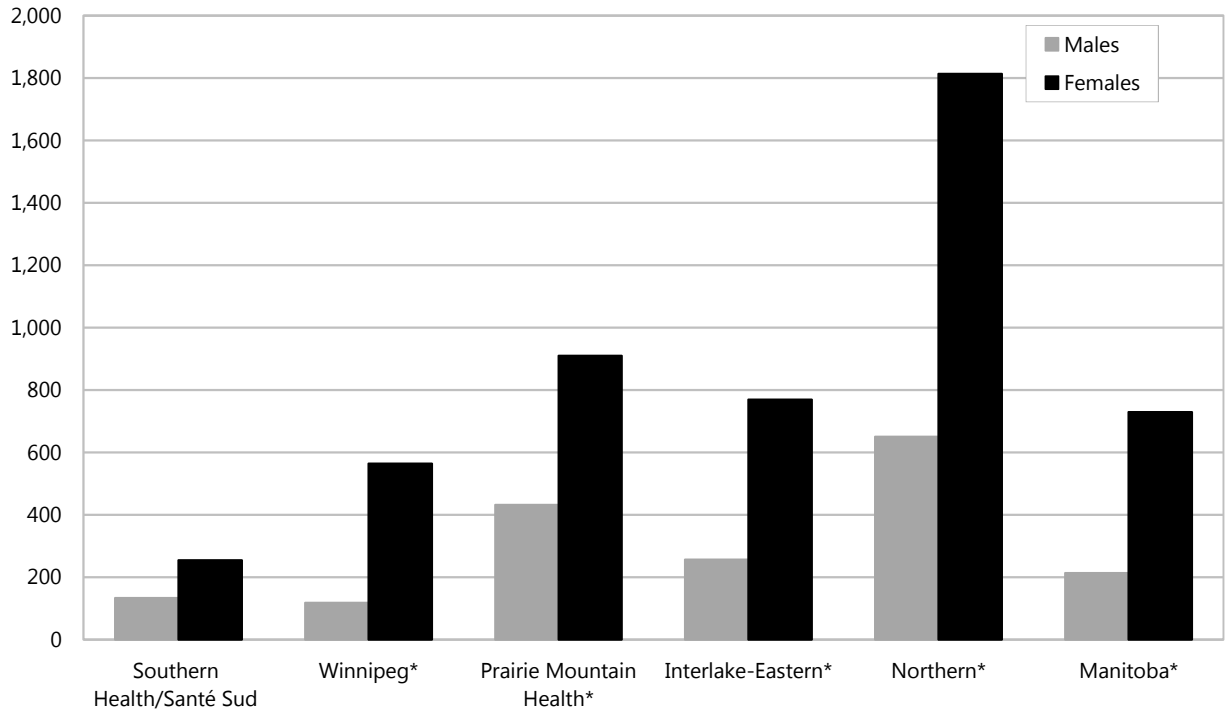
1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)

Prevalence by Sex - Attempted Suicide

Figure 2.49 shows that the four-year rates of attempted suicide were substantially higher in females than males in all health regions except Southern Health/Santé Sud in the second time period. The prevalence in Manitoba was 213 suicide attempts per 100,000 adolescents for males and 729 suicide attempts per 100,000 adolescents for females. Similar differences were found in the first time period (see Appendix Table 5.30).

Figure 2.49: Rate of Attempted Suicide Among Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, per 100,000 adolescents, four-year time period, 2009/10-2012/13



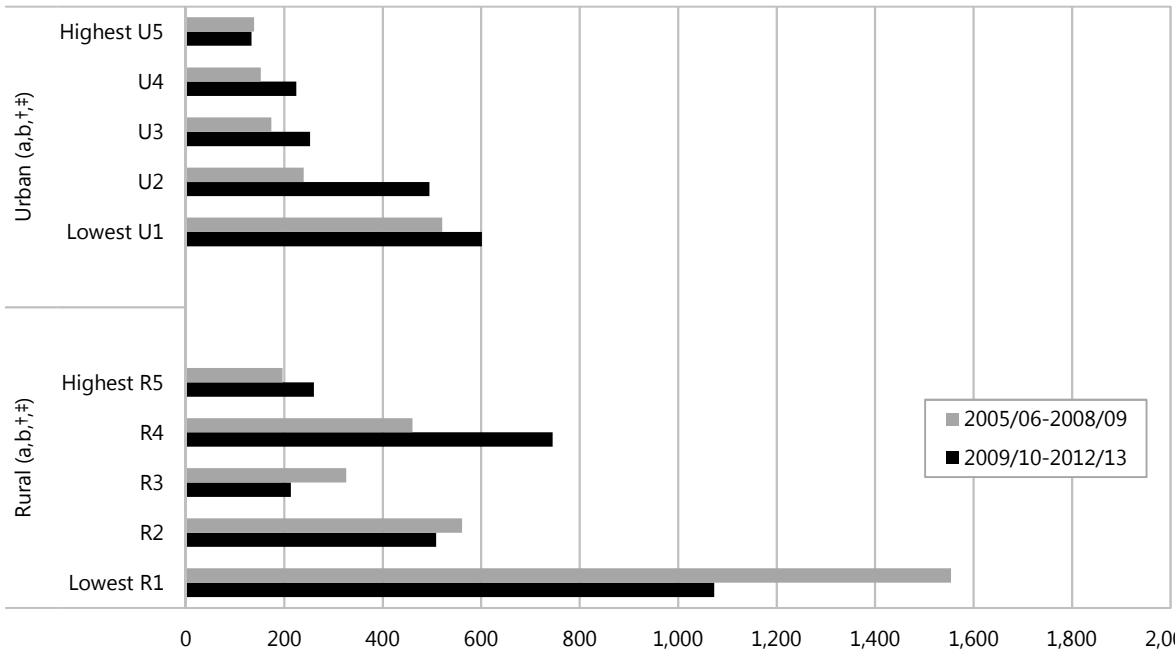
* indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Prevalence by Income Quintile - Attempted Suicide

Figure 2.50 presents the four-year rates of attempted suicide for adolescents aged 13-19 by income quintile. The rates were higher in rural areas than in urban areas in both time periods. In urban areas there was a linear trend across the income quintiles in both time periods, meaning that with each increase in income we generally find a lower rate in attempted suicide. A linear trend was also found in rural areas.

Figure 2.50: Rate of Attempted Suicide Among Adolescents Aged 13-19 by Income Quintile

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period (p<0.01)
b indicates a statistically significant difference across income quintiles for the second time period (p<0.01)
† indicates a statistically significant difference between rural and urban areas in the first time period (p<0.01)
‡ indicates a statistically significant difference between rural and urban areas in the second time period (p<0.01)

What do these results mean?

This report found the age- and sex-adjusted four-year rate of suicide and attempted suicide for adolescents aged 13-19 in the second time period to be 74 per 100,000 adolescents and 459 per 100,000 adolescents, respectively. The suicide and suicide attempt indicators provide irrefutable evidence of the level of mental distress in a population. Groholt and Ekeberg (2009) found that 79% of adolescents in their study with a suicide attempt had at least one mental disorder and 44% had repeated a suicide attempt within an eight-year period. Adolescent suicide rates in Manitoba are considerably higher than what was found nationally. Statistics Canada reported 37 deaths by suicide per 100,000 adolescents (aged 15-19) and 6 deaths by suicide per 100,000 children (aged 10-14) in a four-year period in 2009-2012 (2015). However, national statistics found higher rates of attempted suicide than found in this report. Hospitalization for attempted suicide were estimated at 152 per 100,000 adolescents (15-19 years of age; or 0.15%) in a one-year period (Langlois & Morrison, 2002).

This report found that rates are considerably higher in the Northern Health Region than in Manitoba overall and higher in lower income areas compared to higher income areas. Earlier in this report we found a lower prevalence of many mental disorders in the Northern Health Region. This low mental disorder prevalence is inconsistent with higher suicide and attempted suicide rates, given that most adolescents with suicide attempts have a diagnosed mental disorder. This inconsistency could be due to either less help-seeking behaviours or poor access to mental health services in this region. We suspect that our rates of attempted suicide are underestimated as these rates represent only adolescents who were hospitalized for a suicide attempt and does not include those who were seen in the emergency department but not hospitalized or those who never sought help for suicidal behaviours.

Comorbidity of Children with Mental Disorders

Table 2.1 shows that comorbidity is common among children with mental disorders, developmental disorders, and suicidal behaviours. For example, there is overlap between children with ADHD and those with conduct disorder. We found that 11.3% of the children diagnosed with ADHD had also been diagnosed with conduct disorder, and 46.8% of the 3,558 children diagnosed with conduct disorder has also been diagnosed with ADHD. We further note that 67.8% of children diagnosed with ADHD and only 35.2% of those with conduct disorder had not been diagnosed with another mental disorder. Of children with suicidal behaviours, only 22% had no diagnosed mental disorder. Children with schizophrenia also had high comorbidity rates. Similar findings were found in the first time period (see Appendix 6).

Table 2.1: Percentage of Children with a Mental Disorder who also had a Comorbid Disorder, Diagnosed between 2009/10-2012/13

			Mental Health Comorbidities (%)							
			ADHD*	Conduct	Substance Use	Mood and Anxiety	Schizophrenia	Suicide and Attempted Suicide	Developmental	Child had only the Specified Disorder
Mental Health Disorder	ADHD*	(n=14,714)		11.3	2.7	17.6	0.5	0.5	15.1	67.8
	Conduct	(n=3,558)	46.8		4.8	27.0	1.3	1.6	17.5	35.2
	Substance Use	(n=3,358)	11.8	5.1		44.5	4.7	5.8	5.9	47.0
	Mood and Anxiety	(n=16,911)	15.3	5.7	8.8		1.4	2.4	7.2	71.0
	Schizophrenia	(n=427)	17.6	10.8	36.8	56.7		4.7	21.3	21.3
	Suicide and Attempted Suicide	(n=590)	11.5	9.7	33.2	67.3	3.4		7.1	22.0
	Developmental	(n=6,550)	23.6	6.6	2.1	13.0	1.0	0.5		68.1

* Attention-Deficit Hyperactivity Disorder

CHAPTER 3: DIAGNOSTIC LIFETIME PREVALENCE OF DEVELOPMENTAL DISORDERS IN CHILDREN IN MANITOBA

In this chapter, we present the lifetime diagnostic prevalence of developmental disorders for children in Manitoba. Prevalence estimates are presented by health region, Winnipeg community area, age group, sex, and income quintile. The diagnostic prevalence of the following developmental disorders are presented in this chapter:

- Developmental Disorders; and
- Autism Spectrum Disorder (ASD).

An abridged definition of each developmental disorder is provided prior to the presentation of the prevalence estimates. The full definitions of developmental disorders and ASD, including the ICD-9-CM and ICD-10-CA codes used to identify them, are provided in the technical appendix (Appendix 1). *Diagnostic prevalence* is the term used as a reminder that our definitions include children who have received health and education services for their developmental disorders. It is likely many more children live with these disorders and have not received diagnosis or treatment.

The lifetime prevalence estimates are expressed as the percent of the population that has been diagnosed with the disorder in each of the time periods. Unlike in Chapter 2, here we are examining lifetime prevalence rather than four-year prevalence (see Chapter 1 for methods). **Whenever a difference between prevalence estimates is mentioned in the text, this difference is statistically significant**. Differences that are not statistically significant will not be mentioned. We report the number of children as well as the crude and adjusted prevalences for both indicators in Appendix 5.

For a small percentage of children, there was no information on where they lived. These children are likely children in care of Child and Family Services or the Public Trustee Office. We have reported the prevalence of developmental disorders and ASD in this group of children in Appendix 5.

Developmental Disorders

Developmental disorders are characterized by significant impediments in intellectual and adaptive functioning from a very early age. 'Adaptive functioning' means carrying out everyday activities, such as communicating and interacting with others, managing money, doing household activities, and attending to personal care. The definition of developmental disorders used in this report includes disorders such as mental retardation, chromosomal anomalies (including Down's, Patau's and Edward's syndromes), Fetal Alcohol Spectrum Disorders (FASD), and Autism Spectrum Disorders (ASD). A detailed list of the disorders and their ICD-9 and ICD-10 codes are found in the technical appendix.

In this study, a child (aged 0-19) is considered to have a diagnosis of developmental disorders in either time period when he/she has met at least one of the following criteria in his/her lifetime:

- At least one hospitalization with a diagnosis for conditions such as mental retardation, chromosomal anomalies (including Down's, Patau's and Edward's syndromes), and Autism Spectrum Disorders (ASD);
- At least one physician visit with a diagnosis for conditions such as mental retardation, chromosomal anomalies (including Down's, Patau's and Edward's syndromes), and Autism Spectrum Disorders (ASD);
- Received education funding for special needs; or
- Has been assessed for FASD at the Manitoba FASD Centre.

Key Findings

Below are listed the key findings for the diagnostic prevalence of developmental disorders:

- 2.5% for the first time period and 2.9% for the second time period in Manitoba overall;
- Increased from the first time period to the second time period in Manitoba overall, all health regions except Interlake-Eastern, and all Winnipeg community areas except Seven Oaks/Inkster;
- Lower in Southern Health/Santé Sud than the Manitoba prevalence in both time periods;
- Lower in Seven Oaks/Inkster than the Winnipeg prevalence in the second time period only;
- Higher in males than females in all health regions in both time periods; and
- Higher in urban areas than in rural areas.

There was a linear trend across urban income quintiles, but not in rural areas. In urban areas, this means that as income increased, there was a lower prevalence of developmental disorders.

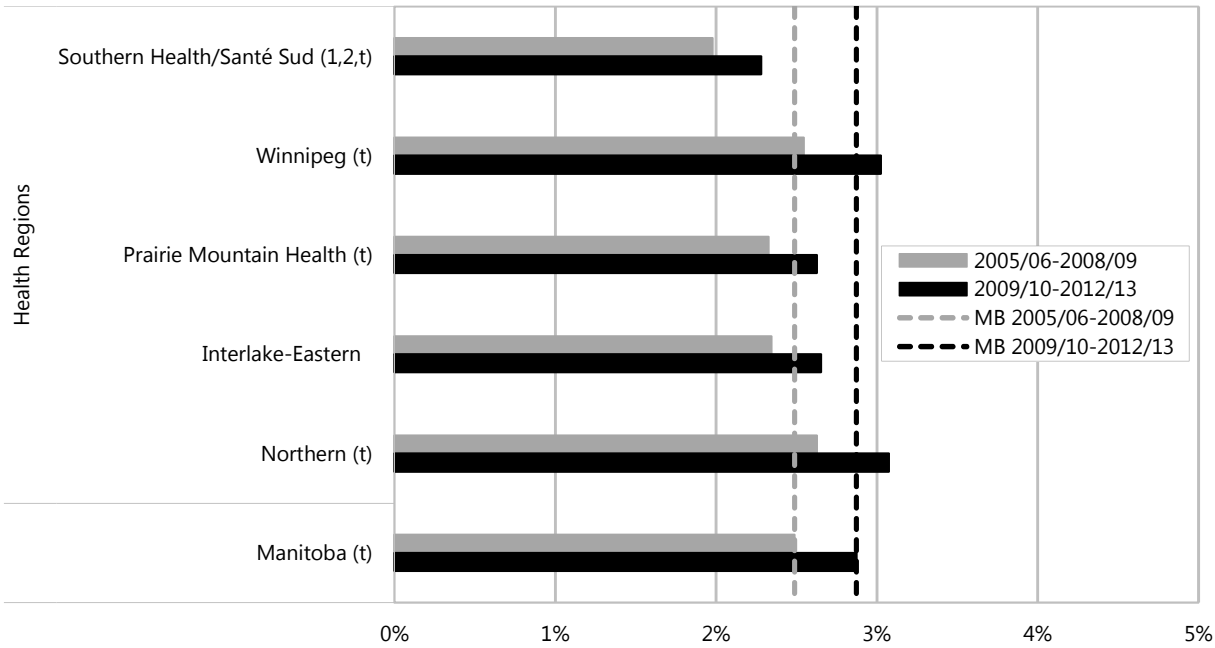
Regional Trends Over Time

Figure 3.1 presents the lifetime diagnostic prevalence of developmental disorders for children aged 0-19 by health region. The prevalence in Manitoba was 2.5% and 2.9% in the first and second time period, respectively. This prevalence increased over time in Manitoba overall and in all health regions except Interlake-Eastern. In both time periods, the developmental disorders prevalence in Southern Health/Santé Sud was lower than the Manitoba prevalence.

Figure 3.2 presents the lifetime diagnostic prevalence of developmental disorders for children aged 0-19 by Winnipeg community area. There was an increase over time in all community areas except Seven Oaks/Inkster. The diagnostic prevalence in Seven Oaks/Inkster was lower thanthe Winnipeg prevalence in the second time period.

Figure 3.1: Lifetime Prevalence of Developmental Disorders in Children Aged 0-19 by Health Region

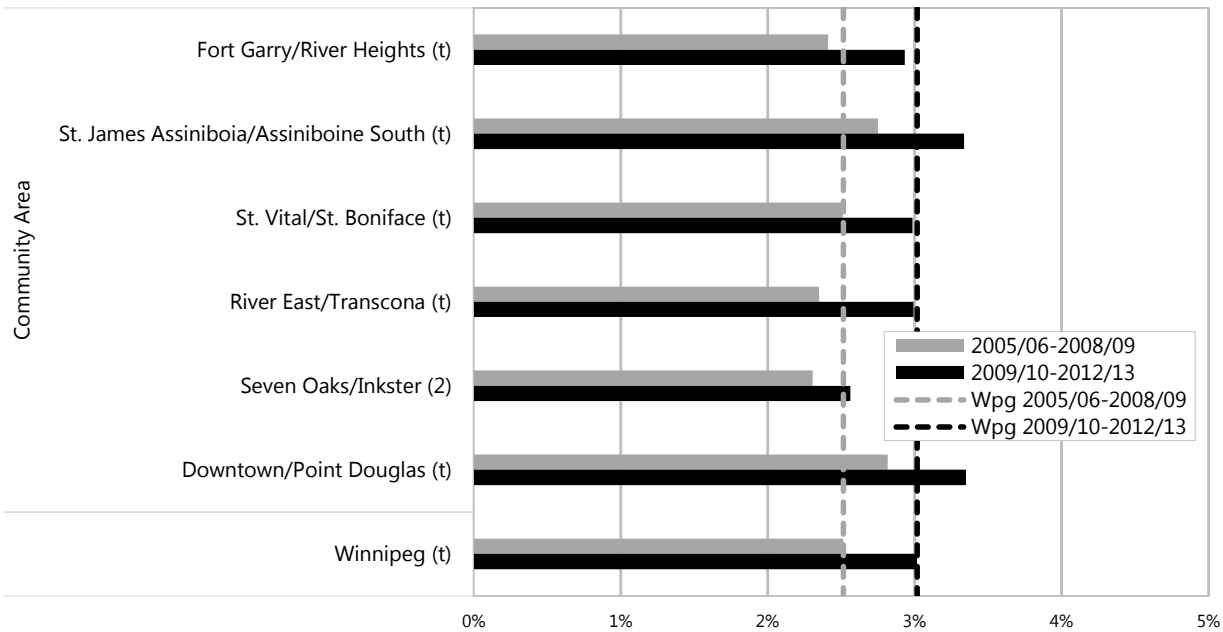
Age- and sex-adjusted, children ever diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period ($p<0.01$)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that health region ($p<0.05$)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.2: Lifetime Prevalence of Developmental Disorders in Children Aged 0-19 by Winnipeg Community Area

Age- and sex-adjusted, children ever diagnosed with disorder, four-year time periods



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period ($p<0.01$)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that community area ($p<0.05$)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Prevalence by Age and Sex

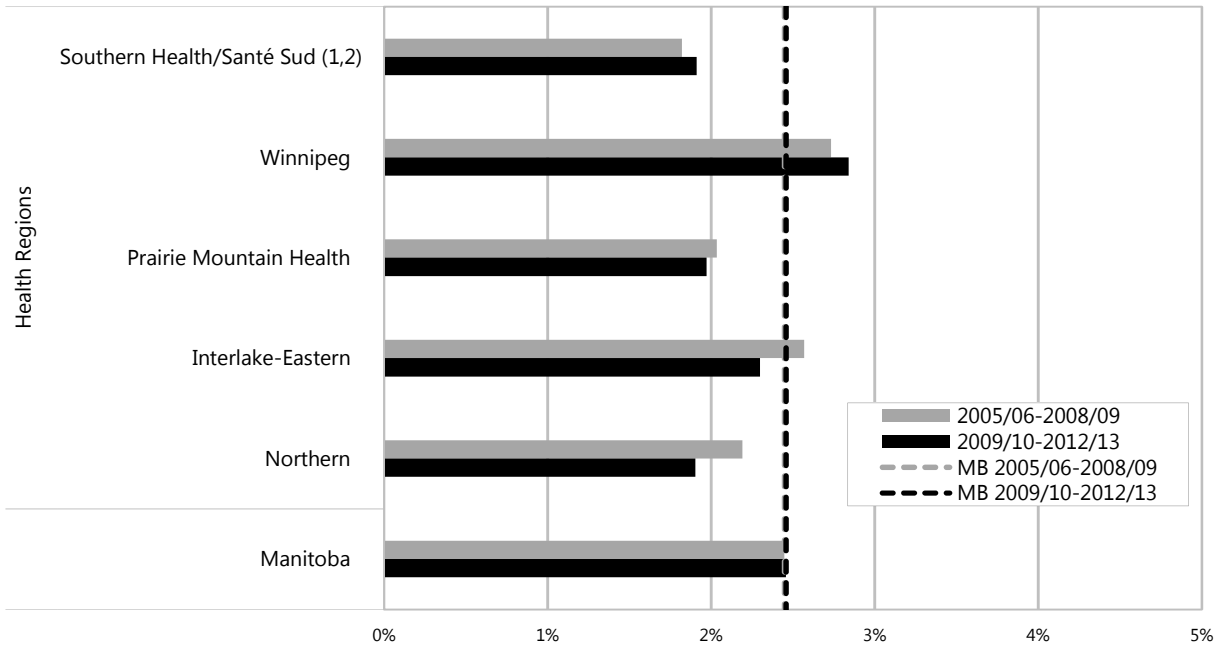
Figures 3.3, 3.4, and 3.5 present the lifetime diagnostic prevalence of developmental disorders for children aged 0-5, 6-12, and 13-19, respectively. For children aged 0-5, the prevalence in Manitoba was 2.4% and 2.5% in the first and second time period, respectively. Southern Health/Santé Sud had a lower prevalence than Manitoba in both time periods.

For children aged 6-12, the prevalence in Manitoba was 3.0% and 3.2% in the first and second time periods, respectively. Compared to the Manitoba prevalence, the prevalence was lower in Southern Health/Santé Sud in both time periods. The prevalence in Winnipeg RHA increased from the first to the second time period.

For adolescents aged 13-19, the developmental disorder prevalence in Manitoba increased over time from 2.0% to 3.0%. This prevalence increased from the first to the second time period in all health regions. In both time periods, the prevalence in Southern Health/Santé Sud was lower than the Manitoba prevalence; conversely, the prevalence in Northern was higher than in Manitoba in the second time period.

Figure 3.3: Lifetime Prevalence of Developmental Disorders in Children Aged 0-5 by Health Region

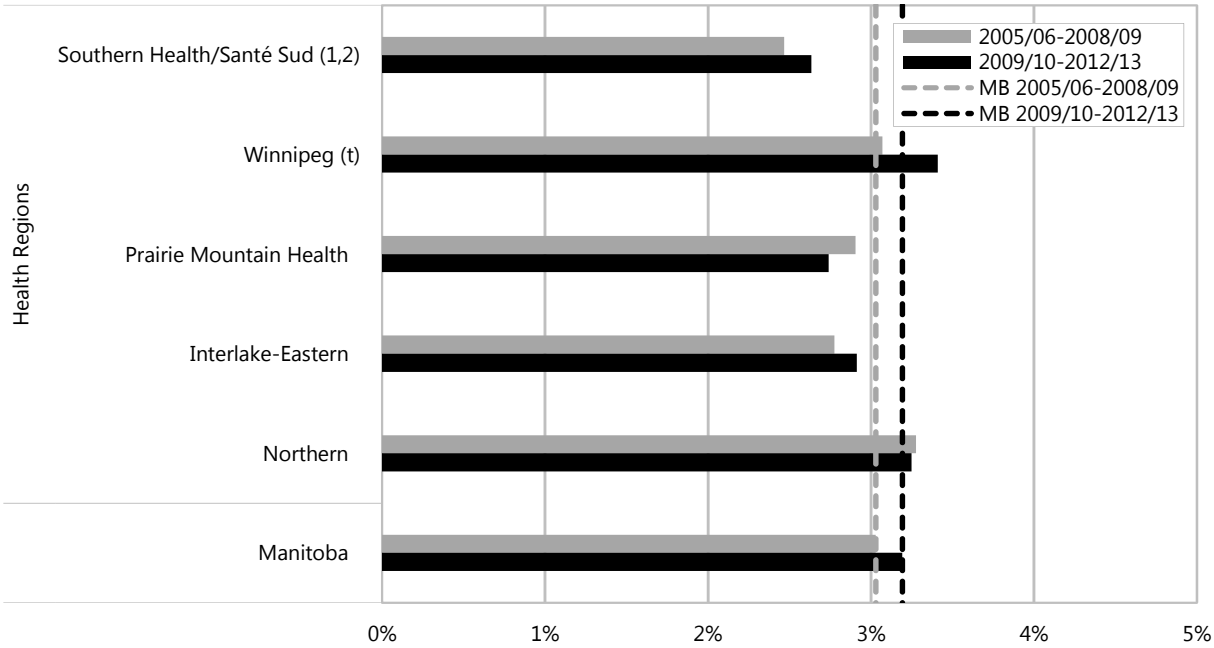
Age- and sex-adjusted, children ever diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period ($p<0.01$)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that health region ($p<0.05$)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.4: Lifetime Prevalence of Developmental Disorders in Children Aged 6-12 by Health Region

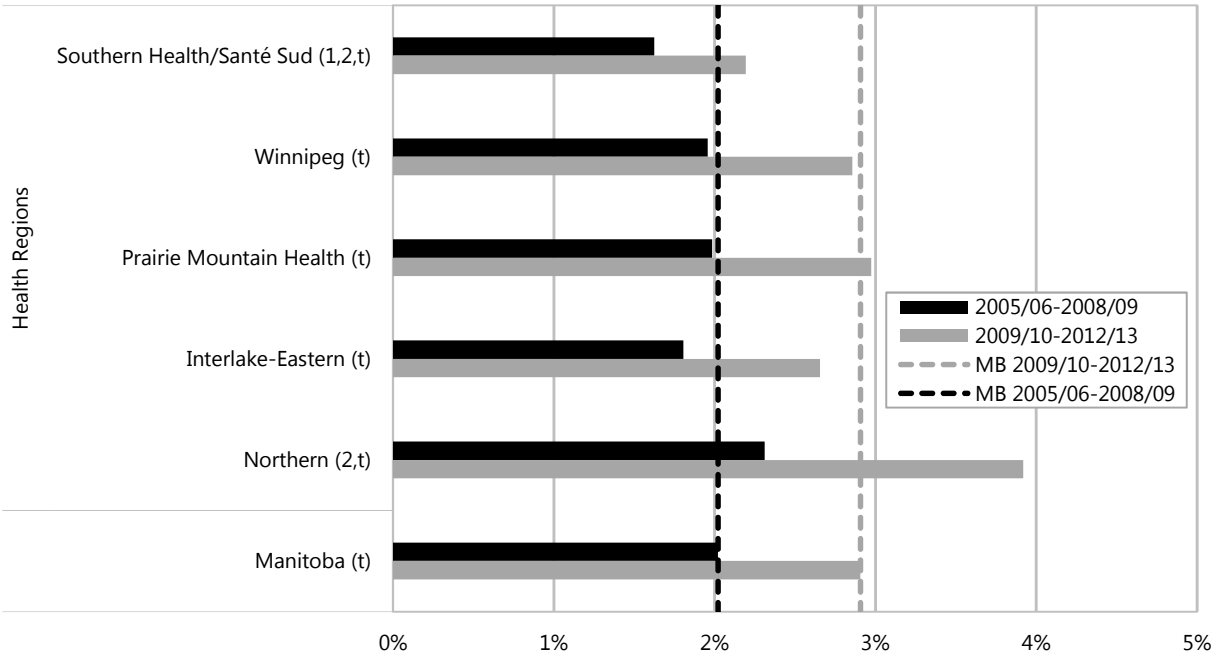
Age- and sex-adjusted, children ever diagnosed with disorder, four-year time periods



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.5: Lifetime Prevalence of Developmental Disorders in Adolescents Aged 13-19 by Health Region

Age- and sex-adjusted, adolescents ever diagnosed with disorder, four-year time periods

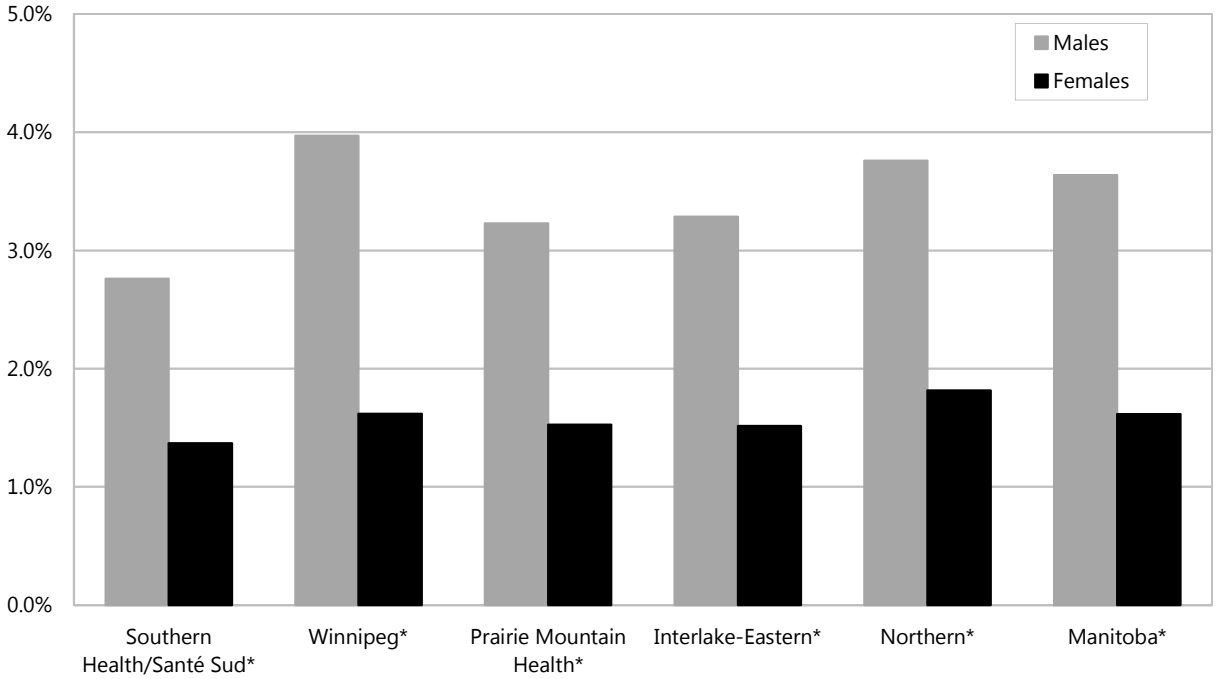


1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.6 shows that the four-year diagnostic prevalence of developmental disorders was higher in males than females in all health regions in the second time period. The prevalence in Manitoba was 3.6% for males and 1.6% for females. Similar differences were found in the first time period (see Appendix Table 5.33).

Figure 3.6: Lifetime Prevalence of Developmental Disorders in Children Aged 0-19 by Sex and Health Region

Age-adjusted, children ever diagnosed with disorder, four-year time period, 2009/10-2012/13



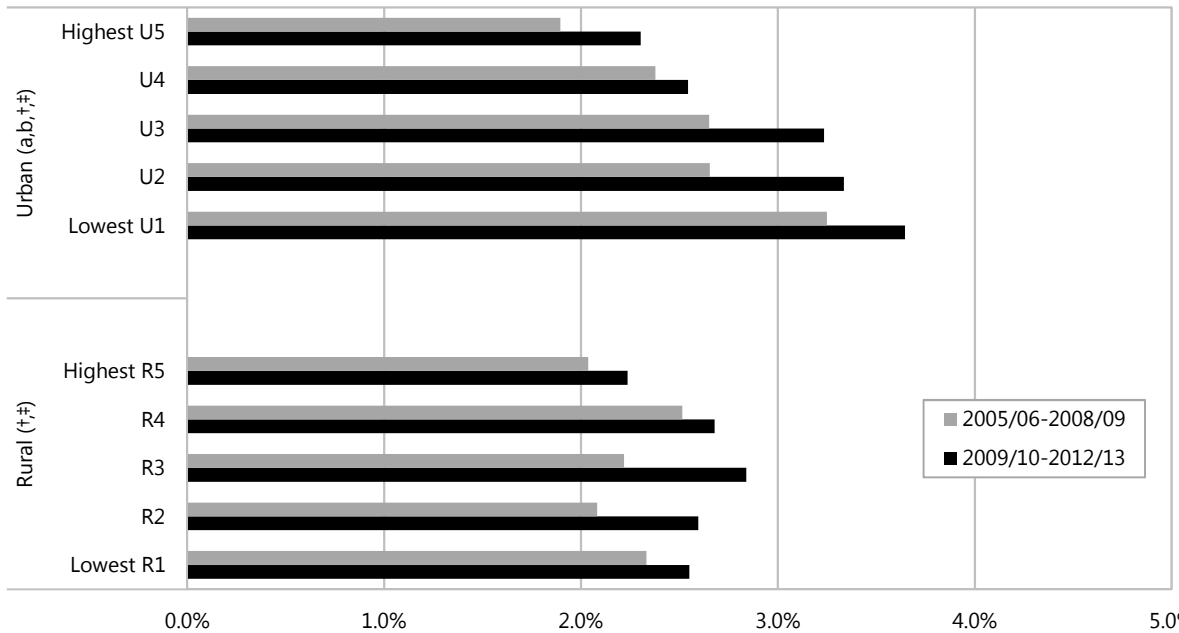
* indicates a statistically significant difference between males and females for that health region ($p<0.05$)
Note: These are children who were age 0-19 during 2009/10-2012/13

Prevalence by Income Quintile

Figure 3.7 presents the lifetime diagnostic prevalence of developmental disorders for children aged 0-19 by income quintile. Overall, we note that the prevalence was higher in urban areas than in rural areas. In both time periods there was a linear trend across the urban income quintiles, meaning that generally as income increased, we found a lower prevalence of developmental disorders.

Figure 3.7: Lifetime Prevalence of Developmental Disorders in Children Aged 0-19 by Income Quintile

Age- and sex-adjusted, children ever diagnosed with disorder, four-year time periods



a indicates a statistically significant difference across income quintiles for the first time period ($p<0.01$)
b indicates a statistically significant difference across income quintiles for the second time period ($p<0.01$)
† indicates a statistically significant difference between rural and urban areas in the first time period ($p<0.01$)
‡ indicates a statistically significant difference between rural and urban areas in the second time period ($p<0.01$)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

What do these results mean?

This report found the age- and sex-adjusted lifetime diagnostic prevalence of developmental disorders for children aged 0-19 to be 2.9% in Manitoba in the second time period. The prevalence found in this study is different from what was found in other studies. A meta-analysis including over 50 low, middle, and high income countries found a prevalence of intellectual disability of 1.37%, and 0.92% in high income countries, in particular (Maulik, Mascarenhas, Mathers, Dua, & Saxena, 2011). This meta-analysis defined intellectual disability as "incomplete development of the mind, which is especially characterized by impairment of skills manifested during the developmental period, which contribute to the overall level of intelligence." The National Health Interview Survey was conducted in the United States over the period 1997-2008 for children aged 3-17. The study was based on parents' self-report and found that 0.47% had Autism Spectrum Disorder, 0.71% had intellectual disabilities, and 3.65% had other developmental delays (Boyle et al., 2011). This last category, called developmental delays by Boyle et al. (2011), is closer to the prevalence found in the present report. Prevalence will vary depending on the disorders included in the definition. For example, Fetal Alcohol Spectrum Disorder was included in our definition of developmental disorders but it is not clear whether FASD was included in previous studies.

The prevalence found in this report was similar across the age groups because many of these disorders are present at birth and are lifelong conditions. Children from low income areas are more likely to be diagnosed with a developmental disorder compared to children from more affluent areas. In addition, we observed that developmental disorders are more common in boys than girls. These findings about income gradients and sex differences are consistent with findings from a recent study by Boyle et al. (2011) that found higher prevalence rates among children living below the poverty line and higher rates for boys than for girls. Also consistent with our findings, Boyle et al. (2011) observed a slight increase in prevalence over time.

Autism Spectrum Disorder

Autism spectrum disorder (ASD) is a developmental disorder that includes difficulties with social communication and interaction, as well as restricted and repetitive patterns of behaviour, interests, or activities (American Psychiatric Association, 2013). Note that ASD was included as one of the conditions in Developmental Disorders and will be examined separately here.

In this study, a child (aged 0-19) is considered to have a diagnosis of ASD in either time period when he/she has met at least one of the following criteria in his/her lifetime:

- At least one hospitalization with a diagnosis of ASD; or
- At least one physician visit with a diagnosis of ASD or
- Received education funding for special needs.

Key Findings

Below are listed the key findings for lifetime diagnostic ASD prevalence:

- 1.0% for the first time period and 1.4% for the second time period in Manitoba overall;
- Increased from the first time period to the second time period in Manitoba overall, all health regions, and all Winnipeg community areas;
- Lower in all health regions than the Manitoba prevalence in both time periods except Interlake-Eastern, where it was lower in the second time period only, and in Winnipeg RHA, where it was higher in both time periods;
- Lower in Seven Oaks/Inkster and higher in St. James Assiniboia/Assiniboine South than the Winnipeg prevalence in both time periods;
- Higher for males than females all health regions in both time periods; and
- Higher in urban areas than in rural areas in both time periods.

There was a linear trend across both rural and urban income quintiles. In urban areas for the second timer period only, this means that as income increased, there was a lower prevalence of ASD. Conversely, in rural areas in both time periods, we found that as income increased, so did ASD prevalence.

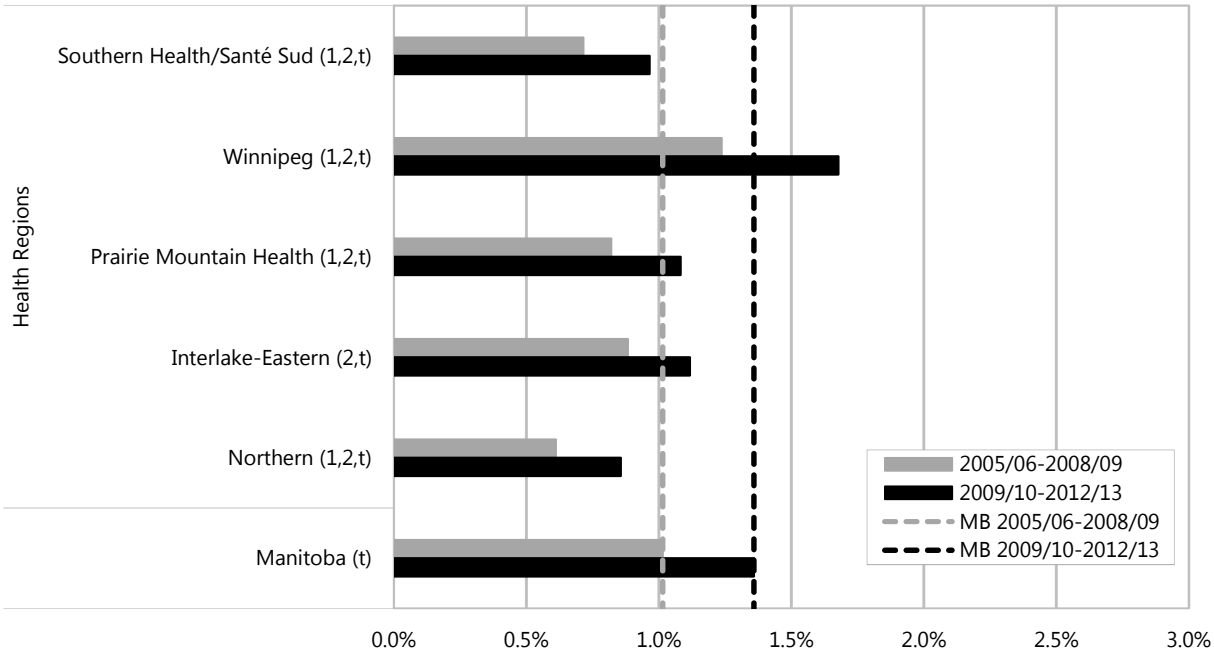
Regional Trends Over Time

Figure 3.8 presents the lifetime diagnostic prevalence of ASD for children aged 0-19 by health region. The prevalence in Manitoba increased over time from 1.0% to 1.4%. In both time periods, the prevalence in Winnipeg RHA was higher than in Manitoba. Conversely, all other health regions had a lower prevalence than Manitoba in both time periods, with the exception of Interlake-Eastern in the first time period. The prevalence of ASD increased over time in all health regions.

Figure 3.9 presents the lifetime diagnostic prevalence of ASD for children aged 0-19 by Winnipeg community area. It shows an increase in prevalence over time in all community areas. In both time periods, the prevalence was higher in St. James/Assiniboine South than in Winnipeg. Conversely, it was lower in Seven Oaks/Inkster than in Winnipeg in both time periods.

Figure 3.8: Lifetime Prevalence of Autism Spectrum Disorder in Children Aged 0-19 by Health Region

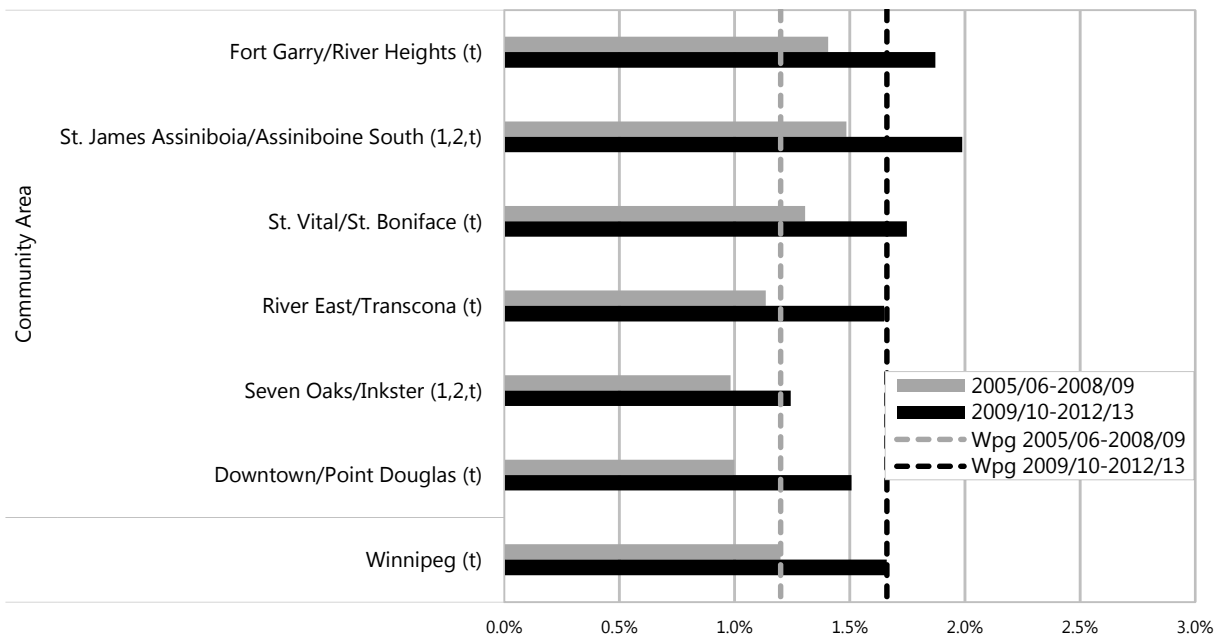
Age- and sex-adjusted, children ever diagnosed with disorder



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.9: Lifetime Prevalence of Autism Spectrum Disorder in Children Aged 0-19 by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder



1 indicates community area's prevalence was statistically different from Winnipeg's in the first time period (p<0.01)
2 indicates community area's prevalence was statistically different from Winnipeg's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that community area (p<0.05)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Prevalence by Age and Sex

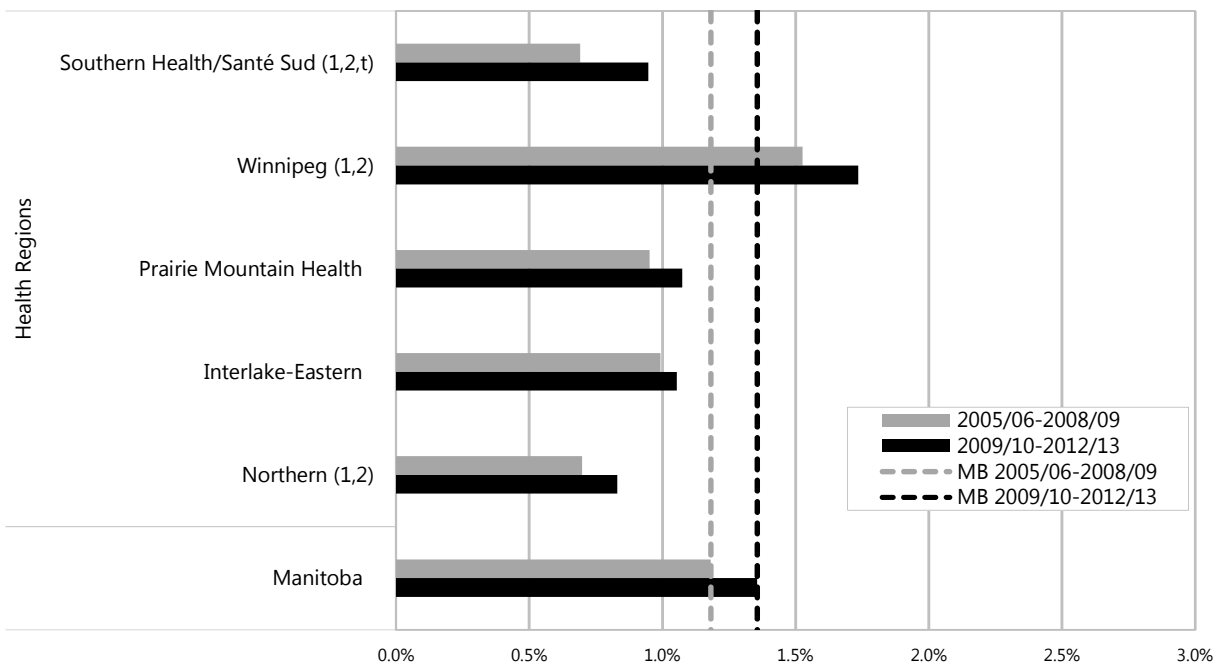
Figure 3.10, 3.11, and 3.12 presents the lifetime diagnostic prevalence of ASD for children aged 05, 6-12, and 13-19, respectively. For children aged 0-5, the prevalence in Manitoba was 1.2% and 1.4% in the first and second time period, respectively. In both time periods, the prevalence in Winnipeg RHA was higher than the Manitoba prevalence. On the other hand, Southern Health/Santé Sud and Northern had a lower prevalence than the Manitoba prevalence in both time periods. The prevalence increased from the first to second time period in Southern Health/Santé Sud.

For children aged 6-12, the prevalence of ASD in Manitoba was 1.2% and 1.5% in the first and second time period, respectively. The '6-12' age group exhibited a similar regional pattern to the '0-5' age group. In both time periods, the prevalence in Winnipeg RHA was higher than in Manitoba. Southern Health/Santé Sud and Northern had a lower prevalence than in Manitoba in both time periods. The prevalence in Prairie Mountain Health was lower than in Manitoba in the second time period. Increases in prevalence over time were observed in Winnipeg RHA, Interlake-Eastern, and Manitoba overall.

For adolescents aged 13-19, the prevalence of ASD in Manitoba was 0.7% and 1.2% in the first and second time period, respectively. Considerable increases over time were found in all health regions. In both time periods, the prevalence in Southern Health/Santé Sud was lower than the Manitoba prevalence. In the second time period, the prevalence was lower in Northern than in Manitoba. Conversely, the prevalence of ASD was higher in Winnipeg RHA than in Manitoba in both time periods.

Figure 3.10: Lifetime Prevalence of Autism Spectrum Disorder in Children Aged 0-5 by Health Region

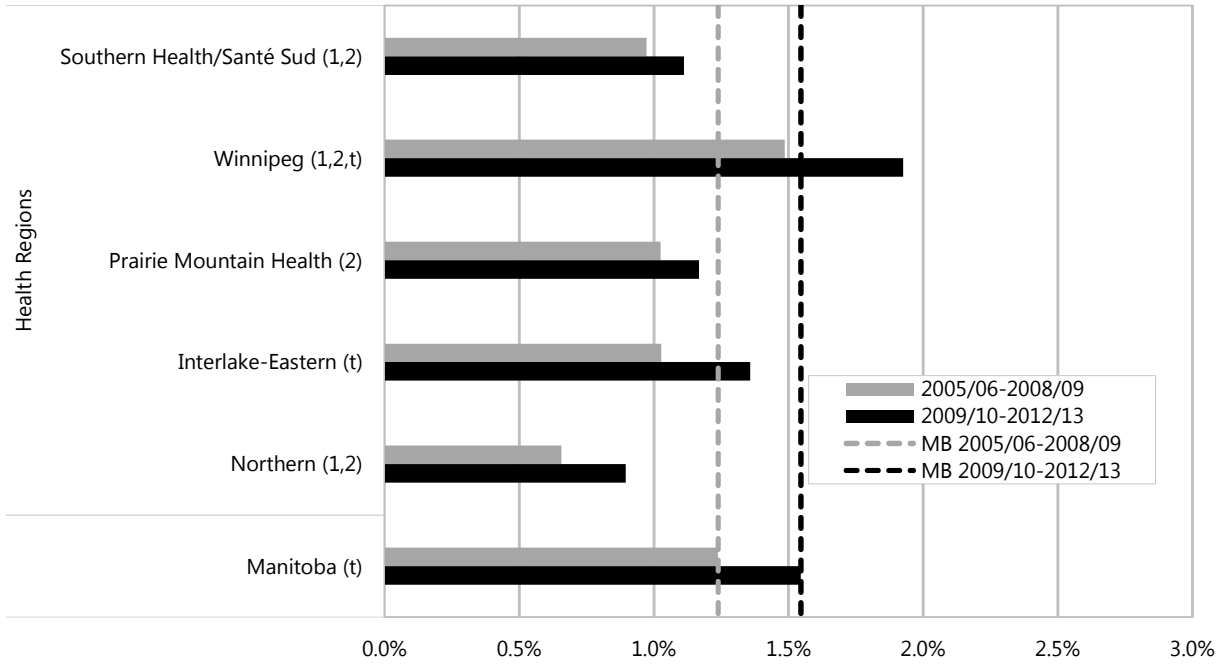
Age- and sex-adjusted, children diagnosed with disorder



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period ($p<0.01$)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period ($p<0.01$)
t indicates a statistically significant difference in the change over time for that health region ($p<0.05$)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.11: Lifetime Prevalence of Autism Spectrum Disorder in Children Aged 6-12 by Health Region

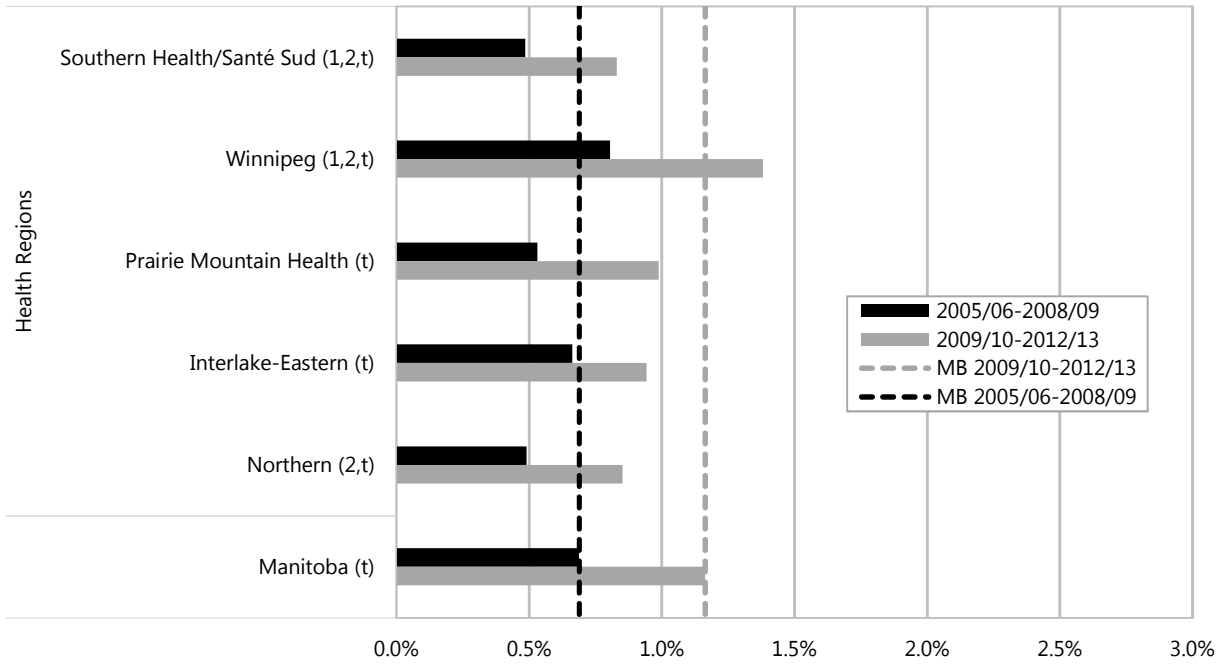
Age- and sex-adjusted, children diagnosed with disorder



1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.12: Lifetime Prevalence of Autism Spectrum Disorder in Adolescents Aged 13-19 by Health Region

Age- and sex-adjusted, adolescents diagnosed with disorder

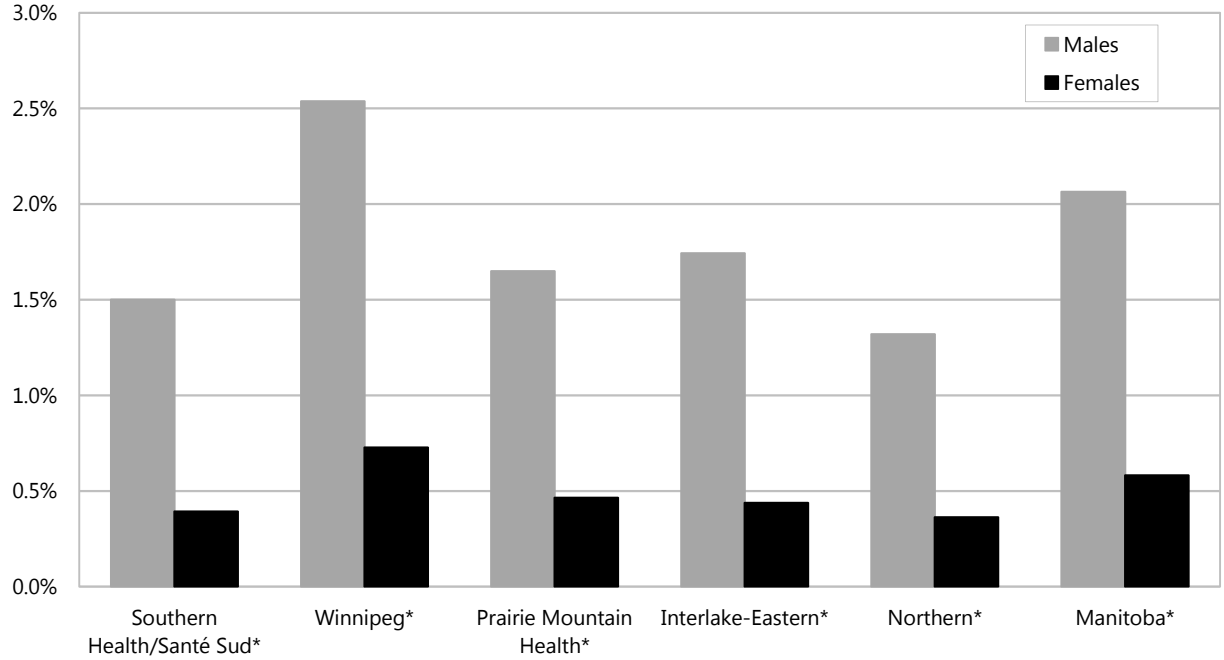


1 indicates health region's prevalence was statistically different from Manitoba's in the first time period (p<0.01)
2 indicates health region's prevalence was statistically different from Manitoba's in the second time period (p<0.01)
t indicates a statistically significant difference in the change over time for that health region (p<0.05)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

Figure 3.13 shows that the lifetime diagnostic prevalence of ASD was considerably higher in males than females in all health regions in the second time period. The prevalence in Manitoba was 2.1% for males and 0.6% for females. Similar differences are found in the first time period (see Appendix Table 5.36).

Figure 3.13: Lifetime Prevalence of Autism Spectrum Disorder in Children Aged 0-19 by Sex and Health Region

Age-adjusted, children ever diagnosed with disorder, 2009/10-2012/13



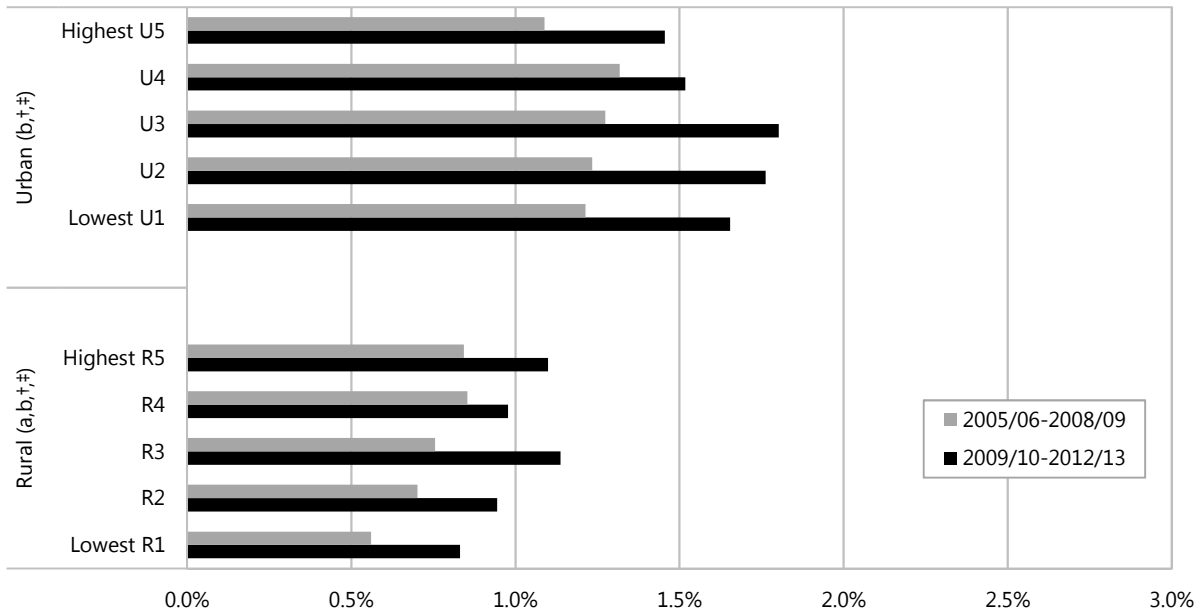
* indicates a statistically significant difference between males and females for that health region ($p<0.05$)
Note: These are children who were age 0-19 during 2009/10-2012/13

Prevalence by Income Quintile

Figure 3.14 presents the lifetime diagnostic prevalence of ASD for children aged 0-19 by income quintile. Overall, for both time periods we note that the prevalence was higher in urban areas than in rural areas. For urban and rural prevalence, there was a linear trend across the income quintiles. It is interesting that the trend across the income quintiles is opposite for urban and rural areas: in urban areas, in the second time period only, the prevalence increases as income decreases whereas in rural areas in both time periods, the prevalence increases as income increases.

Figure 3.14: Lifetime Prevalence of Autism Spectrum Disorder in Children Aged 0-19 by Income Quintile

Age- and sex-adjusted, children ever diagnosed with disorder



a indicates a statistically significant difference across income quintiles for the first time period ($p<0.01$)
b indicates a statistically significant difference across income quintiles for the second time period ($p<0.01$)
† indicates a statistically significant difference between rural and urban areas in the first time period ($p<0.01$)
‡ indicates a statistically isgnificant difference between rural and urban areas in the second time period ($p<0.01$)
Note: These are children who were age 0-19 during time periods 2005/06-2008/09 and 2009/10-2012/13

What do these results mean?

This report found the age- and sex-adjusted lifetime diagnostic prevalence of ASD for children aged 0-19 to be 1.4% in Manitoba in the second time period. We found that this prevalence was in agreement with some studies, but not others. These differences depend partly on the time frame and the age of the children studied. Boyle et al. (2011) reported a prevalence of 0.47% based on US data from 1997-2008. A more recent study based on 2010 data found that the ASD prevalence was 1.47% among 8-year-olds living in the US (Centers for Disease Control and Prevention, 2014). Our report observed an increase in ASD prevalence over time. This increase may be due to changes in ASD diagnostic criteria as our understanding of the disorder has improved. It may also be due to our improved ability to recognize and treat the condition (Blumberg et al., 2013; Centers for Disease Control and Prevention, 2014).

This report found that ASD was much more common in males than in females, a finding that is consistent with US studies (Boyle et al., 2011; Centers for Disease Control and Prevention, 2014). We were surprised to find an income gradient in the rural areas where children in low income areas had lower prevalence than children in high income areas. This finding is similar to what was found in a US study of 3,680 children where ASD was more prevalent among children with a higher socioeconomic status (SES). Barriers in health services among low SES families are believed to be responsible for this inverse income gradient (Durkin et al., 2010). A recent European study measured ASD across a variety of deprivation measures, namely employment, occupation, education, immigration and family structure. The study found that prevalence of ASD with intellectual disability was higher in areas of higher deprivation but that the prevalence of ASD without intellectual disability was similar across all measures of deprivation except living in an area with high immigration (Delobel-Ayoub et al., 2015). Consistent with these prevalence differences across SES areas, we observed that urban areas have higher prevalence than rural areas, presumably because of the availability to health services in urban areas.

CHAPTER 4: CHILDREN'S HEALTH CARE USE, SOCIAL SERVICES USE, AND INVOLVEMENT WITH THE JUSTICE SYSTEM BY MENTAL HEALTH INDICATORS

In this chapter, we examine Manitoban children's use of services by mental health indicator. These services include healthcare use, social services use, and involvement with the justice system. Rates and percentages of service use are presented by the following five indicators: externalizing disorders, mood and anxiety disorders, psychotic disorders, suicide and attempted suicide, and developmental disorders. The mental health indicators examined in this chapter are defined in detail in previous chapters. Schizophrenia, which is included in the definition of psychotic disorders, was analyzed separately and these results are found in Appendix 7. Suicide is combined with attempted suicide to ensure that the numbers of children are large enough for analyses. We will sometimes refer to suicide and attempted suicide as *suicidal behaviours*.

The service use of children diagnosed with mental and developmental disorders, as well as suicidal behaviours was compared to the service use of children with no diagnosed disorders. In this chapter, the term "disorders" refers to diagnosed mental disorders, developmental disorders, and suicide or attempted suicide examined in thise report: the term "no disorders" refers to the absence of these diagnosed disorders and suicidal behaviours. These results are presented for two fiscal years (2008/09 and 2012/13) to determine if there were changes over time. The information is presented in two ways: 1) a graph for the most current fiscal year, and 2) a table for both fiscal years. The graphs visually illustrate the differences in service use between children with disorders and children with no disorders. The tables present the precise rates, percentages, or average numbers, and show differences over time.

Because the age of onset is different across the mental health indicators, three different age ranges were established to examine the service use indicators: age 6-19 (externalizing disorder and mood and anxiety disorders), age 13-19 (psychotic disorders and suicidal behaviours), and age 0-19 (developmental disorders). Each indicator is compared to the corresponding age group of children or adolescents with no diagnosed disorders. The age groupings are explained in greater detail in Chapter 1.

A definition of each of the following service use indicators is provided prior to the presentation of the rates:

- Physician visits;
- Psychiatrist visits;
- Inpatient hospitalizations (including injury hospitalizations);
- Injury hospitalizations;
- Services from Manitoba Adolescent Treatment Centre (MATC);
- Child and Family Services contact;
- Child in care;
- Living in a family on income assistance;
- Young adult on income assistance
- Child in social housing;
- Justice system involvement: accused; and
- Justice system involvement: victim.

We conducted another analysis to compare the rates of health services use four years before an attempted suicide to rates four years after the attempted suicide. The health services examined were physician visits, psychiatrist visits, MATC visits, and hospitalizations.

Only statistically significant results are described in the text. Differences between children with and without diagnosed disorders are tested at a 0.01 level of significance and differences between the two fiscal years are tested at the 0.05 level of significance (see Chapter 1 for details).

Physician Visits

Physician visits include contact with a licensed physician in an outpatient setting in Manitoba. A physician can be a general practitioner, family physician, or a specialist physician. Outpatient settings generally include office visits, walk-in clinics, home visits, and visits to outpatient departments in hospitals. For the purposes of this report, inpatient visits (admitted to an acute care hospital) are not considered physician visits; also, outpatient surgeries and diagnostic tests and procedures are not considered physician visits.

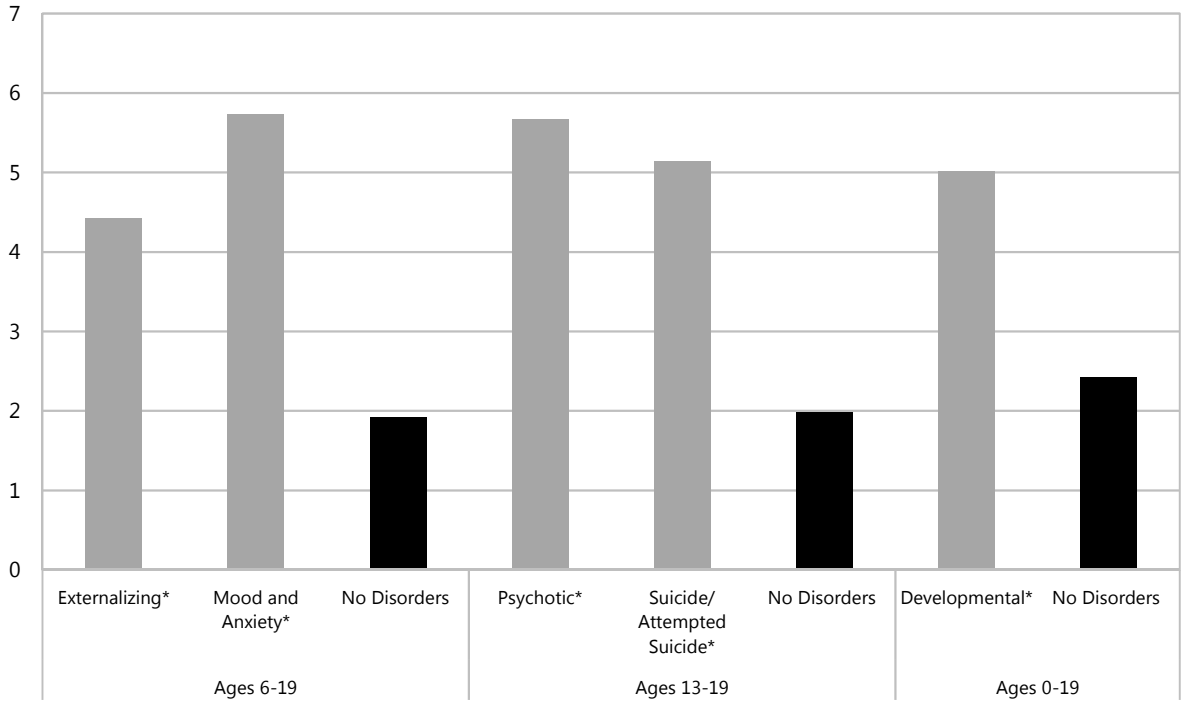
Figure 4.1 and Table 4.1 present the age- and sex-adjusted average number of physician visits per child by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- Children diagnosed with mental disorders, developmental disorders, and suicide or attempted suicide had more physician visits on average than children with no disorders in both fiscal years. For example, in 2012/13 children with a mood or anxiety disorder visited a physician 5.7 times on average compared to 1.9 times on average for those with no disorders.
- An increase over time was observed in the average number of physician visits among children who attempted or died by suicide.

Figure 4.1: Average Number of Physician Visits per Child by Disorder

Age- and sex-adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.1: Average Number of Physician Visits per Child by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	4.4	4.4
Mood and Anxiety (1,2)	5.9	5.7
No Disorders	2.0	1.9
Ages 13-19		
Psychotic (1,2)	5.7	5.7
Suicide/Attempted Suicide (1,2,t)	4.0	5.1
No Disorders	2.1	2.0
Ages 0-19		
Developmental (1,2)	5.2	5.0
No Disorders	2.5	2.4

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Psychiatrist Visits

Psychiatrists are physicians specializing in the treatment of psychiatric disorders. Psychologists also have advanced training in psychiatric disorders, but are not physicians and are not included in the medical claims data or in our definition of psychiatrist. Psychiatrist visits include all contacts with a licensed psychiatrist in an outpatient setting in Manitoba.

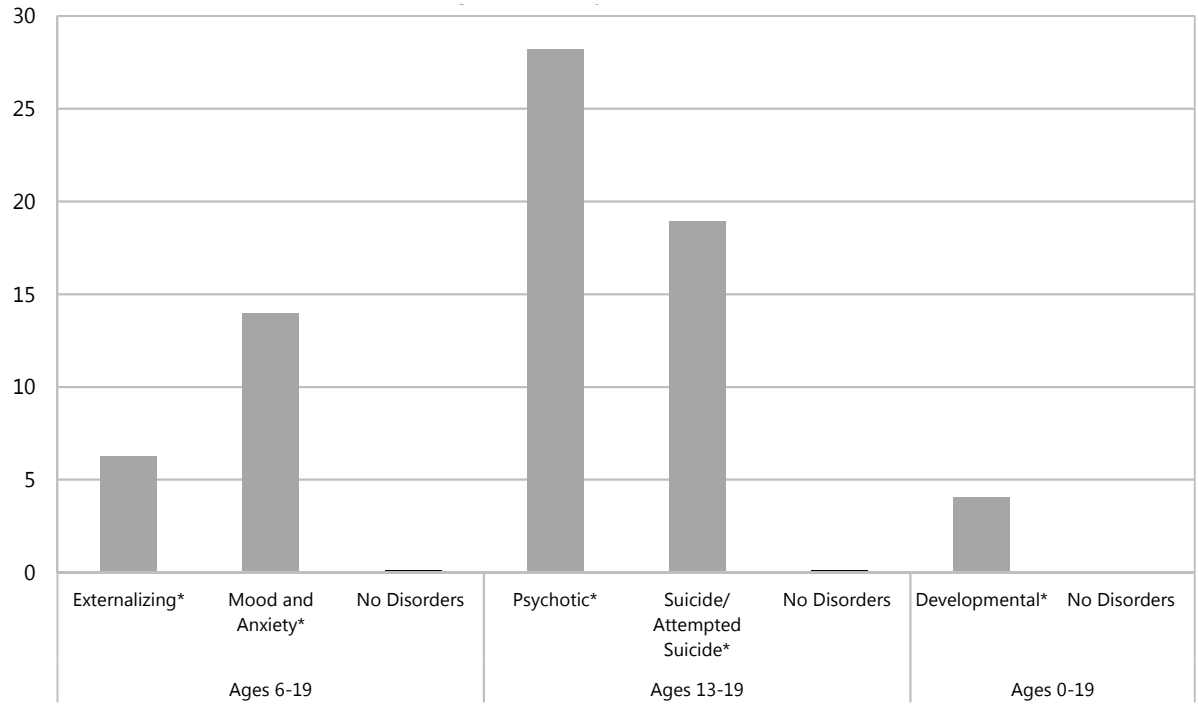
Figure 4.2 and Table 4.2 present the age- and sex-adjusted average number of psychiatrist visits per child by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- Children with diagnosed mental disorders, developmental disorders, and suicide and attempted suicide had considerably more psychiatrist visits on average than children with no disorders in both fiscal years. For example, in 2012/13 children with a psychotic disorder visited a psychiatrist 28.2 times on average compared to 0.1 times on average for children with no disorders.
- A decrease was observed over time in the average number of psychiatrist visits among children diagnosed with a developmental disorder, as well as among children with no disorders in the age groups 6-19 years and 0-19 years.

Figure 4.2: Average Number of Psychiatrist Visits per Child by Disorder

Age- and sex-adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group (p>0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.2: Average Number of Psychiatrist Visits per Child by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	7.4	6.2
Mood and Anxiety (1,2)	16.6	14.0
No Disorders (t)	0.2	0.1
Ages 13-19		
Psychotic (1,2)	31.9	28.2
Suicide/Attempted Suicide (1,2)	15.1	18.9
No Disorders	0.2	0.1
Ages 0-19		
Developmental (1,2,t)	5.8	4.1
No Disorders (t)	0.1	0.1

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Inpatient Hospitalizations

This indicator represents the number of hospital episodes per 1,000 children per year. A 'hospital episode' is a single, continuous stay in the hospital system, irrespective of transfers between hospitals. For simplicity, we will refer to 'hospital episodes' as *hospitalizations*. A hospitalization can be for any reason requiring a hospital stay including for mental health and non-mental health reasons, such as injuries (including self-inflicted), mental health, or surgical procedures.[1] For the suicide/attempted suicide indicator, all adolescents who have attempted suicide will have at least one hospitalization.

Figure 4.3 and Table 4.3 present the age- and sex-adjusted rate of inpatient hospitalizations per 1,000 children by mental health indicator in the fiscal years 2008/09 and 2012/13.

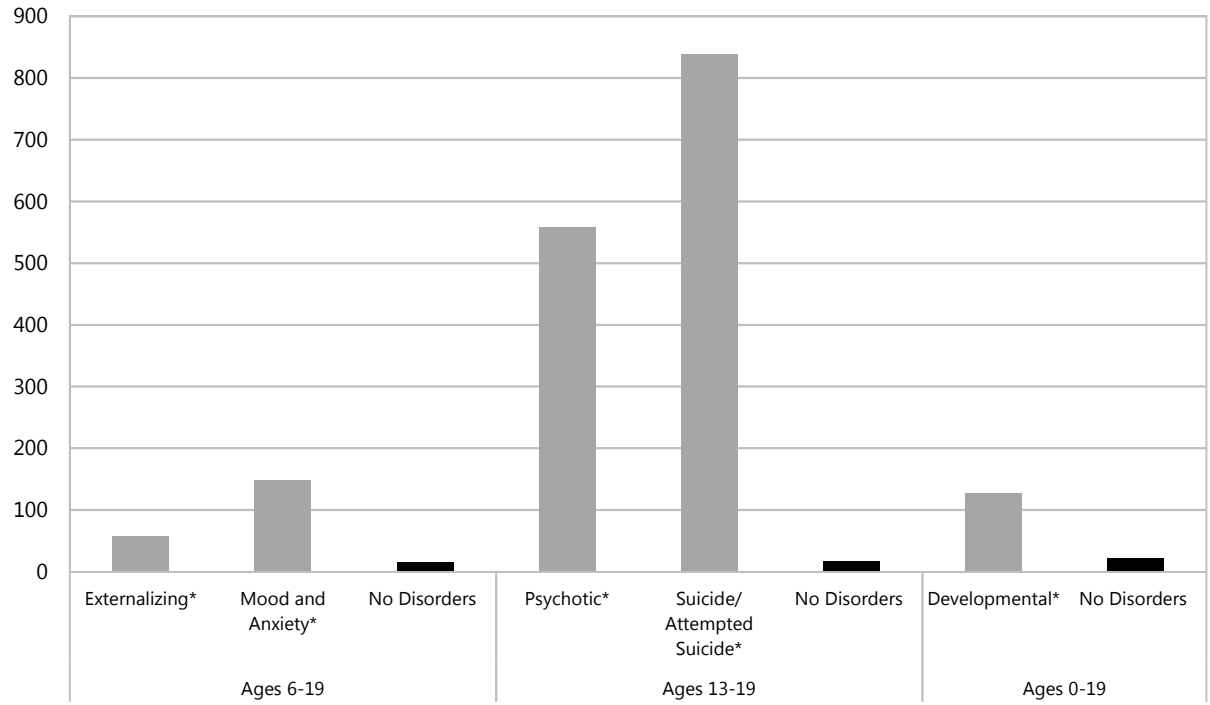
Key Findings

- Children diagnosed with mental disorders, developmental disorders, and suicide and attempted suicide had considerably more hospitalizations than children with no disorders, in both fiscal years. For examples, in 2012/13 children with mood or anxiety disorders had a rate of 147.9 hospitalizations per 1,000 children compared to 14.8 hospitalizations per 1,000 children for those with no disorders.
- A decrease over time was observed in the rate of hospitalizations for children with a developmental disorder.

1 Each child who attempted suicide will have at least one hospitalization because we defined attempted suicide solely with the hospitalization data. It is likely that we are capturing only the most serious suicide attempts given that they required hospitalization. The hospitalization rate would be lower among children who attempted suicide if we were able to include suicide attempts that did not result in a hospitalization in our analysis.

Figure 4.3: Inpatient Hospitalization Rate by Disorder

Age- and sex-adjusted, per 1,000 children, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.3: Inpatient Hospitalization Rate by Disorder

Age- and sex-adjusted, per 1,000 children

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	60.8	57.1
Mood and Anxiety (1,2)	160.4	147.9
No Disorders	16.5	14.8
Ages 13-19		
Psychotic (1,2)	515.0	558.8
Suicide/Attempted Suicide (1,2)	749.9	838.6
No Disorders	18.9	16.9
Ages 0-19		
Developmental (1,2,t)	175.8	127.5
No Disorders	24.6	22.1

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Injury Hospitalizations

This indicator represents the number of hospital episodes for which an injury code was included as one of the diagnoses. A 'hospital episode' is a single, continuous stay in the hospital system, irrespective of transfers between hospitals. For simplicity, we will refer to 'injury hospital episodes' as *injury hospitalizations*. In any given period, a child could be hospitalized for an injury more than once; this indicator measures the total number of injury hospitalizations from acute care facilities. This definition comprises injuries from all causes, including self-inflicted injuries.[2] For the suicide/attempted suicide and psychotic disorders indicators, we excluded self-inflicted injuries. Almost all adolescents who are included in the "attempted suicide" group will have at least one self-inflicted injury hospitalization.

Figure 4.4 and Table 4.4 present the age- and sex-adjusted rate of injury hospitalizations per 1,000 children by mental health indicator in the fiscal years 2008/09 and 2012/13.

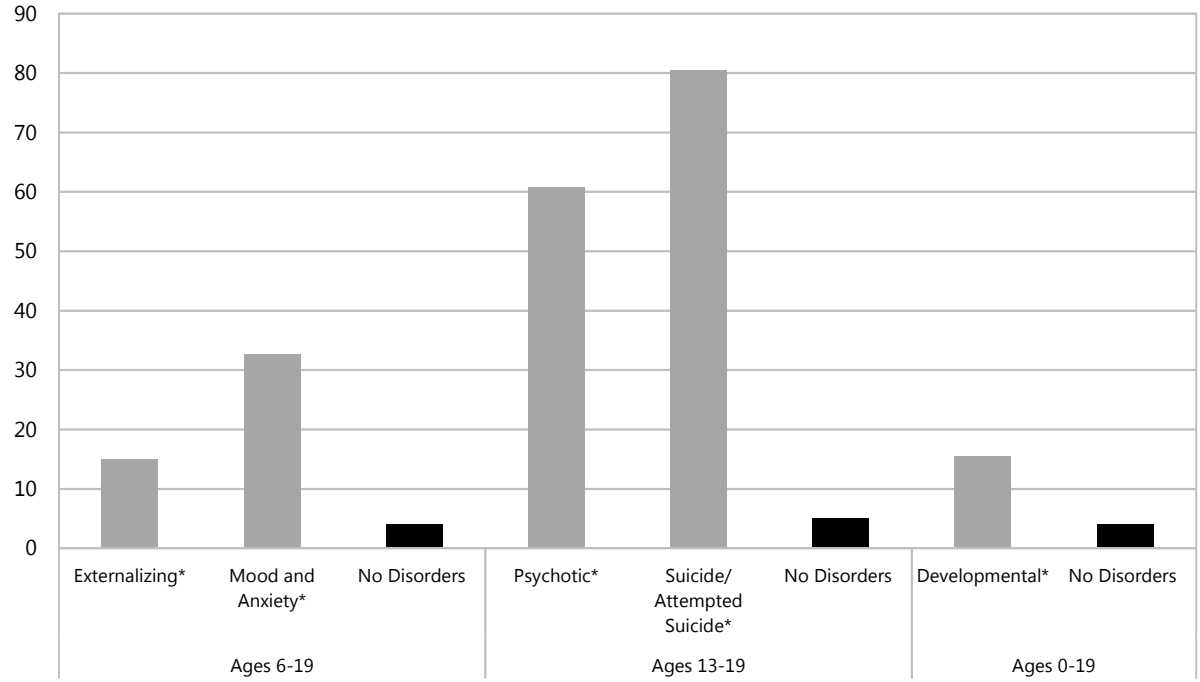
Key Findings

- Children with diagnosed mental disorders, developmental disorders, and suicide and attempted suicide had considerably more injury hospitalizations than children with no disorder in both fiscal years. For example, in 2012/13 children with a psychotic disorder had a rate of 60.8 hospitalizations per 1,000 children compared to 5.1 per 1,000 children for those with no disorders. We note that despite removing all self-inflicted injuries for adolescents who either died by suicide or attempted suicide, their injury hospitalization rate is still the highest.
- A decrease over time was observed in injury hospitalization rates among children aged 0-19 years with no disorders.
- Conversely, a marked increase over time was found in injury hospitalization rates among children who attempted or died by suicide.

2 Each child who attempted suicide will have at least one hospitalization because we defined attempted suicide solely with the hospitalization data. It is likely that we are capturing only the most serious suicide attempts given that they required hospitalization. The hospitalization rate would be lower among children who attempted suicide if we were able to include suicide attempts that did not result in a hospitalization in our analysis.

Figure 4.4: Injury Hospitalization Rate by Disorder

Age- and sex-adjusted, per 1,000 children, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group(p<0.01)
Note: Injury hospitalizations due to self-inflicted injuries were removed from the Suicide/Attempted Suicide indicator
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide.

Table 4.4: Injury Hospitalization Rate by Disorder

Age- and sex-adjusted, per 1,000 children

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	16.8	15.1
Mood and Anxiety (1,2)	31.3	32.7
No Disorders	5.0	4.1
Ages 13-19		
Psychotic (1,2)	72.1	60.8
Suicide/Attempted Suicide (1,2,t)	34.2	80.5
No Disorders	6.3	5.1
Ages 0-19		
Developmental (1,2)	20.0	15.4
No Disorders (t)	5.0	4.2

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: Injury hospitalizations due to self-inflicted injuries were removed from the Suicide/Attempted
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide.

Manitoba Adolescent Treatment Centre

The Manitoba Adolescent Treatment Centre (MATC) provides a range of mental health services to children who experience mental and developmental disorders, as well as suicidal behaviours, and to their families. Services range from brief interventions to intensive, long-term treatments that are both community- and hospital-based. Treatment is provided by a team of mental health experts and is delivered in partnership with families and collateral agencies.

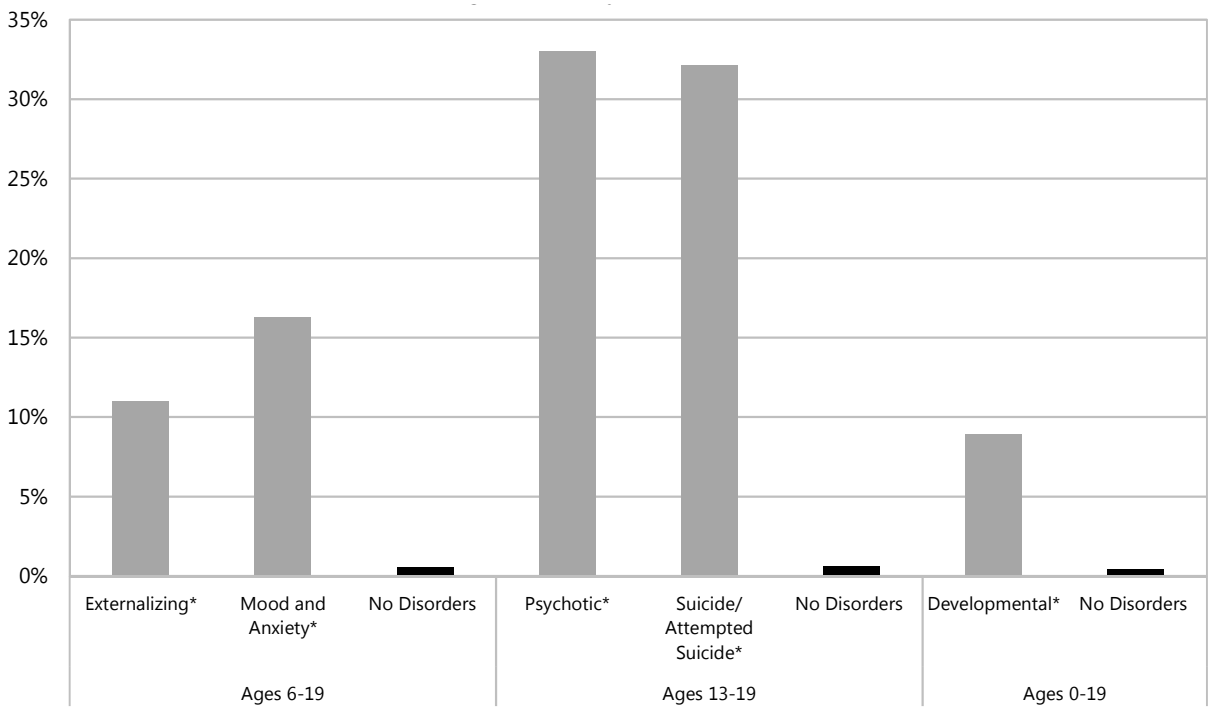
Figure 4.5 and Table 4.5 present the age- and sex-adjusted percentages of children who received services at least once from MATC by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- A greater percentage of children diagnosed with mental disorders, developmental disorders, and suicide and attempted suicide received services from MATC compared to children with no disorders in both fiscal years. For example, in 2012/13, 32.1% of children who had attempted or completed suicide received MATC services compared to 0.6% of those with no disorders.
- An increase over time was observed in the percentage of children receiving services from MATC who had attempted or died by suicide.

Figure 4.5: Percentage of Children Receiving Services from Manitoba Adolescent Treatment Centre by Disorder

Age- and sex-adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group ($p<0.01$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.5: Percentage of Children Receiving Services from Manitoba Adolescent Treatment Centre by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	11.1%	11.0%
Mood and Anxiety (1,2)	15.2%	16.3%
No Disorders	0.5%	0.6%
Ages 13-19		
Psychotic (1,2)	26.4%	33.0%
Suicide/Attempted Suicide (1,2,t)	17.9%	32.1%
No Disorders	0.6%	0.6%
Ages 0-19		
Developmental (1,2)	12.2%	8.9%
No Disorders	0.4%	0.4%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 ($p<0.01$)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 ($p<0.01$)
t indicates a statistically significant difference in the change over time ($p<0.05$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Child and Family Services

Child and Family Services (CFS) is a division within the Department of Families, Government of Manitoba, that is responsible for providing child protection services and other services to support children and families (Government of Manitoba, 2016). This indicator includes children living within a family receiving a range of protection and support services from CFS, including children who spent at least one day in care over the fiscal year examined.

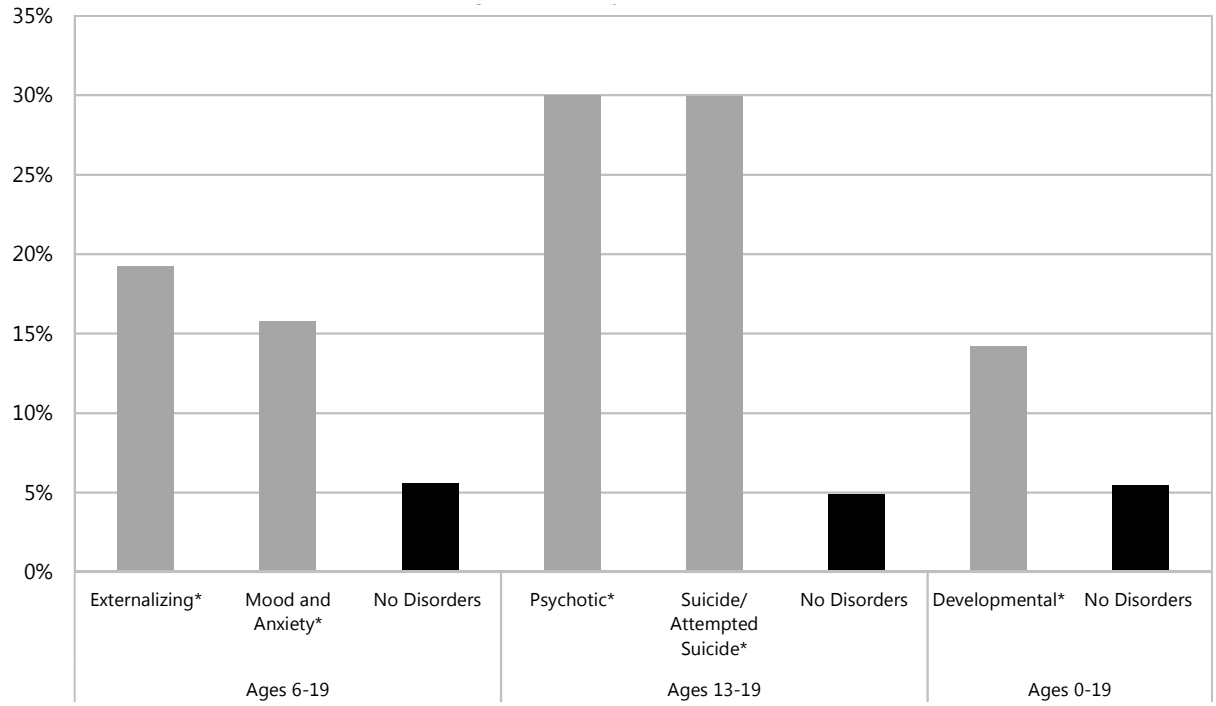
Figure 4.6 and Table 4.6 present the age- and sex-adjusted percentages of children who received services at least once from CFS by mental health disorder in fiscal years 2008/09 and 2012/13.

Key Findings

- A greater percentage of children diagnosed with mental disorders, developmental disorders, and suicide and attempted suicide received services from CFS compared to children with no disorders in both fiscal years. For example, in 2012/13, 14.2% of children diagnosed with developmental disorders received services from CFS compared to 5.5% of those with no disorders.
- A decrease over time was observed in the percentage of children receiving services from CFS among children with mood and anxiety disorders and children with developmental disorders, as well as those with no disorders.

Figure 4.6: Percentage of Children who had Involvement with Child and Family Services by Disorder

Age- and sex-adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.6: Percentage of Children who had Involvement with Child and Family Services by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	20.9%	19.2%
Mood and Anxiety (1,2,t)	18.0%	15.8%
No Disorders (t)	6.1%	5.6%
Ages 13-19		
Psychotic (1,2)	26.1%	30.0%
Suicide/Attempted Suicide (1,2)	31.7%	29.9%
No Disorders (t)	5.6%	4.9%
Ages 0-19		
Developmental (1,2,t)	17.5%	14.2%
No Disorders (t)	6.6%	5.5%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Children in Care

Children in care are children who have been removed from the care of their original families because 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. In this study, children are considered to be "in care" if they spent at least one day in the care of Child and Family Services during the specified time periods.

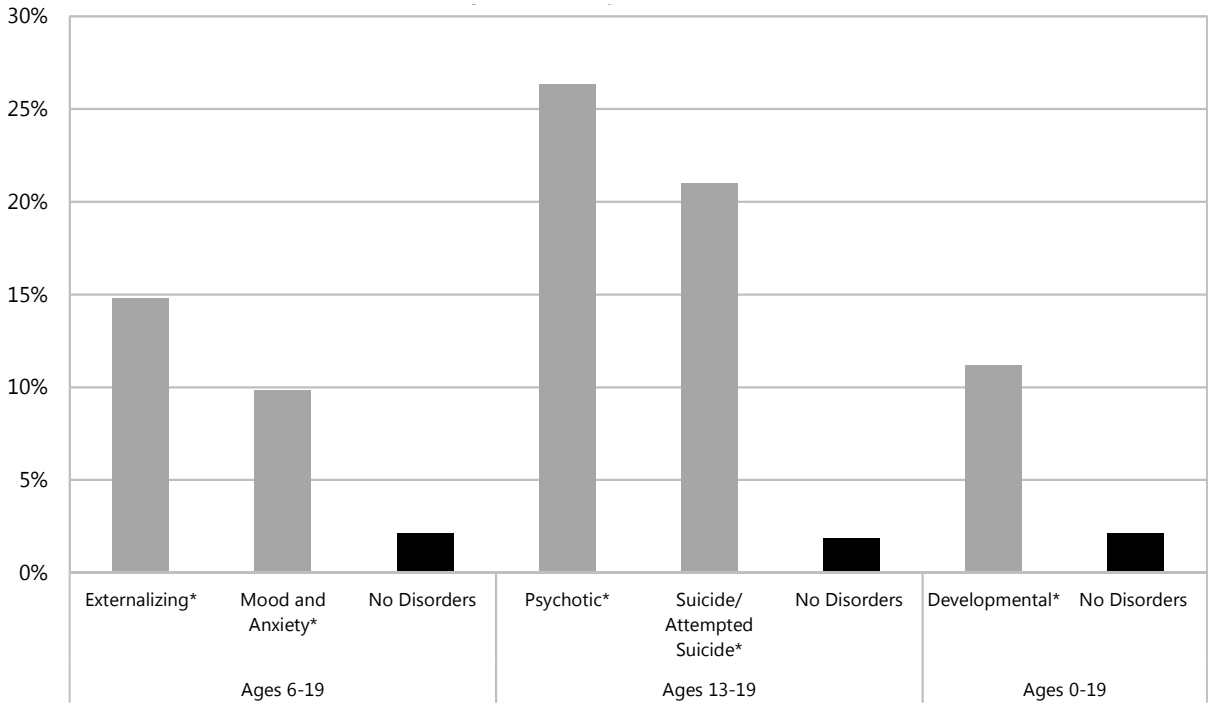
Figure 4.7 and Table 4.7 present the age- and sex-adjusted percentages of children in care by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- A greater percentage of children diagnosed with mental disorders, developmental disorders, and suicide and attempted suicide have been in care compared to children with no disorders in both fiscal years. For example, in 2012/13, 14.8% of children diagnosed with an externalizing disorder had been in care compared to 2.1% of those with no disorders.
- An increase over time was observed in the percentage of children with a psychotic disorder who were taken into care.

Figure 4.7: Percentage of Children in Care by Disorder

Age- and sex-adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group ($p<0.01$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.7: Percentage of Children in Care by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	13.8%	14.8%
Mood and Anxiety (1,2)	10.3%	9.8%
No Disorders	2.1%	2.1%
Ages 13-19		
Psychotic (1,2,t)	19.6%	26.3%
Suicide/Attempted Suicide (1,2)	17.8%	21.0%
No Disorders	1.8%	1.9%
Ages 0-19		
Developmental (1,2)	12.8%	11.2%
No Disorders	2.4%	2.1%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 ($p<0.01$)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 ($p<0.01$)
t indicates a statistically significant difference in the change over time ($p<0.05$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Living in a Family on Income Assistance

Income assistance (IA) is a program of financial assistance for individuals or families who need help to meet basic personal and family needs. As such, this indicator is a measure of poverty or economic instability. Income assistance 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. The program is administered via the Employment and Income Assistance program. This indicator is defined as the percentage of children aged 0-19 living in families receiving IA.

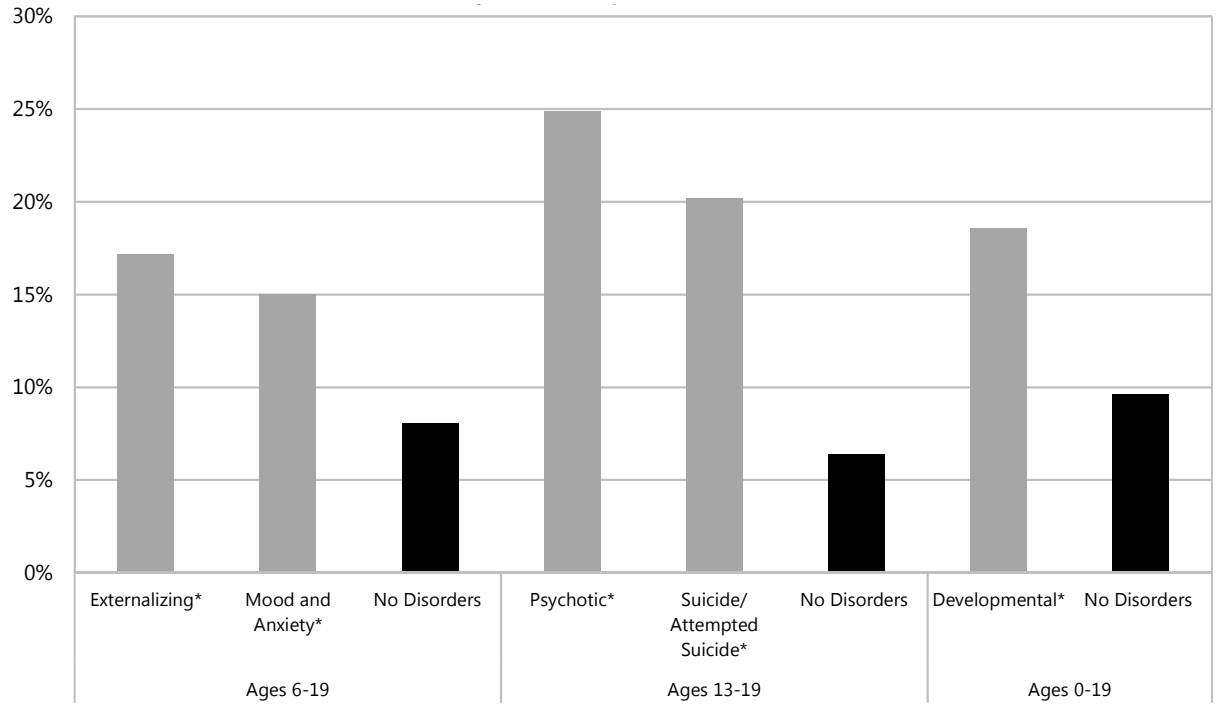
Figure 4.8 and Table 4.8 present the age- and sex-adjusted percentages of children living in families receiving IA by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- A greater percentage of children diagnosed with mental disorders, developmental disorders, and suicide and attempted suicide were living in families receiving IA compared to those with no disorders in both fiscal years. For example, in 2012/13, 17.2% of children diagnosed with an externalizing disorder were living in families receiving IA compared to 8.0% of those with no disorders.
- No change over time was observed in the percentage of children living in families receiving IA.

Figure 4.8: Percentage of Children in Families Receiving Income Assistance by Disorder

Age- and sex-adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.8: Percentage of Children in Families Receiving Income Assistance by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	15.3%	17.2%
Mood and Anxiety (1,2)	14.9%	15.0%
No Disorders	7.7%	8.0%
Ages 13-19		
Psychotic (1,2)	25.4%	24.9%
Suicide/Attempted Suicide (1,2)	17.1%	20.2%
No Disorders	6.0%	6.4%
Ages 0-19		
Developmental (1,2)	19.1%	18.6%
No Disorders	9.4%	9.6%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Young Adult on Income Assistance

Income assistance (IA) is a program of financial assistance for individuals or families who need help to meet basic personal and family needs. This indicator represents the percentage of young adults 18 and 19 years old who are receiving IA.

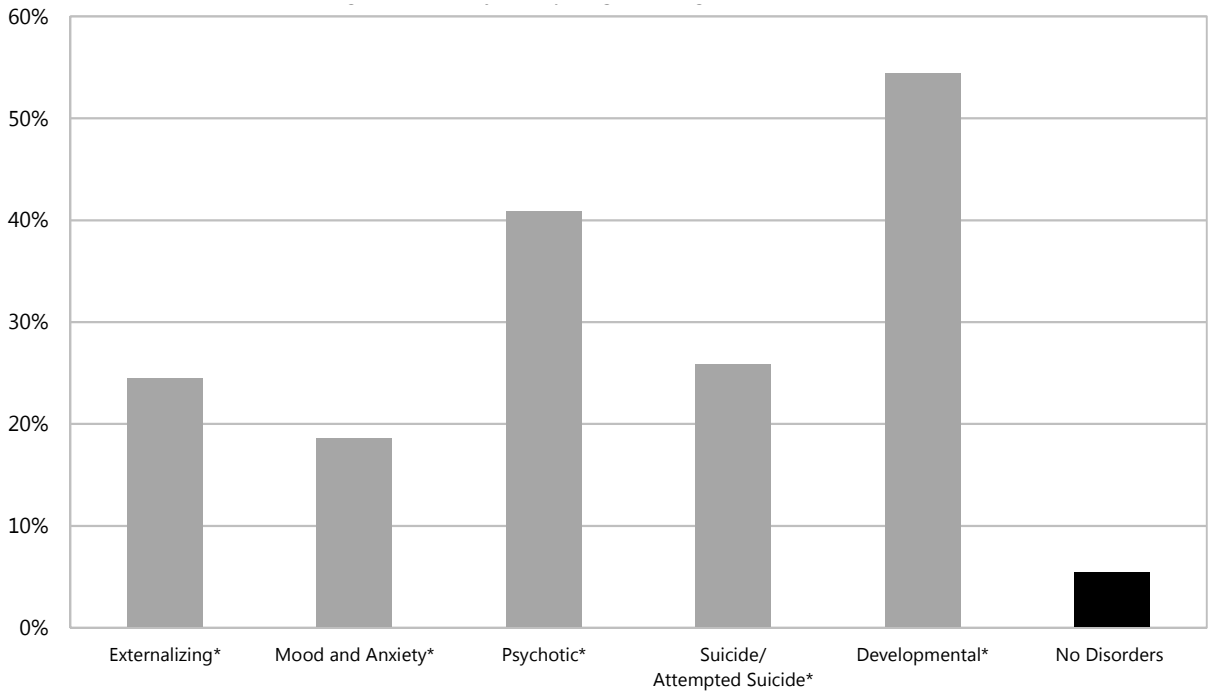
Figure 4.9 and Table 4.9 present the age- and sex-adjusted percentages of young adults receiving IA by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- A greater percentage of young adults diagnosed with mental disorders, developmental disorders, and suicide and attempted suicide received IA compared to those with no disorders in both fiscal years. For example, in 2012/13, 54.4% of young adults diagnosed with a developmental disorder received IA compared to 5.5% of those with no disorders.
- No change over time was observed in the percentage of young adults receiving IA.

Figure 4.9: Percentage of Young Adults Receiving Income Assistance by Disorder

Age- and sex-adjusted, young adults aged 18-19, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.9: Percentage of Young Adults Receiving Income Assistance by Disorder

Age- and sex-adjusted, young adults aged 18-19

Disorder	2008/09	2012/13
Externalizing (1,2)	19.7%	24.5%
Mood and Anxiety (1,2)	16.1%	18.6%
Psychotic (1,2)	40.5%	40.9%
Suicide/Attempted Suicide (1,2)	21.6%	25.9%
Developmental (1,2)	56.3%	54.4%
No Disorders	4.7%	5.5%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Social Housing

Social housing is non-profit housing often subsidized by government funds. This indicator represents the proportion of children living in social housing directly owned and managed by the provincial government under Manitoba Housing and Community Development. The provincial government manages about one third of all social housing in Manitoba, while non-profit groups or cooperatives manage the remaining two-thirds (Finlayson et al., 2013).

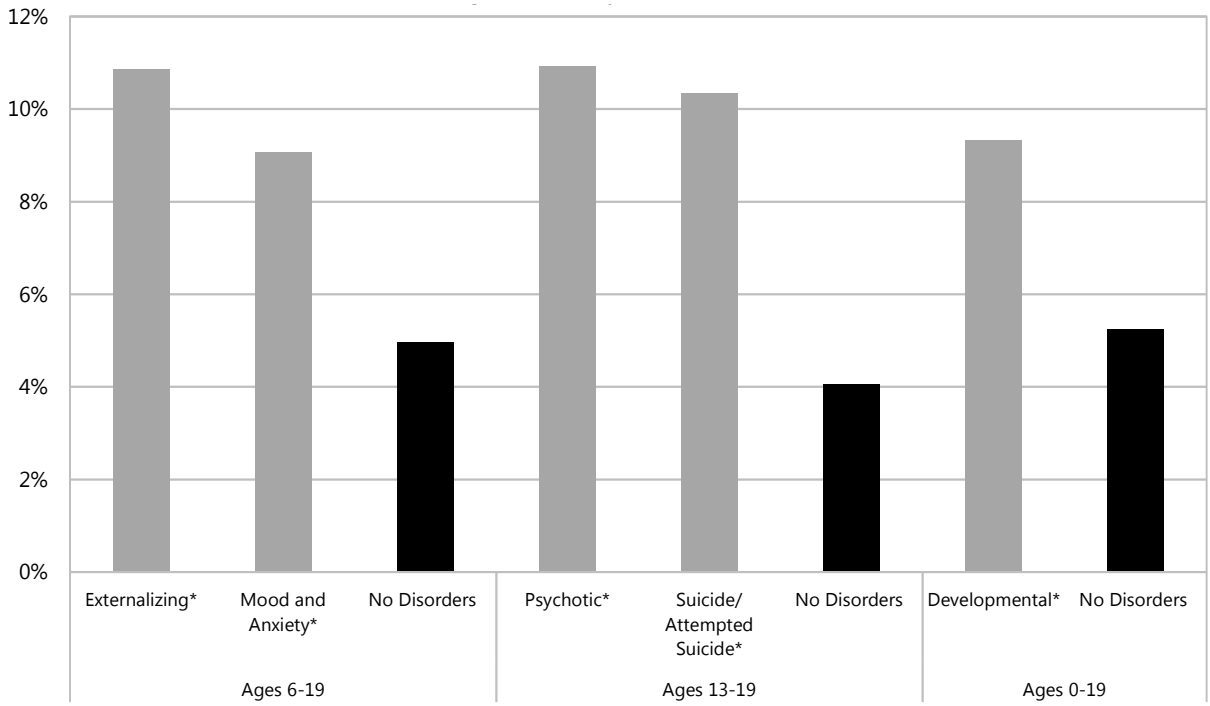
Figure 4.10 and Table 4.10 presented the age- and sex-adjusted percentages of children living in social housing by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- A greater percentage of children diagnosed with mental disorders, developmental disorders, and suicide and attempted suicide were living in social housing compared to those with no disorders in both fiscal years. For example, in 2012/13, 10.3% of children who attempted or completed suicide lived in social housing compared to 4.0% of those with no disorders.
- An increase over time was observed in the percentage of children living in social housing among children diagnosed with externalizing disorders, mood and anxiety disorders, and developmental disorders, as well as those with no disorders.

Figure 4.10: Percentage of Children Living in Social Housing by Disorder

Age- and sex-adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within the age group (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.10: Percentage of Children Living in Social Housing by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2,t)	7.8%	10.9%
Mood and Anxiety (1,2,t)	7.3%	9.1%
No Disorders (t)	3.8%	5.0%
Ages 13-19		
Psychotic (1,2)	7.3%	10.9%
Suicide/Attempted Suicide (1,2)	6.4%	10.3%
No Disorders (t)	3.1%	4.0%
Ages 0-19		
Developmental (1,2,t)	7.4%	9.3%
No Disorders (t)	4.4%	5.2%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Justice System Involvement: Accused

This indicator represents the proportion of children accused of a crime in Manitoba at least once in the specified fiscal year as tracked by Manitoba Justice's Prosecution Information and Scheduling Management (PRISM) database. The PRISM database contains criminal accusations, such as domestic trouble, sexual assault, break and enter, and impaired driving. The most common types of offenses are listed in Appendix 8. Only adolescents aged 13 and older were included in this analysis, because children younger than age 13 are not charged. The available data did not allow us to determine if the adolescents accused were eventually sentenced or if the charges were dropped.

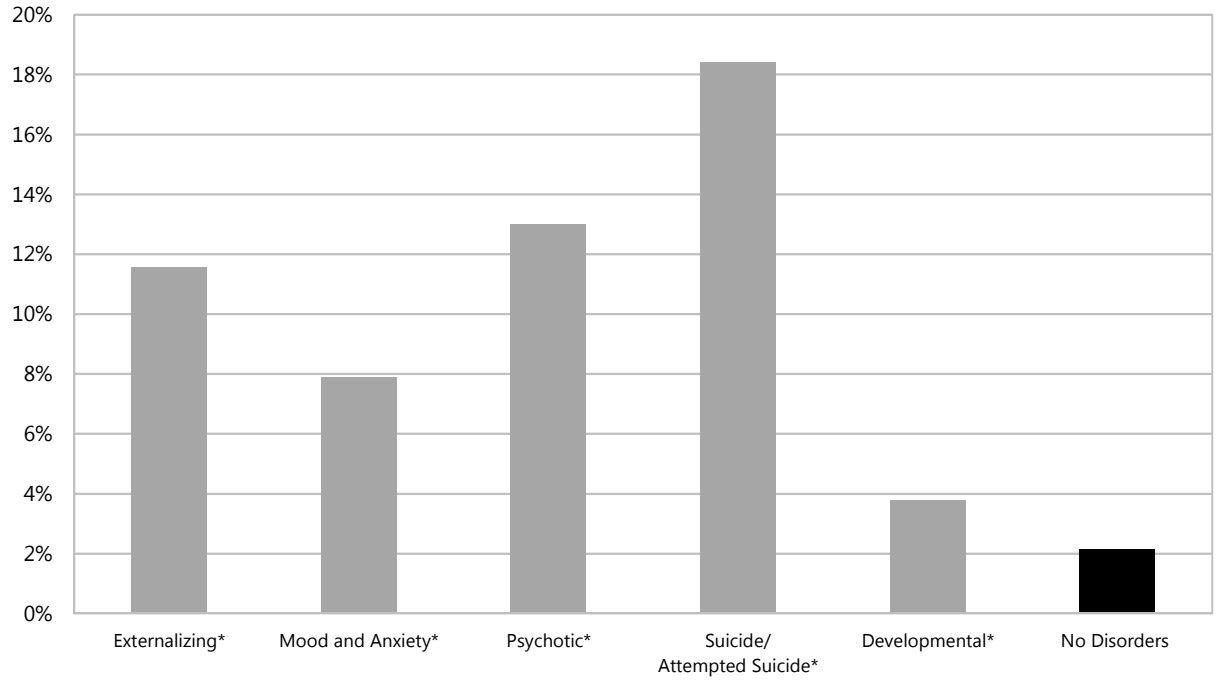
Figure 4.11 and Table 4.11 present the age- and sex- adjusted percentages of adolescents aged 1319 accused of a crime by mental health indicators in fiscal years 2008/09 and 2012/13. Note that Appendix 7 shows the percentage of children diagnosed with schizophrenia who were accused of a crime (a subset of those diagnosed with psychotic disorders).

Key Findings

- A greater percentage of children with mental disorders, developmental disorders, and suicide and attempted suicide were accused of a crime compared to those with no disorders in both fiscal years. For example, in 2012/13, 7.9% of children diagnosed with a mood or anxiety disorder were accused of a crime compared to 2.1% of those with no disorders.
- A decrease over time was observed in the percentage of children accused of a crime among children with no disorders.

Figure 4.11: Percentage of Adolescents Accused of a Crime by Disorder

Age- and sex-adjusted, adolescents aged 13-19, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.11: Percentage of Adolescents Accused of a Crime by Disorder

Age- and sex-adjusted, adolescents aged 13-19

Disorder	2008/09	2012/13
Externalizing (1,2)	12.8%	11.6%
Mood and Anxiety (1,2)	9.0%	7.9%
Psychotic (1,2)	15.7%	13.0%
Suicide/Attempted Suicide (1,2)	18.6%	18.4%
Developmental (1,2)	4.7%	3.8%
No Disorders (t)	3.0%	2.1%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 ($p<0.01$)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 ($p<0.01$)
t indicates a statistically significant difference in the change over time ($p<0.05$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide.

Justice System Involvement: Victim

This indicator represents the proportion of children who were victims of a reported crime in Manitoba as tracked by Manitoba Justice's Prosecution Information and Scheduling Management (PRISM) database. These children may be victims of any number of crimes, such as difficulties related to their families, being assaulted with or without a weapon, being sexually assaulted, or being threatened. The most common crimes committed against children are listed in Appendix 8. A child was considered a victim of a crime if she/he was victimized at least once in the fiscal years examined.

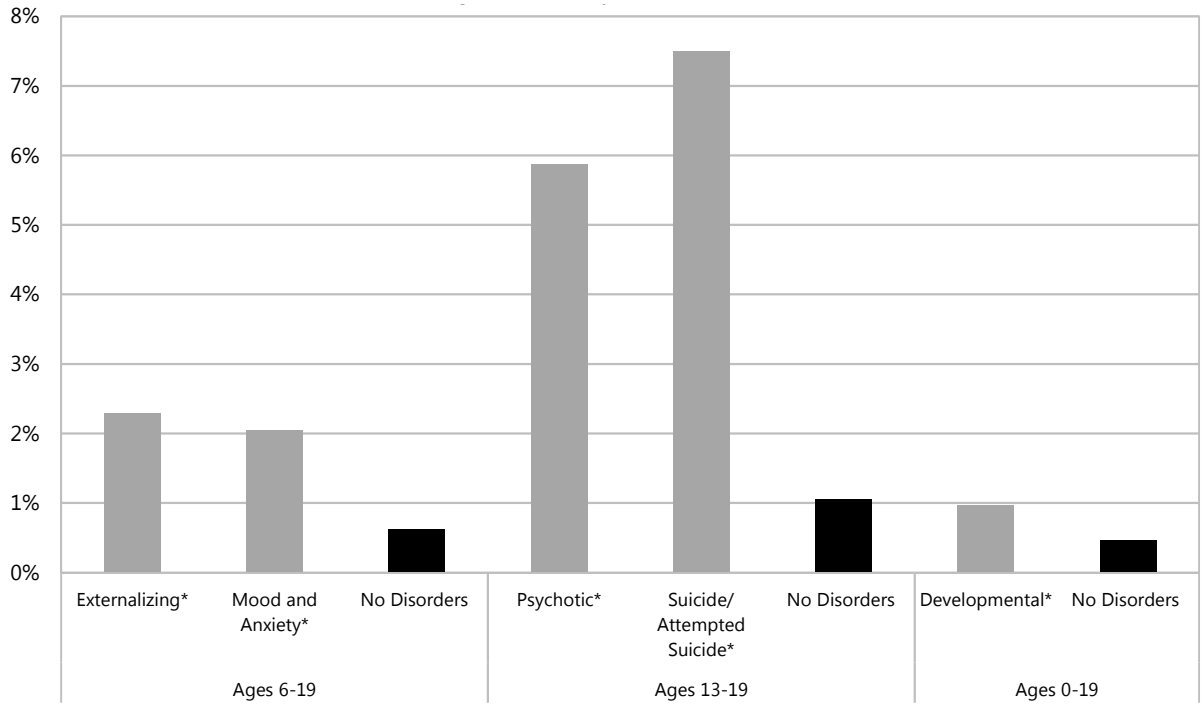
Figure 4.12 and Table 4.12 present the age- and sex-adjusted percentages of children who were victims of a crime by mental health indicator in fiscal years 2008/09 and 2012/13.

Key Findings

- A greater percentage of children diagnosed with mental disorders, developmental disorders, and suicidal behaviours were victims of a crime compared to those with no disorders in both fiscal years. For example, in 2012/13, 5.9% of children diagnosed with a psychotic disorder were victims of a crime compared to 1.1% of those with no disorders.
- A decrease over time was observed in the percentage of children who were victims of a crime among children with no disorders.

Figure 4.12: Percentage of Children who were Victims of a Crime by Disorder

Age- and sex- adjusted, 2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders within age groups (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 4.12: Percentage of Children who were Victims of a Crime by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (1,2)	2.6%	2.3%
Mood and Anxiety (1,2)	2.4%	2.0%
No Disorders (t)	0.8%	0.6%
Ages 13-19		
Psychotic (1,2)	5.7%	5.9%
Suicide/Attempted Suicide (1,2)	6.5%	7.5%
No Disorders (t)	1.3%	1.1%
Ages 0-19		
Developmental (1,2)	1.2%	1.0%
No Disorders (t)	0.7%	0.5%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Health Services Use before and after a Suicide Attempt

We compared health services use before and after a suicide attempt among adolescent males (Table 4.13) and females (Table 4.14). The average number of physician and psychiatrist visits per adolescent male increased from 0.55 in the four-year period before the suicide attempt to 2.97 in the four-year period after the attempt. For adolescent females, the average number of physician and psychiatry visits increased from almost one visit per child (0.95) in the four-year period before the suicide attempt to 2.83 in the four-year period after the attempt. Also, the number of hospitalizations for adolescent females increased after the attemped suicide compared to before the attemped suicide.

Table 4.13: Health Services Use Among Adolescent Males (13-19 years) who Attempted Suicide, 2005/06-2008/09

Calculated four years before and after the attempt

Health Service Used Over Time Period	Before	After
Physician Visits (number per adolescent)	2.66	**3.61**
Psychiatry Visits (number per adolescent)	0.55	**2.97**
Hospitalization (All Causes) (number per adolescent)	0.26	0.36
MATC Services (percentage of adolescents)	13.71%	13.71%

Bold values indicate a statistically significant difference between before and after the suicide attempt

Table 4.14: Health Services Use Among Adolescent Females (13-19 years) who Attempted Suicide, 2005/06-2008/09

Calculated four years before and after the attempt

Health Service Used Over Time Period	Before	After
Physician Visits (number per adolescent)	3.88	**6.40**
Psychiatry Visits (number per adolescent)	0.95	**2.83**
Hospitalization (All Causes) (number per adolescent)	0.26	**0.46**
MATC Services (percentage of adolescents)	10.61%	11.82%

Bold values indicate a statistically significant difference between before and after the suicide attempt

What Do These Results Mean?

Health Care Services

Higher healthcare services use was found among children and adolescents with mental disorders, developmental disorders, and suicide and attempted suicide compared to those with no disorders. As expected given their diagnosis, healthcare use for children with mental disorders, developmental disorders, or suicidal behaviours was particularly high among mental health services, such as visits to a psychiatrist and to Manitoba Adolescent Treatment Centre. Children with psychotic disorders and those with suicidal behaviours had among the highest rates or percentages of all types of health services use. It is not surprising that these children seek help in greater numbers because of the severity of the symptoms associated with psychotic disorders and suicidal behaviours. Children with these disorders and behaviours experience marked distress and interference with their functioning, and require treatment to cope with and alleviate their symptoms. Those who attempt suicide and injure themselves may also need treatment for the self-inflicted injuries.

Consistent with our report, a UK study found that children with any anxiety and mood disorders, externalizing disorders, conduct disorders, and developmental disorders were in contact with mental health services more than children with no diagnosis (Merikangas et al., 2011). Using the National Health Interview Survey, Schieve et al. (2012) found that children with any learning or behavioural developmental disability (self-reported) were 2.5 times

more likely to receive medical care, 10.6 times more likely to see a mental health professional, and 7.9 times more likely to receive physical, speech, respiratory, occupational, and/or audiology therapy compared to children without developmental disabilities. Children with autism spectrum disorder (ASD) had more outpatient visits, physician visits, and medications prescribed than children in the general population (Liptak, Stuart, & Auinger, 2006).

Health services use among children with mental and developmental disorders depends on factors within their jurisdictions. Differences among healthcare systems can consist of the type of mental health services offered, who is offering them, how the services are organized, and their availability. When examining services, it is not always possible for researchers to capture all the potential contacts with mental health services. This study examined physician visits, hospitalizations and specialized services deliverered by MATC; however, contacts with social workers, nurses, psychologists, or school-based counselling are not captured in the Repository at MCHP and were therefore not included in this study. Kataoka, Stein, Nadeem, and Wong (2007) found in a telephone survey that two-thirds of youth received school or community mental health services in the US.

According to Huffman et al. (2012), the availability of mental health services in the United States was a predictor of use, as were the severity of mental disorders, multiple diagnoses, and making a serious suicide attempt. Help-seeking behaviour for mental health problems has increased over the past decades, but many people continue to report that they do not consult with health professionals. Essau (2005) found that 18% of German adolescents with an anxiety disorder and 23% of those with a depressive disorder used mental health services. A model in Australia called *Headspace* has been successful in attracting youth to their mental health services (Scott et al., 2012). This model differs from conventional health services in that the environment is youth-friendly, provides a one-stop shop for general medical and specialized psychological care, allows the young person to go directly to a mental health service (rather than navigate a burdensome referral system), and removes financial barriers. *Headspace* was linked to a national campaign promoting youth mental health services as part of its strategy to encourage use in children and adolescents (Scott et al., 2012).

In examining healthcare services before and after a suicide attempt, we found modest increases in healthcare services use after a suicide attempt. These modest increases may be a result of inadequate resources but may also be a result of suicidal teens not following through with treatment services (this would be consistent with the literature). It is possible that children who attempted suicide are accessing services from non-medical programs and resources. Our analyses would not have captured these. On a more positive note, it appears that services are improving for children with suicidal behaviours. We observed a large increase in MATC services use from one time period (2005/06-2008/09) to the next (2009/10-2012/13) among children who attempted suicide. Innovative programs, such as MATC's Rural and Northern Telehealth Service, may be reaching more children in crisis (MATC, 2016).

A US study found that most children (10-19 years old) were not admitted into hospital after a suicide attempt (Levine, Schwarz, Argon, Mandell, & Feudtner, 2005). Factors that determined whether they would be admitted or not depended on the number of mental disorders and the method used in the suicide attempt. Other factors included whether the hospital was for children or adults and the type of insurance the child's family had (Levine et al., 2005). Asarnow et al. (2011) noted that US youth do not always receive the necessary follow-up after a suicide attempt. The researchers found that an intervention (Family Intervention for Suicide Prevention) increased rates of post discharge follow-up: 92% of youths receiving the intervention used mental health services after discharge compared to 76% in the 'emergency care as usual' group. The intervention included a wide spectrum of strategies, including education to families, restricting access to suicide methods (such as weapons and medications), commitment from youth that they will not attempt suicide, a Safety Plan Card, and following up with youth and family within 48 hours of discharge (Asarnow et al., 2011).

In this report, a decrease over time in psychiatrist visits and hospitalizations was observed for children with developmental disorders. Discerning whether low health services use reflects good health or poor access to services is always a challenge in interpreting healthcare use. A decreased hospitalization rate can be interpreted as improved health of children with disorders because hospitalization is normally reserved for children in marked distress or with severe illnesses. One possibility for a decrease in healthcare use may be that the population of children diagnosed with developmental disorders had less severe forms of disorders in 2012/13 than in 2008/09. In Chapter 3, we noted an increase in children with developmental disorders over time and posited that improved recognition may be responsible for this increase. Children who were not previously diagnosed may have less noticeable and less severe types of the disorders, and are therefore less in need of health services.

Social Services

Children with mental disorders, developmental disorders, and suicidal behaviours use more social services than those with no disorders. We reported that almost one-third of children with a psychotic disorder had received services from Child and Families Services and over one quarter had been taken into care. Consistent with our findings, a US study reported a high prevalence of mental disorders among children in care. They found the following prevalence of mental disorders: conduct disorder, 40%; depressive disorder, 32%; adjustment disorder, 32%; anxiety disorder, 19%; ADHD, 13%; bipolar disorder, 9%; and schizophrenia, 8% (Shin, 2005). Being in care may be a risk factor for developing mental disorders, but in some cases, a child's behavioural problems or developmental disorders may have contributed to being placed into care. First Nations families whose children have a developmental disorder must sometimes place their children "into voluntary placement simply to access services" (Wright, Hiebert-Murphy, & Gosek, 2005) because supportive services provided by CFS for children with developmental disorders may not be available in their communities.

In this report, we observed a number of changes in social services use over time. For instance, the percentage of children taken into care increased among children with psychotic disorders, although not among children with schizophrenia specifically. Conversely, the percentage of children who received protective and supportive services from CFS decreased over time for many other groups of children, including those with mood and anxiety disorders, developmental disorders, and those with no disorders.

Social housing and IA are more commonly used by families with children with disorders or suicidal behaviours. Furthermore, when these children become adults, they are more likely to use IA than youth with no disorders. For example, in our study, 24% of young adults aged 18-19 years with externalizing disorders and 50% of young adults with a developmental disorder were receiving IA. Consistent with our findings, an Australian study found that 24.9% of young people aged 12-25 entering mental health centres were already receiving financial assistance (Scott et al., 2012). We also observed that the percentage of children living in social housing increased over time. Offering increased secure housing for families with children would be addressing an important risk factor in the long term outcomes of children.

This report found that children with mental disorders are more likely to be living in low income areas and, as observed in this chapter, receiving social services to address the conditions of poverty. It is well known that mental disorders are higher among people living on lower incomes (Wilkinson & Pickett, 2010). In general, living in poverty is associated with poorer access to nutritious food, residing in unsafe housing and neighborhoods, and having fewer resources to face life's challenges. These conditions contribute to stressful or toxic environments that have been posited to predispose children to mental illness. This finding is important to consider, given that Manitoba has one of the highest child poverty rates in Canada.

Justice Involvement

The analyses in this report permitted us to describe the association between mental illness and involvement with the justice system. We found that a high percentage of children with mental disorders, developmental disorders, or suicidal behaviours had either been accused of a crime or had been a victim of one. The percentage of criminal accusation and victimization is particularly high among children with a psychotic disorder and suicidal behaviours.

Other research has found similar results. Coker, Smith, Westphal, Zonana, and McKee (2014), using the National Comorbidity Survey on adolescents, found that those with lifetime psychiatric disorders had greater odds of committing a crime than youth with no disorders. The disorders associated with the highest odds were conduct disorders, alcohol use disorders, and drug use disorders. Youth with three or more disorders, which made up 16.0% of the study population, accounted for 54% of those arrested for a violent crime. These authors calculated (using population attributable fractions) that a maximum of 85.8% reduction in crime could be expected if mental illness were eliminated from US adolescents (Coker et al., 2014). The authors stressed that most youth with psychiatric disorders (88.2%) had never committed a crime. When studying youth with more severe mental disorders, the rates of justice system involvement are particularly high. A Boston study found that 64% of youths who had received intensive mental health services (aged 8- 25) were subsequently involved with the justice system later in adolescence or early adulthood (Davis, Banks, Fisher, & Grudzinskas, 2004).

Summary

This report found that children experiencing mental health problems are in contact with many aspects of health and social services, providing many opportunities to intervene early in addressing these problems and preventing them from getting worse. These children would benefit from an intersectoral approach to address the complexity of their needs. Government policy, research, and practice often take place in systems or organizations that have little involvement with each other, a type of management sometimes referred to as "information silo" or "silo mentality". To develop an effective mental health promotion strategy at a population level, long-term and integrated planning, implementation, and investment across these "silos" is essential (Walker, Verins, Moodie, & Webster, 2005).

CHAPTER 5: EDUCATIONAL OUTCOMES OF CHILDREN BY MENTAL HEALTH INDICATOR

In this chapter, we examine the educational outcomes of Manitoba's children by mental health indicator. The educational outcomes are presented by the following five mental health indicators: externalizing disorders, mood and anxiety disorders, psychotic disorders, suicide and attempted suicide, and developmental disorders. The mental health indicators used in this chapter were defined in detail in previous chapters. Suicide is combined with attempted suicide to ensure that the numbers of children are large enough for analyses. We will sometimes refer to suicide and attempted suicide as *suicidal behaviours*. Because certain disorders are rare in children younger than 13 years of age, we did not examine them among children in Grade 3. These disorders include: substance use disorders, psychotic disorders, and suicide and attempted suicide. Percentages for all the education outcomes with the exception of high school graduation were calculated for the second time period (2009/10–2012/13) only, due to lack of available data in earlier years. The educational outcomes of children diagnosed with mental and developmental disorders, as well as with suicidal behaviours were compared to the services use of children with no disorders. The term "disorders" refers to mental disorders, developmental disorders, or suicide or attempted suicide (suicidal behaviours). When referring to children with none of these disorders or suicidal behaviours, we use the term "no disorders".

Unlike in previous chapters, the education indicators are positive outcomes meaning that a high percentage indicates a good outcome. The educational outcomes are presented in two ways: with a graph and a table. The graphs illustrate the differences in indicators between children with disorders and those with no disorders. The tables offer the precise percentages of all the indicators and, for high school graduation, show changes from the first time period to the next.

A definition of each of the following indicators is provided prior to the presentation of the results:

- Grade 3: Numeracy Assessment;
- Grade 3: Reading Assessment;
- Grade 7: Mathematics Assessment;
- Grade 7: Student Engagement;
- Grade 8: Reading and Writing Assessment; and
- High School Completion

Only statistically significant results are described in the text. Differences between children with and without diagnosed disorders are tested at a 0.01 level of significance, and differences across the two fiscal years are tested at the 0.05 level of significance (see Chapter 1 for details).

Grade 3 Numeracy Assessment

Numeracy assessments are conducted for Grade 3 students in publicly funded schools in Manitoba. Using criteria provided by the Department of Education and Training, each student was assessed by the teacher early in the school year to identify strengths and needs in numeracy and to guide the class curriculum for the school year. Students were assessed using the following numeracy competencies: 1) predicts an element in a repeating pattern; 2) understands the meaning of the equal symbol; 3) understands the concept of whole numbers; and 4) uses various mental math strategies to determine answers to addition and subtraction questions up to the number 18. Grade 3 numeracy was not examined for children with substance use disorders, psychotic disorders, and suicidal behaviours because these mental health problems are rare in children younger than 13 years old.

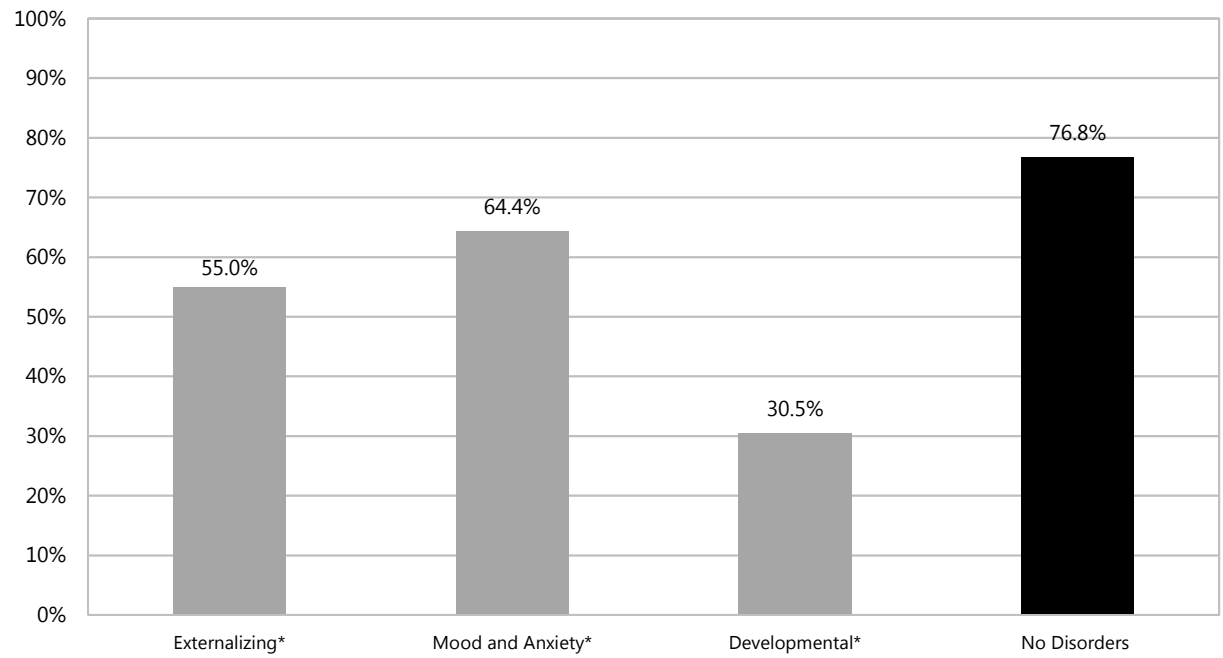
We calculated the age- and sex-adjusted percentages of Grade 3 children who were 'meeting' or 'approaching' expectations on all four numeracy competencies in the second time period: that is, fiscal years 2009/10-2012/13. These results are presented in Figure 5.1 by mental health indicator.

Key Findings

- A lower percentage of children diagnosed with a disorder 'met' or 'approached' expectations on the Grade 3 numeracy assessment compared to children with no disorders. For example, 64.4% of children diagnosed with a mood or anxiety disorder 'met' or 'approached' expectations compared to 76.8% of those with no disorders.

Figure 5.1: Percentage of Grade 3 Children Meeting or Approaching Expectations for Numeracy by Disorder

Age- and sex-adjusted, four-year time period, 2009/10-2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Grade 3 Reading Assessment

Reading assessments are conducted for Grade 3 students in publicly funded schools in Manitoba. Using criteria provided by the Department of Education and Training, each student was assessed by the teacher early in the school year to identify strengths and needs in reading and to guide the class curriculum for the school year. Students were assessed using the following reading competencies: 1) reflects on and sets reading goals; 2) uses strategies during reading to make sense of texts; and 3) demonstrates comprehension. Grade 3 reading was not examined for children with substance use disorders, psychotic disorders, and suicidal behaviours because these mental health problems are rare in children younger than 13 years old.

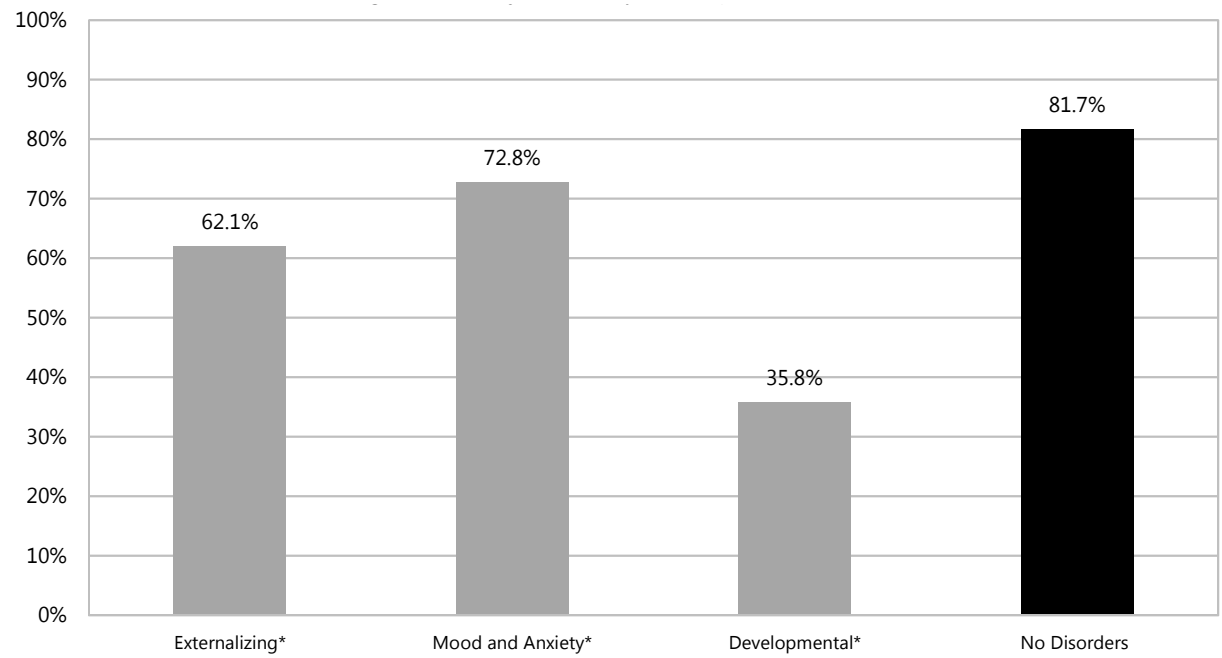
We calculated the age- and sex-adjusted percentages of Grade 3 children who were 'meeting' or 'approaching' expectations on all three reading competencies in the second time period: that is, fiscal years 2009/10-2012/13. These results are presented in Figure 5.2 by mental health indicator.

Key Findings

- A lower percentage of children diagnosed with a disorder 'met' or 'approached' expectations on the Grade 3 reading competencies compared to children with no disorders. For example, 35.8% of children diagnosed with a developmental disorder 'met' or 'approached' expectations compared to 81.7% of those with no disorders.

Figure 5.2: Percentage of Grade 3 Children Meeting or Approaching Expectations for Reading by Disorder

Age- and sex-adjusted, four-year time period, 2009/10-2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Grade 7 Mathematics Assessment

An assessment of mathematical skills is conducted for Grade 7 students in publicly funded schools in Manitoba. This assessment is completed by the teacher and each student throughout the academic year in order to review the students' skills in mathematics and to develop the best learning process to reach their competency goals. Students were assessed using the following competencies: 1) orders fractions; 2) orders decimal numbers; 3) understands that a given number may be represented in a variety of ways; 4) uses number patterns to solve mathematical problems; and 5) uses a variety of strategies to calculate and explain a mental math problem. Children who are assessed for this educational outcome are typically 12 or 13 years old. Compared to older children, the prevalence of the following mental health indicators will be lower among Grade 7 students: substance use disorders, psychotic disorders, and suicide and attempted suicide.

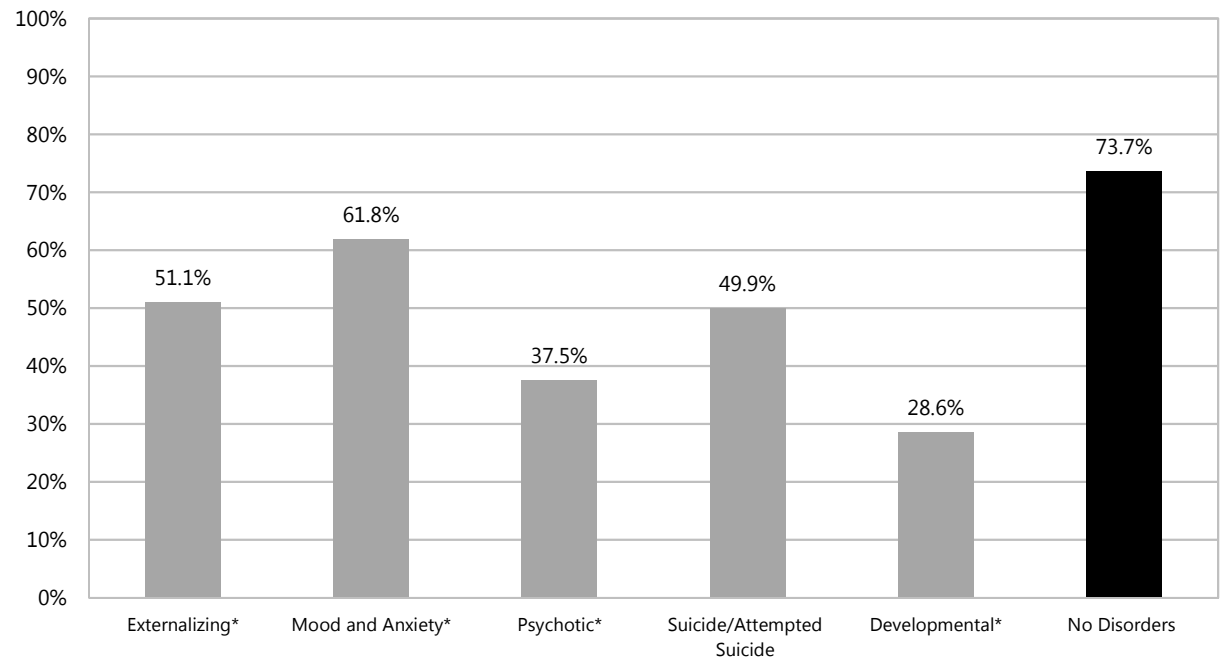
We calculated the age- and sex-adjusted percentages of Grade 7 students who were 'meeting' or 'approaching' expectations on all five mathematics competencies in the second time period: that is, fiscal years 2009/10-2012/13. These results are presented in Figure 5.3 by mental health indicator.

Key Findings

- With the exception of Grade 7 students who attempted suicide or died by suicide, a lower percentage of students diagnosed with a disorder 'met' or 'approached' expectations on the Grade 7 mathematics competencies compared to students with no disorders. For example, 51.1% of students diagnosed with an externalizing disorder 'met' or 'approached' expectations compared to 73.7% of those with no disorders. The low numbers of Grade 7 students who attempted suicide or died by suicide may explain why there were no statistically significant differences in Grade 7 mathematics competencies between groups.

Figure 5.3: Percentage of Grade 7 Adolescents Meeting or Approaching Expectations for Mathematics by Disorder

Age- and sex-adjusted, four-year time period, 2009/10-2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Grade 7 Student Engagement

An assessment of student involvement in their education is conducted in Grade 7 in publicly funded schools in Manitoba. Students and teachers use the assessment to set goals and observe and communicate successes. The recorded assessment is based on the teacher's observations and conversations with the student. Each student was assessed using the following student engagement competencies: 1) demonstrates an interest in his or her learning; 2) engages in self-assessment; 3) is aware of learning goals of a unit of study and/or personal learning goals; 4) participates in lessons; and 5) accepts responsibility of assignments. French immersion students and Français students are also assessed on their relationship with the French language; however, these areas were not included in our definition so that all students could be assessed on the same five measures. Children who are assessed for this educational outcome are typically 12 or 13 years old. Compared to older children, the prevalence of the following indicators will be lower among Grade 7 students: substance use disorders (within externalizing disorders), psychotic disorders, and suicide and attempted suicide.

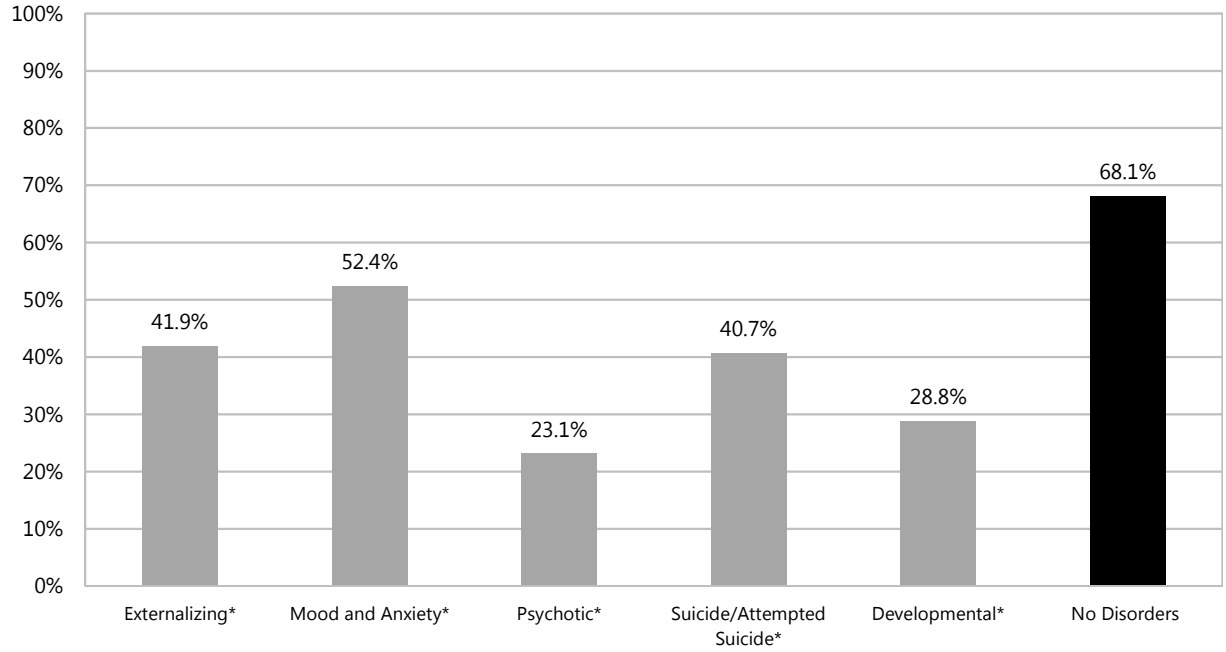
We calculated the age- and sex-adjusted percentages of Grade 7 students who were rated as 'establishing' or 'developing' in all five engagement competencies in the second time period: that is, fiscal years 2009/10-2012/13. These results are presented in Figure 5.4 by mental health indicator.

Key Findings

- A lower percentage of students diagnosed with a disorder were rated as 'establishing' or 'developing' engagement in Grade 7 compared to students with no disorders. For example, 23.1% of students diagnosed with a psychotic disorder were rated as 'establishing' or 'developing' engagement compared to 68.1% of those with no disorders.

Figure 5.4: Percentage of Grade 7 Adolescents Who Were Establishing or Developing Student Engagement by Disorder

Age- and sex-adjusted, four-year time period, 2009/10-2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)

Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Grade 8 Reading and Writing Assessment

An assessment of reading comprehension and writing of informal texts is conducted for Grade 8 students in publicly funded schools in Manitoba. This assessment is completed by teachers and students during the first term of the school year to review the students' reading and writing skills and to develop the best learning process to reach their competency goals. Students were assessed using the following reading and writing competencies: 1) understands key ideas and messages in a variety of texts; 2) interprets a variety of texts; 3) responds critically to a variety of texts; 4) generates, selects, and organizes ideas to support the reader's understanding; 5) chooses language to make an impact on the reader; and 6) uses conventions and resources to edit and proofread to make the meaning clear. Children who are evaluated for the Grade 8 Reading and Writing Assessment are typically 13 or 14 years old. Compared to older children, the prevalence of the following indicators will be lower among Grade 8 students: substance use disorders (within externalizing disorders), psychotic disorders, and suicide and attempted suicide.

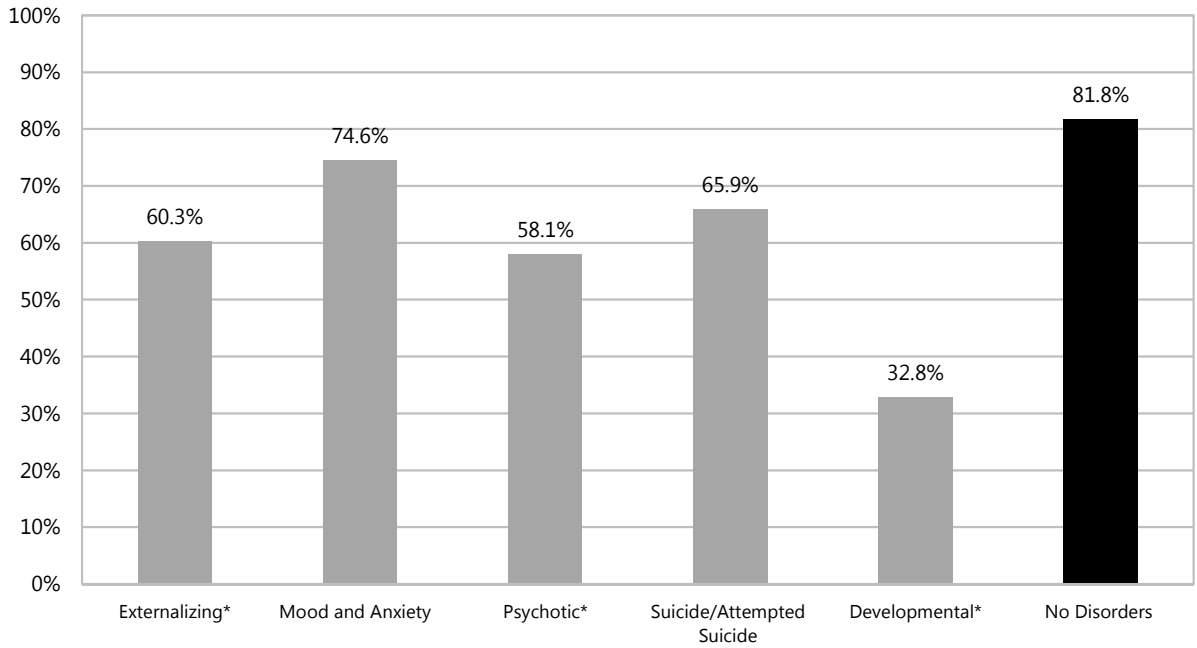
We calculated the age- and sex-adjusted percentages of Grade 8 students who were 'meeting' or 'approaching' expectations on all six reading and writing competencies in the second time period: that is, fiscal years 2009/10-2012/13. These results are presented in Figure 5.5 by mental health indicator.

Key Findings

- A lower percentage of students diagnosed with a externalizing disorders, psychotic disorders and developmental disorders were 'approaching' or 'meeting' Grade 8 expectations for reading and writing compared to students with no disorders. For example, 60.3% of students with an externalizing disorder were 'approaching' or 'meeting' Grade 8 expectations for reading and writing compared to 81.8% of those with no disorders.

Figure 5.5: Percentage of Grade 8 Adolescents Meeting or Approaching Expectations for Reading and Writing by Disorder

Age- and sex-adjusted, four-year time period, 2009/10-2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)

Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

High School Completion

High school completion is a level of educational attainment whereby the student has completed the requirements for high school.

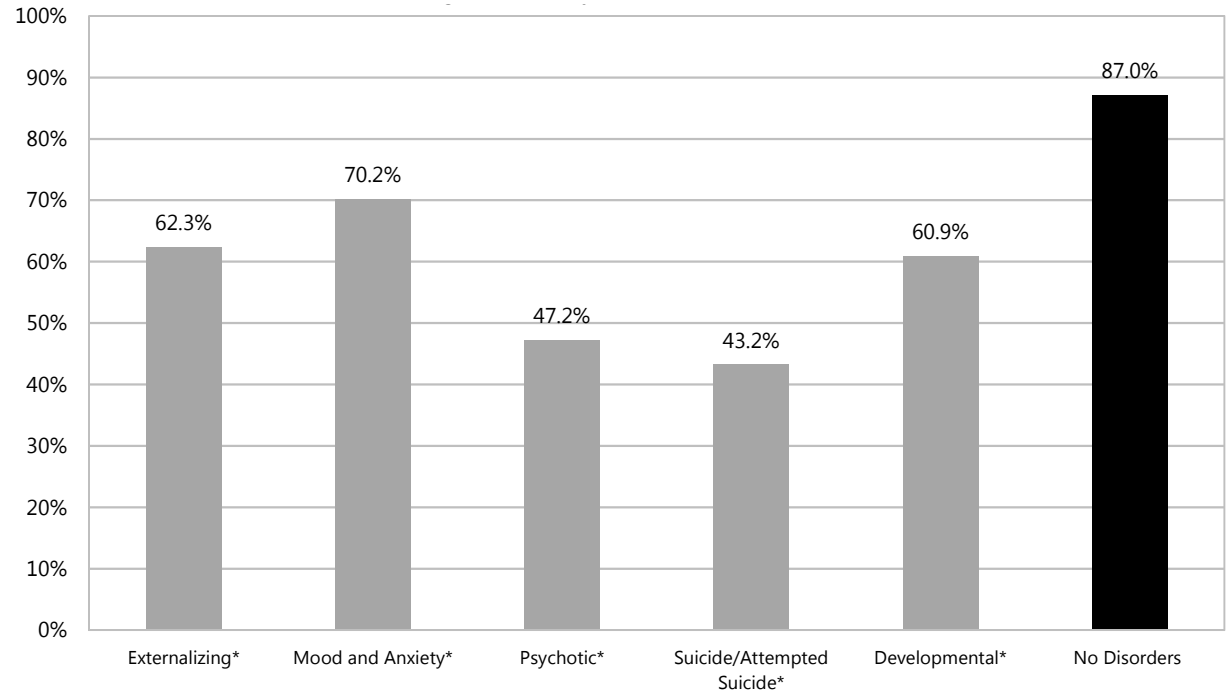
We calculated the age- and sex-adjusted percentages of students who completed high school in two fiscal years: that is, 2008/09 and 2012/13. These results are presented in Figure 5.6 and Table 5.1 by mental health indicator.

Key Findings

- A lower percentage of children diagnosed with a disorder completed high school compared to students with no disorders. For example, 47.2% of students who were diagnosed with a psychotic disorder had completed high school in 2012/13, compared to 87.0% of those with no disorders.
- A larger proportion of adolescents with no disorders graduated from high school in 2012/13 than in 2008/09.

Figure 5.6: Percentage of Adolescents Graduating from High School by Disorder

Age- and sex-adjusted, 2009/10-2012/13



* Indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)

Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 5.1: Percentage of Adolescents Graduating from High School by Disorder

Age- and sex-adjusted

Disorder	2005/06-2008/09	2009/10-2012/13
Externalizing (1,2)	60.2%	62.3%
Mood and Anxiety (1,2)	69.8%	70.2%
Psychotic (1,2)	46.1%	47.2%
Suicide/Attempted Suicide (1,2)	42.2%	43.2%
Developmental (1,2)	58.0%	60.9%
No Disorders (t)	85.0%	87.0%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2005/06-2008/09 ($p<0.01$)

2 indicates a statistically significant difference between children with the disorder and No Disorders in 2009/10-2012/13 ($p<0.01$)

t indicates a statistically significant difference in the change over time for the disorder ($p<0.05$)

Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

What do these results mean?

Children diagnosed with mental disorders, developmental disorders, and with suicidal behaviours had poorer educational outcomes compared to those with no disorders, suggesting that these disorders interfere with academic achievement (consistent with studies described below). We note that among children with mental disorders, those with psychotic disorders and suicide behaviours had the poorest educational outcomes, followed by externalizing disorders and then mood and anxiety disorders. As expected, children with developmental disorders had some of the poorest educational outcomes, most likely due to their language, motor, and learning disabilities.

It is important to keep in mind that the educational outcomes (Grade 3, 7, and 8 assessments) examined in this study are based on data obtained by the Department of Education and Training. The data on some children are not included in these datasets, such as children who are not in the public school system. Children from some First Nations schools are not found in the Education and Training dataset, because those schools do not consistently provide data to the department. The data gaps could influence the magnitude of the differences found in the educational outcomes between children with and without disorders.

We found large differences in the percentage of high school completion between children with and without disorders. Among the educational outcomes examined in this report, high school completion may be the most objective indicator of academic achievement. The data used to calculate this indicator, and the way we defined it, permitted us to include most children in the province, even those who were no longer in the school system.[3] In contrast to the other indicators in this chapter, which are based on a single teacher's assessment, high school completion is the accumulation of students' performance records across multiple subjects and grades, and is thus less prone to bias.

Our findings are consistent with previous studies examining the relationship between mental disorders and educational outcomes. Mojtabai, Stuart, and Hwang (2015), using the US National Comorbidity study, followed children with mental disorders for 10 years and found that these children were less likely to complete high school and college. The mental disorders they studied were mood and anxiety disorders and externalizing disorders. They recommended expanding mental health services to prevent adverse educational outcomes (Mojtabai et al., 2015). Barkley, Fischer, Smallish, and Fletcher (2006) compared the educational outcomes of 149 children diagnosed with hyperactivity to 72 control children. Students diagnosed with hyperactivity were more likely to have repeated a grade, been suspended from high school, and have required special education in high school, as well as less being likely to have graduated from high school (Barkley et al., 2006). Similarly, Fergusson and Horwood (1995) found that children with early externalizing disorders (conduct disorder and ADHD) had poorer school achievement and delinquent behaviour in early to mid-adolescence.

3 The Department of Education and Training does not always receive complete data from the band-operated schools; therefore, we do not have information for all the children in the province.

CHAPTER 6: PHYSICAL HEALTH FOR CHILDREN BY MENTAL HEALTH INDICATORS

In this chapter we report the prevalence of physical health conditions among Manitoba's children by the following mental health indicators: externalizing disorders, mood and anxiety disorders, psychotic disorders, suicide and attempted suicide, and developmental disorders. These mental health indicators were defined in detail in previous chapters. The prevalence of physical health conditions for children diagnosed with a disorder were compared to the prevalence for children with no disorders. The term "no disorders" refers to no mental disorder, no developmental disorder, and no suicide or attempted suicide. We will sometimes refer to *suicide* or *attempted suicide* as *suicidal behaviours*. Through our analyses, we did not attempt to explain any differences we report, but rather we describe how common the physical health conditions are among children in all groups.

The indicators are examined over two time periods to determine if there were changes over time. These time periods will be defined by each physical health condition, and is presented in two ways: a graph for the most current time period and a table for both time periods. The graphs visually illustrate the differences in physical health conditions in children with disorders and suicidal behaviours, and children with no disorders. The tables offer the precise percentages and show differences across time periods.

It should be noted that because the age of onset is different across mental health indicators, three different age ranges were established to examine the indicators: 0-19 years for developmental disorders, 6-19 years for externalizing disorders and mood and anxiety disorders, and 13-19 years for psychotic disorders and suicide and attempted suicide. The age groupings are explained in greater detail in Chapter 1.

The physical health conditions were chosen based on their prevalence and how well they could be captured using the Repository data. Although death (mortality) is not a physical health condition and is relatively rare in childhood, it is important to determine whether it is more frequent in those with disorders compared to those with no disorders.

A definition of each of the following physical health conditions is provided prior to the presentation of the prevalence results:

- Asthma;
- Diabetes;
- Atopic Dermatitis; and
- Mortality

Only statistically significant results are described in the text. Differences between children with and without diagnosed disorders are tested at a 0.01 level of significance and differences across the two time periods are tested at the 0.05 level of significance (see Chapter 1 for details).

Asthma

Asthma is an inflammatory disorder of the airways, characterized by periodic attacks of wheezing, shortness of breath, chest tightness, and coughing. It is the most common chronic condition in children. This report provides the asthma prevalence in children aged 6 and older because definitions of asthma that are based on symptoms, physician diagnoses, or drug prescriptions often cannot distinguish chronic asthma from wheezing in preschool children (Bisgaard & Bonnelykke, 2010; Kozyrskyj, Mustard, & Becker, 2004). The definition of asthma is found in the technical appendix.

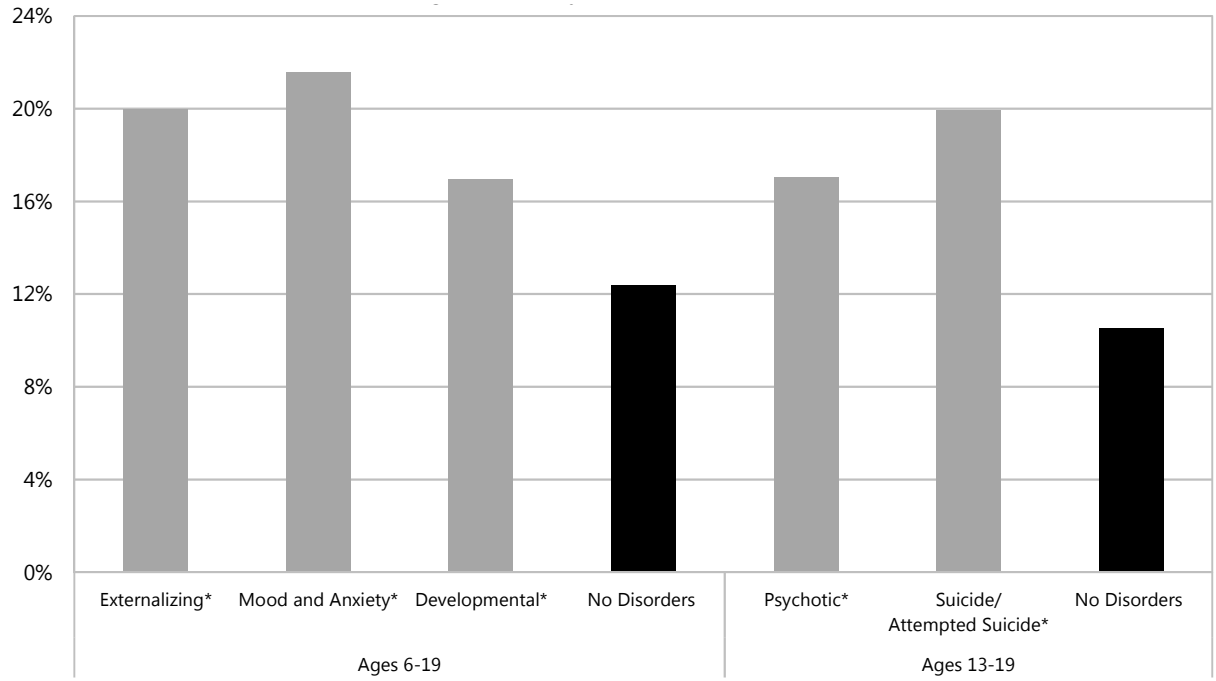
Figure 6.1 and Table 6.1 present the age- and sex-adjusted asthma prevalence among children by mental health indicator in two 2-year periods: 2007/08-2008/09 and 2011/12-2012/13.

Key Findings

- Children diagnosed with developmental disorders, externalizing disorders, or mood and anxiety disorders had a higher prevalence of asthma compared to children with no disorders in both time periods. For example, 20.0% of children diagnosed with an externalizing disorder were also diagnosed with asthma compared to 12.4% of those with no disorders.
- Children diagnosed with a psychotic disorder or who had attempted or died by suicide had a higher asthma prevalence than children with no disorders.

Figure 6.1: Asthma Prevalence in Children by Disorder

Age- and sex-adjusted, 2011/12-2012/13



* indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 6.1: Asthma Prevalence in Children by Disorder

Age- and sex-adjusted

Disorder	2007/08-2008/09	2011/12-2012/13
Ages 6-19		
Externalizing (1,2)	18.7%	20.0%
Mood and Anxiety (1,2)	21.3%	21.6%
Developmental (1,2)	15.9%	17.0%
No Disorders	12.3%	12.4%
Ages 13-19		
Psychotic (2)	13.5%	17.0%
Suicide/Attempted Suicide (2)	14.8%	19.9%
No Disorders	10.5%	10.5%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2007/08-2008/09 ($p<0.01$)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2011/12-2012/13 ($p<0.01$)
t indicates a statistically significant difference in the change over time for the disorder ($p<0.05$)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide.

Diabetes

Diabetes is defined as a chronic condition in which the pancreas no longer produces enough insulin (Type 1 diabetes) or when cells stop responding to the insulin that is produced (Type 2 diabetes), so that glucose in the blood cannot be absorbed into the cells of the body. Type 1 diabetes is controlled by regular insulin injections, while Type 2 diabetes can usually be controlled with diet and oral medication. In children, Type 1 diabetes is the more common type of diabetes (Dabelea, Mayer-Davis, & Saydah, 2014), but in this report, we present the combined prevalence of type 1 and type 2 diabetes because the medical claims data does not distinguish between these types.

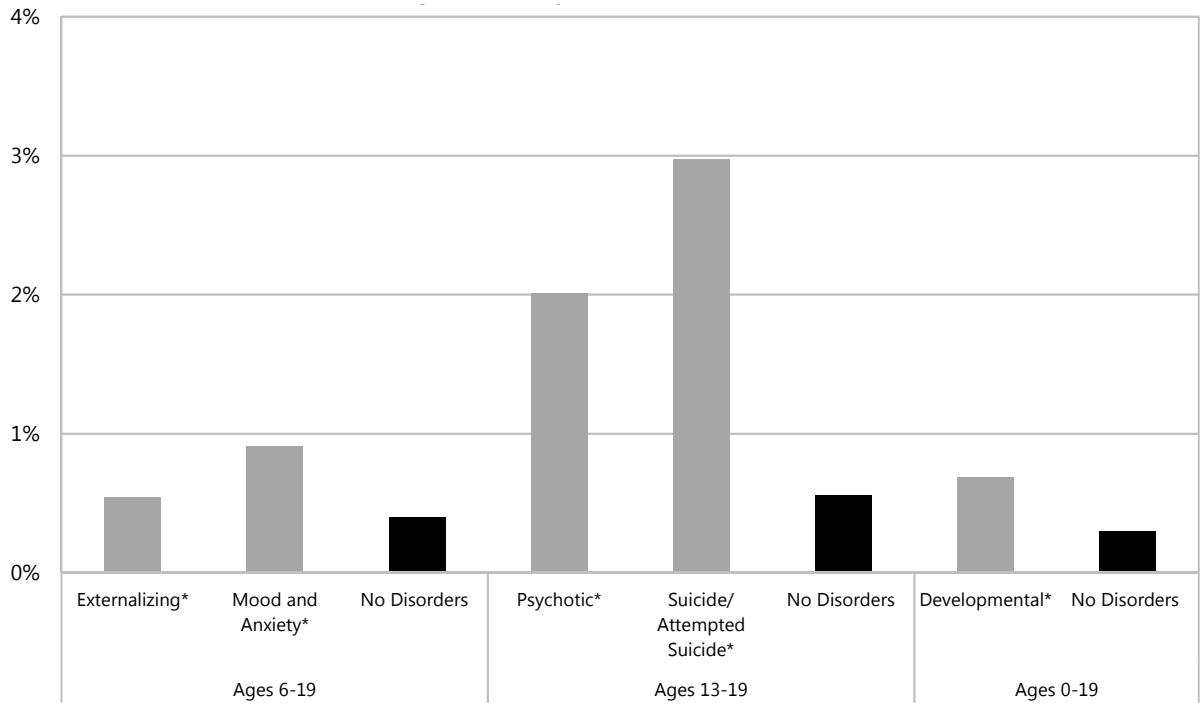
Figure 6.2 and Table 6.2 present the age- and sex-adjusted diabetes prevalence among children by mental health indicator in two 3-year periods: 2006/07-2008/09 and 2010/11-2012/13.

Key Findings

- Children diagnosed with developmental disorders, externalizing disorders, or mood and anxiety disorders, as well as those with suicidal behaviours, had a higher prevalence of diabetes than children with no disorders in both time periods. For example, 0.7% of children diagnosed with developmental disorders were diagnosed with diabetes compared to 0.3% of those with no disorders.
- Children diagnosed with psychotic disorders had a higher diabetes prevalence than children with no disorders.

Figure 6.2: Diabetes Prevalence in Children by Disorder

Age- and sex-adjusted, 2010/11-2012/13



* indicates a statistically significant difference between children with the disorder and No Disorders (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 6.2: Diabetes Prevalence in Children by Disorder

Age- and sex-adjusted

Disorder	2006/07-2008/09	2010/11-2012/13
Ages 6-19		
Externalizing (1,2)	0.5%	0.5%
Mood and Anxiety (1,2)	0.9%	0.9%
No Disorders	0.4%	0.4%
Ages 13-19		
Psychotic (2)	1.3%	2.0%
Suicide/Attempted Suicide (1,2)	2.3%	3.0%
No Disorders	0.5%	0.6%
Ages 0-19		
Developmental (1,2)	0.7%	0.7%
No Disorders	0.3%	0.3%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2006/07-2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2010/11-2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time for the disorder (p<0.05)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Atopic Dermatitis

Atopic dermatitis, also known as atopic eczema, is a type of inflammation of the skin that results in itchy, red, swollen, and cracked skin. It typically starts in childhood with changing severity over the years. In infants, much of the body may be affected. Scratching worsens symptoms and affected people have an increased risk of skin infections or of developing hay fever or asthma (National Institute of Arthritis and Musculoskeletal and Skin Diseases, 2013).

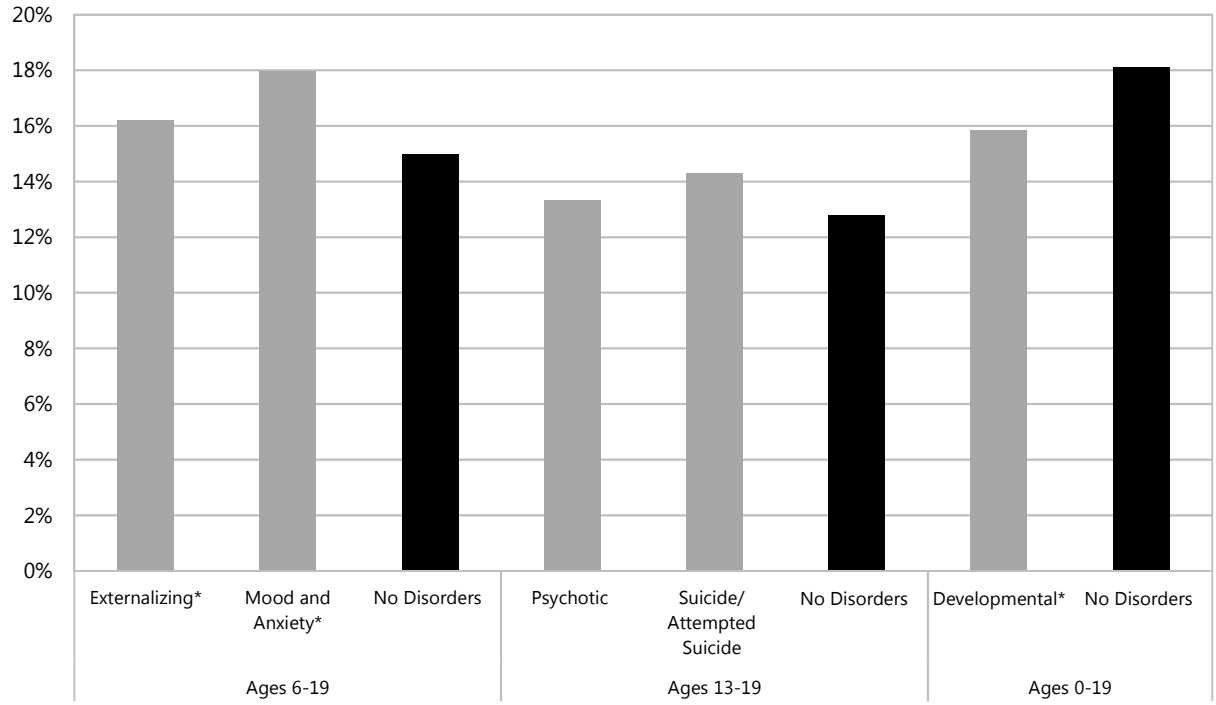
Figure 6.3 and Table 6.3 present the age- and sex-adjusted atopic dermatitis prevalence among children by mental health indicator in the fiscal years 2008/09 and 2012/13.

Key Findings

- In 2012/13, the atopic dermatitis prevalence for children diagnosed with externalizing disorders was higher than for children with no disorders.
- In both fiscal years, children diagnosed with mood or anxiety disorders had a higher prevalence of atopic dermatitis than children with no disorders.
- Conversely, in both fiscal years, children diagnosed with developmental disorders had a lower prevalence of atopic dermatitis than children with no disorders.
- Among children with no disorders the prevalence of atopic dermatitis decreased over time.

Figure 6.3: Atopic Dermatitis Prevalence in Children by Disorder

Age- and sex-adjusted, 2012/13



* indicates a statistically significant difference between children with the disorder and No Disorders ($p<0.01$)

Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Table 6.3: Atopic Dermatitis Prevalence in Children by Disorder

Age- and sex-adjusted

Disorder	2008/09	2012/13
Ages 6-19		
Externalizing (2)	16.7%	16.2%
Mood and Anxiety (1,2)	18.5%	18.0%
No Disorders (t)	16.2%	15.0%
Ages 13-19		
Psychotic	12.1%	13.3%
Suicide/Attempted Suicide	12.8%	14.3%
No Disorders (t)	14.0%	12.8%
Ages 0-19		
Developmental (1,2)	15.3%	15.8%
No Disorders (t)	19.7%	18.1%

1 indicates a statistically significant difference between children with the disorder and No Disorders in 2008/09 ($p<0.01$)

2 indicates a statistically significant difference between children with the disorder and No Disorders in 2012/13 ($p<0.01$)

t indicates a statistically significant difference in the change over time for the disorder ($p<0.05$)

Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

Child Mortality

The child mortality rate is the number of deaths in a given year, expressed per 100,000 children aged 0-19 years. For the mental health indicator "suicide and attempted suicide", we did not calculate the mortality rate for the children who died by suicide. These children were removed from this analysis.

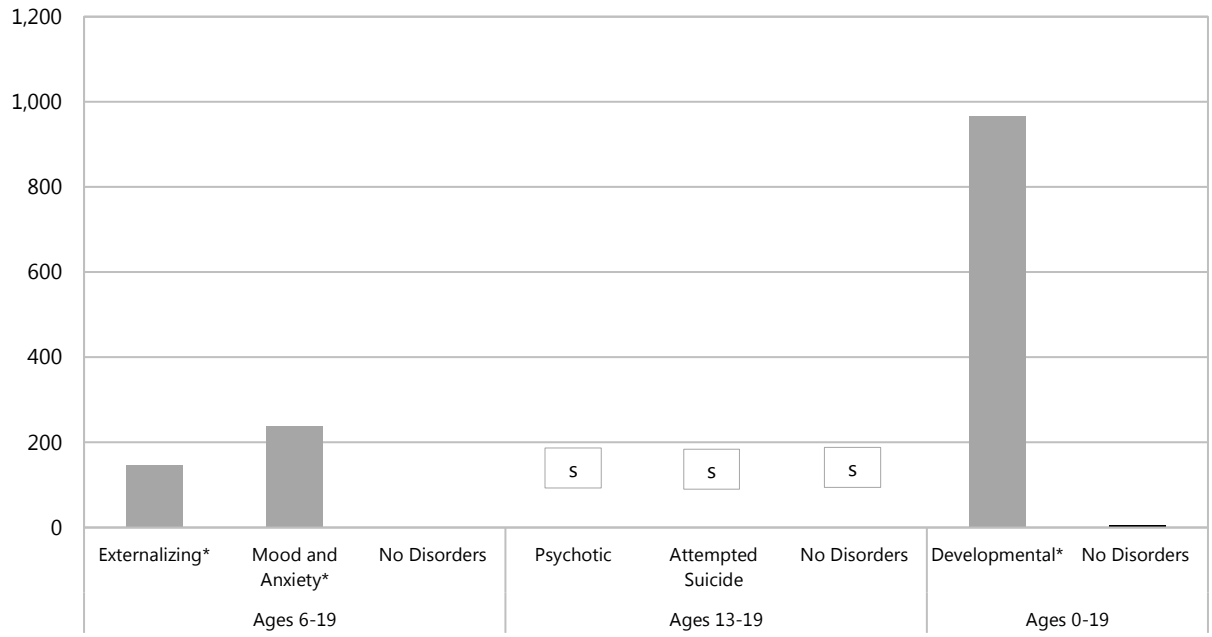
Figure 6.4 and Table 6.4 present the age- and sex-adjusted mortality rates among children by mental health indicator in two 4-year periods (2005/06-2008/09 and 2009/10-2012/13).

Key Findings

- In both time periods, children diagnosed with developmental disorders, externalizing disorders, or mood and anxiety disorders had a higher mortality rate than children with no disorders.
- Children diagnosed with developmental disorders and those with no disorders had a lower mortality rate in the second time period compared to the first.
- We were unable to report the mortality rates among children with psychotic disorders or who had attempted suicide, because of the small numbers of children.

Figure 6.4:Child Mortality Rate by Disorder

Age- and sex-adjusted, per 100,000 children, 2009/10-2012/13



s indicates suppressed due to small numbers
* indicates a statistically significant difference between children with the disorder and No Disorders (p<0.01)
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide
Note: in calculating the mortality rate, we removed all children who had died by suicide in the Attempted Suicide indicator

Table 6.4: Child Mortality Rate by Disorder

Age- and sex-adjusted, per 100,000 children

Disorder	2005/06-2008/09	2009/10-2012/13
Ages 6-19		
Externalizing (1,2)	185.9	145.7
Mood and Anxiety (1,2)	312.1	238.1
No Disorders (t)	9.2	2.0
Ages 13-19		
Psychotic (s)	s	s
Attempted Suicide (s)	s	s
No Disorders (s)	10.4	s
Ages 0-19		
Developmental (1,2,t)	1,691.8	966.7
No Disorders (t)	10.5	5.2

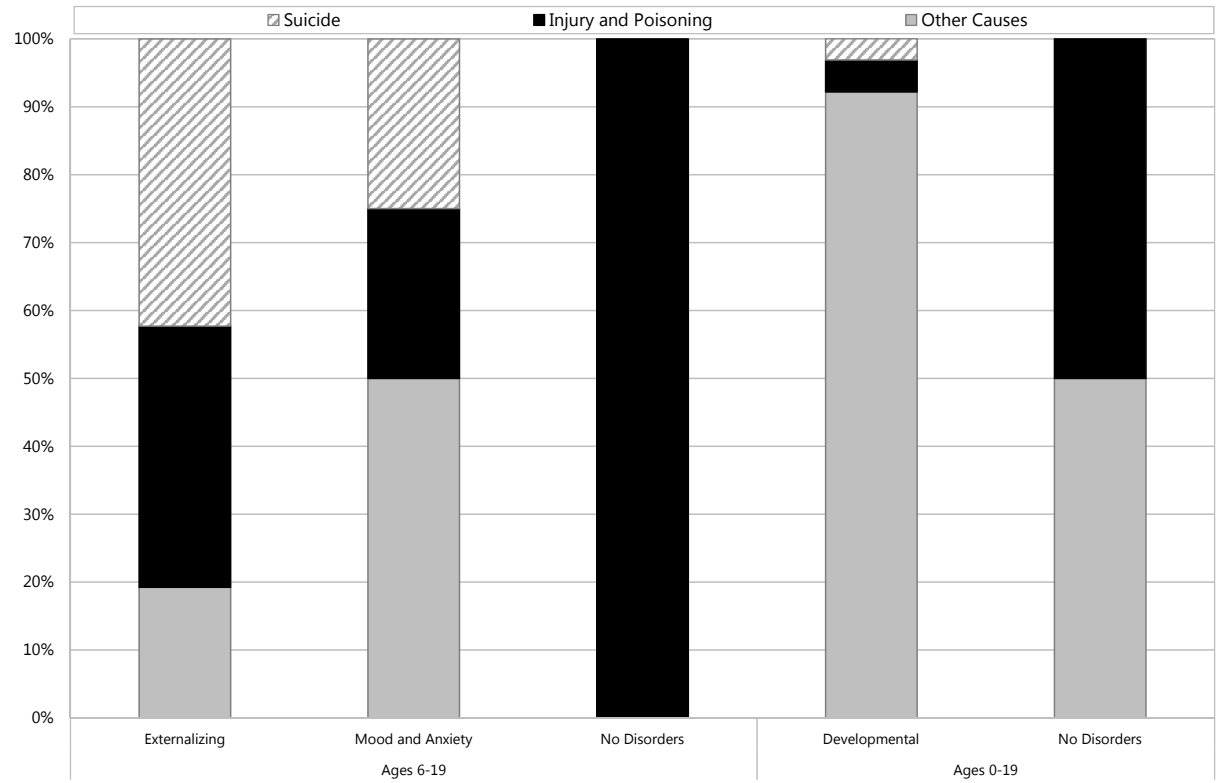
1 indicates a statistically significant difference between children with the disorder and No Disorders in 2005/06-2008/09 (p<0.01)
2 indicates a statistically significant difference between children with the disorder and No Disorders in 2009/10-2012/13 (p<0.01)
t indicates a statistically significant difference in the change over time for the disorder (p<0.05)
s indicates suppressed due to small numbers
Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide
Note: in calculating the mortality rate, we removed all children who had died by suicide in the Attempted Suicide indicator

Causes of Child Mortality

Figure 6.5 shows the most common causes of death among children. Among children with externalizing disorders and mood and anxiety disorders, suicide is a notable cause of death. Few deaths attributable to suicide were observed among children with developmental disorders. Similar results were found in first time period (see Appendix 9). Among children aged 0-19 with no disorders, the main causes of child mortality were external causes (injury or poisoning) and other causes. The few deaths among children aged 6-19 with no disorders were all due to injury or poisoning. The "other causes" category included the following ICD codes associated with mortality: cancer; diseases of the nervous system; endocrine, nutritional and metabolic disease; disease of the respiratory system; symptoms, signs, and abnormal clinic and laboratory findings; disease of the digestive system; mental and behavioural disorders; and conditions originating in the perinatal period.

Figure 6.5: Cause of Child Death by Disorder, 2009/10-2012/13

Age- and sex-adjusted



Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

What do these results mean?

Children with mental disorders have a higher prevalence of asthma, diabetes, and atopic dermatitis than children with no disorders. Mental disorders in children are also associated with higher mortality rates. The most common causes of mortality include suicide, injuries and poisoning, and congenital abnormalities. We did not determine whether the physical health problems preceded the mental disorders or vice versa.

The link between asthma and mental disorders has been examined in a number of studies. One study found not only a higher rate of asthma among children with ADHD compared to controls, but also that the risk of ADHD increased for children with asthma (Tsai, Chang, Mou, Sung, & Lue, 2013). Morgensen, Larsson, Lundholm, and Almqvist (2011) found that 8- and 9-year-olds with asthma had an almost twofold increased risk of having symptoms of hyperactivity or impulsivity, and that by the time they were 13 or 14 years old, they had more than twofold increased risk of having hyperactivity or impulsivity symptoms. Because the study by Morgensen et al. (2011) was based on twins, they were able to investigate the mechanisms underlying this association. They reported that the association between asthma and symptoms of hyperactivity or impulsivity was partially explained by genetic influences (Mogensen et al., 2011). A study of 11- to 17-year-olds enrolled in a Health Maintenance Organization found that a significantly higher percentage of youth with asthma (16.3%) compared to a control group (8.6%) met DSM-IV criteria for one or more anxiety and/or depression disorders (Katon et al., 2007). Finally, a fourth study using data from the 2011 Youth Risk Behavioural Surveys examined levels of two-week sadness (a proxy for depression). Youths with asthma had higher levels (35.2%) of sadness compared to those without asthma (26.7%), and were more likely to report suicidal ideation and suicidal behaviours (Steinberg, Aldea, & Messias, 2015).

A few studies were found regarding the association between mental disorders and other physical health problems and with mortality. Yaghmaie, Koudelka, and Simpson (2013) reported that children with atopic dermatitis were more likely to have ADHD (odds ratio (OR): 1.87), depression (OR: 1.81), anxiety (OR: 1.77), conduct disorders (OR: 1.87), and autism (OR: 3.04) than control children after controlling for socioeconomic status. The association between atopic dermatitis and mental disorders was stronger among children with more severe skin conditions than milder ones. The stress of this chronic condition was posited to be an explanation for the higher rates of mental disorders among these children (Yaghmaie et al., 2013). Similarly, Tsai et al. (2013) reported an association between ADHD and atopic diseases. One study showed that people with diabetes have a higher prevalence of mental disorders compared with people without diabetes (Wandell, Ljunggren, Wahlstrom, & Carlsson, 2014). ADHD was also found to be associated with higher mortality rates independent of a diagnosis of conduct disorder or oppositional disorder (Dalsgaard, Ostergaard, Leckman, Mortensen, & Pedersen, 2015).

Given that the rates of mortality were higher for children with mental disorders, partly due to suicide, these findings underscore the importance of early detection for all mental disorders. While the mechanisms underlying the relationship between physical and mental health are not well understood, healthcare providers should be alert for signs and symptoms of mental illness in the paediatric population.

CHAPTER 7: EARLY CHILDHOOD FACTORS AND MENTAL DISORDERS IN MIDDLE CHILDHOOD

Introduction

Mental disorders in children can negatively impact their lives by interfering with their ability to succeed in school, establish healthy relationships, and eventually make their way into the workforce. It is important to understand the factors contributing to the development of these disorders in children. Many factors in early childhood (ages 0-5) are believed to influence the development of mental disorders. For instance, living in a high risk family environment (see definition below) and in a low socioeconomic area are stressful environments for young children and may lead to the development of mental disorders. Child development (both emotional and social) is influenced by the family environment and the socioeconomic area where the child lives and may be a pathway to explain the development of mental disorders. In this chapter, we explore the relationships between these early childhood factors and receiving a diagnosis of ADHD, conduct disorder, and mood and anxiety disorders in middle childhood (ages 6-12).

Objectives and Hypotheses

The specific objectives of this part of our research were as follows:

- To examine the relationship between children's development (emotional maturity and social competence) in kindergarten, as measured by the Early Development Instrument (EDI), and a diagnosis of a mental disorder in middle childhood. We hypothesized that low scores in child development at age 5 are associated with mental disorders in middle childhood;
- To determine the relationship between low SES in early childhood and a mental disorder diagnosis in middle childhood, and to ascertain whether this relationship is direct or whether it is explained by child development (EDI) scores or by family environment. We hypothesized that low SES in early childhood is associated with the diagnosis of mental disorders in middle childhood, and that this relationship is mediated or explained by child development (EDI) scores and high risk family environment;
- To examine the relationship between family environment in early childhood and a mental disorder diagnosis in middle childhood, and to determine whether this relationship is direct or whether it is mediated or explained by low child development (EDI) scores. We hypothesized that living in a high risk family environment in early childhood is associated with a diagnosis of mental disorders in middle childhood and that this relationship is explained by low child development scores.

Methods: How We Conducted the Analyses

Statistical Methods

In order to understand the complex inter-relationships among factors that are associated with children's mental disorders, a statistical modelling technique known as structural equation modelling (SEM) was used. Using SEM, we can examine both direct and indirect relationships between early childhood factors and mental disorders in children. An indirect relationship can occur when a third factor (a mediating factor) explains the relationship between the other factors. For example, a child's family environment is both directly and indirectly (through EDI scores) related to his/her diagnosis of mental disorders. Another important reason for the choice of SEM as our modelling approach is the presence of latent constructs, such as living in a low SES area and living in a high risk family environment.

We conducted several separate analyses to test our hypotheses. In one analysis, we loaded the EDI variables (social competence and emotional maturity) and the mental disorders (ADHD, conduct and mood and anxiety) into one

latent construct. Our results showed that EDI scores and the mental disorders did not measure the same construct. Hence, we have kept our analyses as presented in this report. We constructed separate composite models that included low SES, high risk family environment, EDI (social competence and emotional maturity), and mental disorders (ADHD, conduct disorder, and mood and anxiety disorders). In addition to these composite models we also conducted a separate mediation analysis to test whether there was a mediating factor causing an indirect relationship.

The following statistics were used to test the overall goodness of fit of our models. Bentler Comparative Fit Index (CFI) and Bentler-Bonett Non-Normed Index (NNFI) values greater than or equal to 9 were considered adequate (O'Rourke & Hatcher, 1994). The other statistics used were the root mean squared error of approximation (RMSEA), and the standardized root mean square residual (SRMSR). A model with a value less than 0.08 for both RMSEA and SRMSR was considered to be a good fit (O'Rourke & Hatcher, 1994). Implementation of the SEM models was done using SAS PROC CALIS in SAS® version 9.4 (SAS Institute Inc, 2011).

Description of Variables Used in the Models

We examined the following outcome variables: ADHD, conduct disorder, and mood and anxiety disorders. Each of the disorders examined in this chapter are described and defined in detail in Chapter 2. A child was considered to have a mental disorder if he/she met the definition of one of the disorders between their 6th birthday and the end of the study period (March 31, 2013). We examined other variables that are not directly found in the administrative data, but can be estimated through other observable measures. These variables are knows as "latent constructs". In these analyses, we have two latent constructs: *family environment* and *living in a low SES area*. The variables used for these analyses are described below:

- *Sex* – this variable was defined as a dichotomous variable.
- *Child's Age at EDI Assessment* – this is a continuous variable.
- *Early Development Instrument (EDI)* – children's development at school entry was measured with the EDI, which is an assessment completed by kindergarten teachers when children are 5 or 6 years old. The EDI measures five domains of child development; however, we have restricted our analyses to two of these domains: emotional maturity and social competence. Emotional maturity measures children's emotional development and social competence measures social development. We used continuous EDI scores from these two domains.
- *High Risk Family Environment* - this is a latent construct that was measured by the following four variables: family on income assistance (IA), family receiving services from Child and Family Services (CFS), mother was a teenager at the birth of her first child, and family has four or more children. These factors are measured during the children's early childhood (birth to age 4).
  - *Family on IA* – defined as a child living in a family that received income assistance for at least 1 month at any point during the child's early childhood.
  - *Family receiving services from CFS* – defined as a child living in a family that received any protection and support services from CFS at any point in his/her early childhood. This includes a child who has spent at least one day in care during early childhood.
  - *Mother was a teenager at the birth of her first child* – defined as a child whose mother was a teenager when her first child was born.
  - *Family has four or more children* – defined as a child who was from a family of four or more children during their early childhood period.
- *Living in a Low Socioeconomic Status Area* – this is a latent construct that is measured by the following three area-level variables from the census data based on the area where the child was living at age 4: income level (low income area), low high school completion rates, and high labour force unemployment.
  - Low income area – a dichotomous measure of whether the child is living in a low income area;
  - Low high school completion area – an area-level measure of the population who have not completed high school; and
  - High unemployment area – an area-level measure of the population that is not in the labour force.

Results

The cohort used for conducting the SEM included 21,802 children who were assessed with the EDI in school years 2005/06 and 2006/07. Appendix Table 10.1 in Appendix 10 shows the percentage of children with the factors or variables used in this analysis.

For additional results, see Appendix 10.

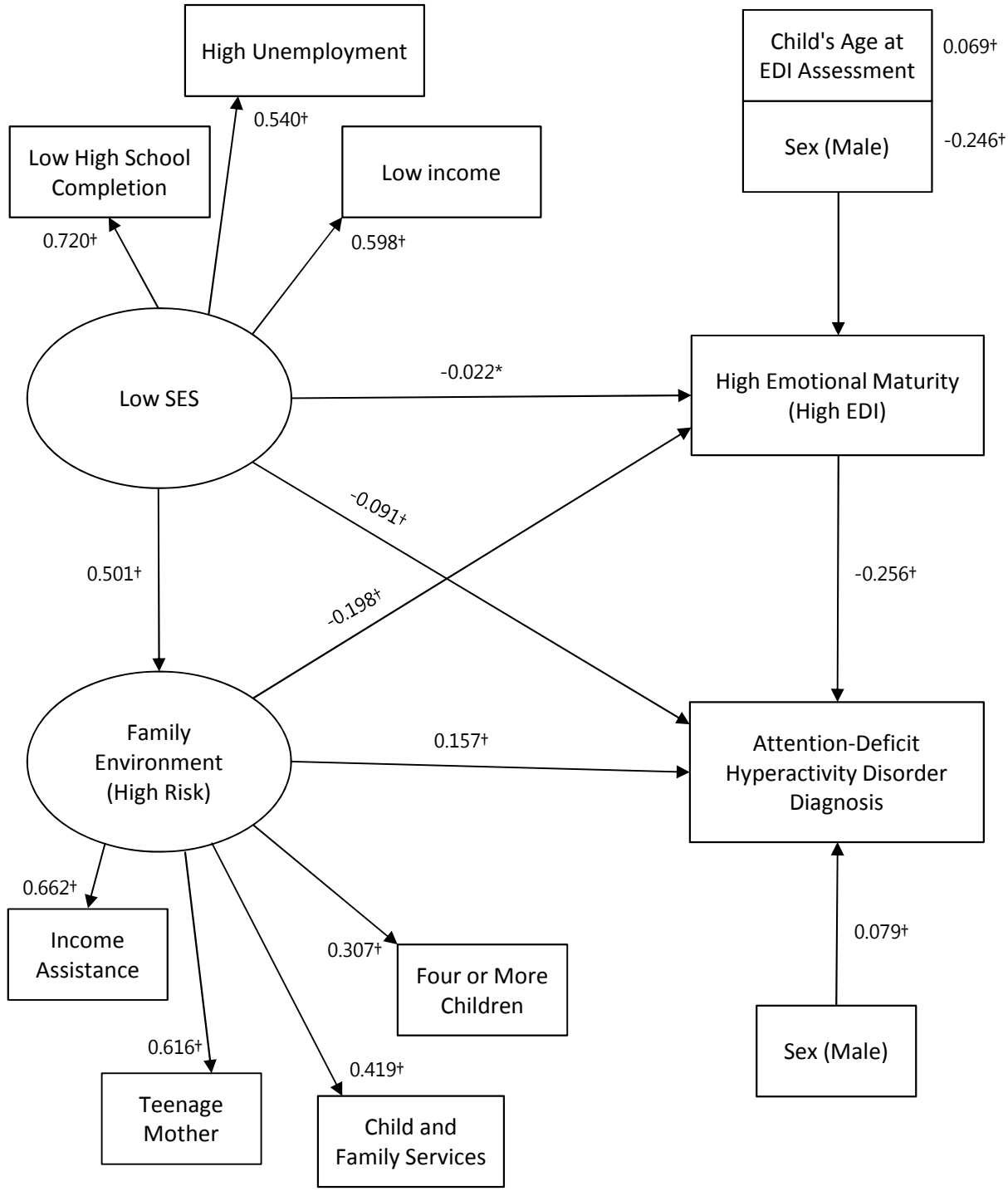
Models Examining Emotional Maturity, SES, Family Environment, and Mental Disorders

In the models shown in Figures 7.1, 7.2, and 7.3, we present the relationships between emotional maturity, low SES, high risk family environment, and being diagnosed with ADHD, conduct disorder, and mood or anxiety disorders. The results for these disorders follow a similar pattern and are therefore discussed together. With these models we can observe the unique contribution of each early childhood factor when all the factors have been accounted for. **Only statistically significant findings are reported**. A higher value signifies a stronger association. The results for the mediation analyses are reported here and the figures illustrating these analyses are found in Appendix 10 sections C, D, and E.

As expected, low emotional maturity scores are associated with a diagnosis for ADHD (-0.256), conduct disorder (-0.111), and mood and anxiety disorders (-0.061). These are negative coefficients, and we interpret these lower scores on emotional development as being associated with a mental disorder diagnosis. The value for a diagnosis of ADHD is the most negative, indicating that ADHD had the strongest relationship with low emotional maturity scores, followed by conduct disorder and then mood and anxiety disorders.

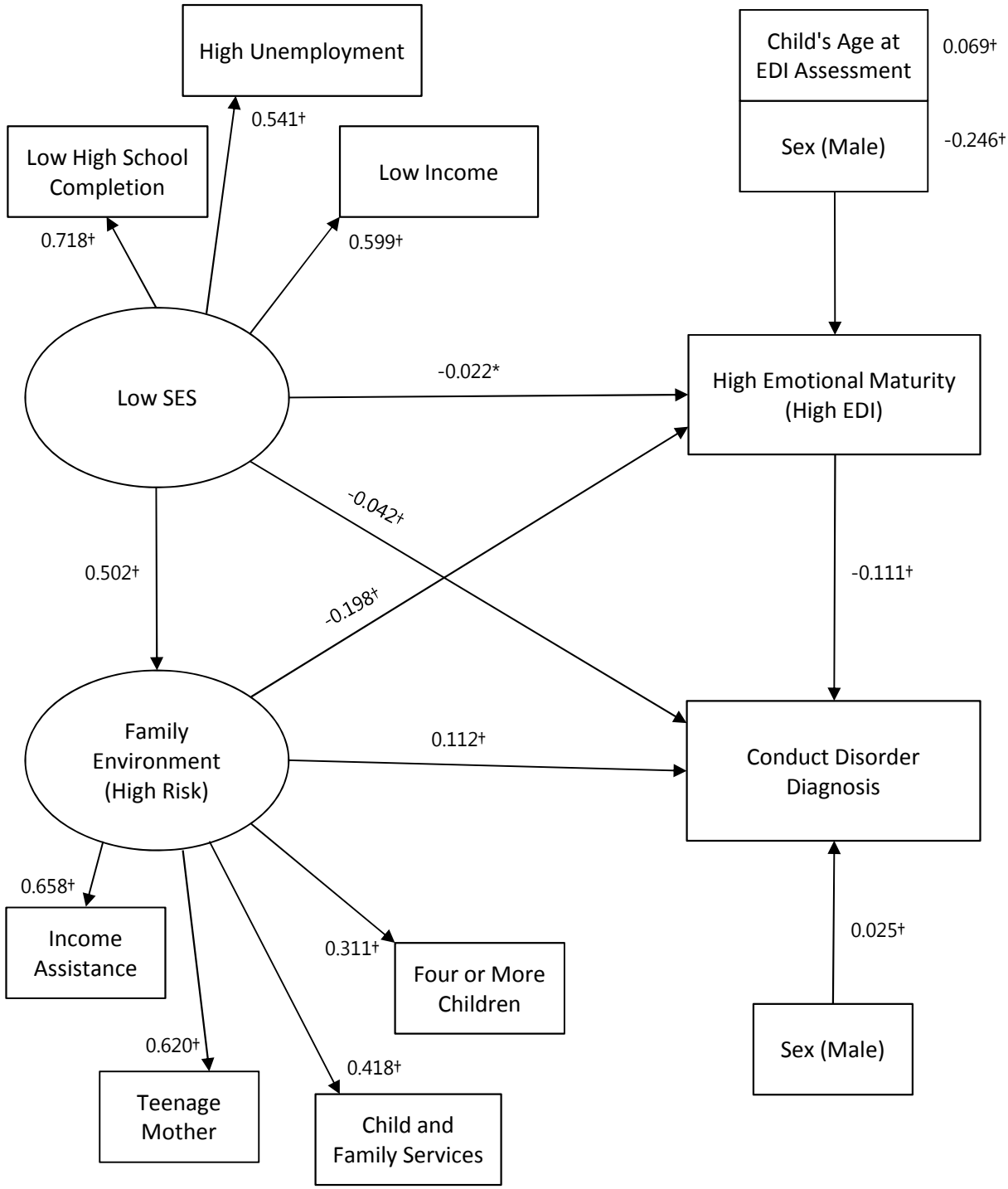
Unexpectedly, low SES was associated with a lower chance of being diagnosed with all three disorders: ADHD (-0.091), conduct disorder (-0.042), and mood and anxiety disorders (-0.064). This finding is counterintuitive, but is consistent with results reported earlier. Recall that in Chapter 2, we found that living in a low income rural area was associated with lower diagnostic prevalence of ADHD, conduct disorder, and mood and anxiety disorders (Figures 2.6, 2.12, 2.28). A potential reason for finding lower prevalence in rural, low income areas is that these areas may not have adequate resources to identify and treat mental disorders in children. It may also be a limitation of how salaried physician billings are captured in the administrative data. Salaried physicians in rural areas may not be submitting all their billing claims and therefore we may not be capturing all the diagnoses that have been made for these children.

Figure 7.1: Relationship Between Early Childhood Factors, Emotional Maturity (EDI), and Diagnosis of Attention-Deficit Hyperactivity Disorder, Full Model



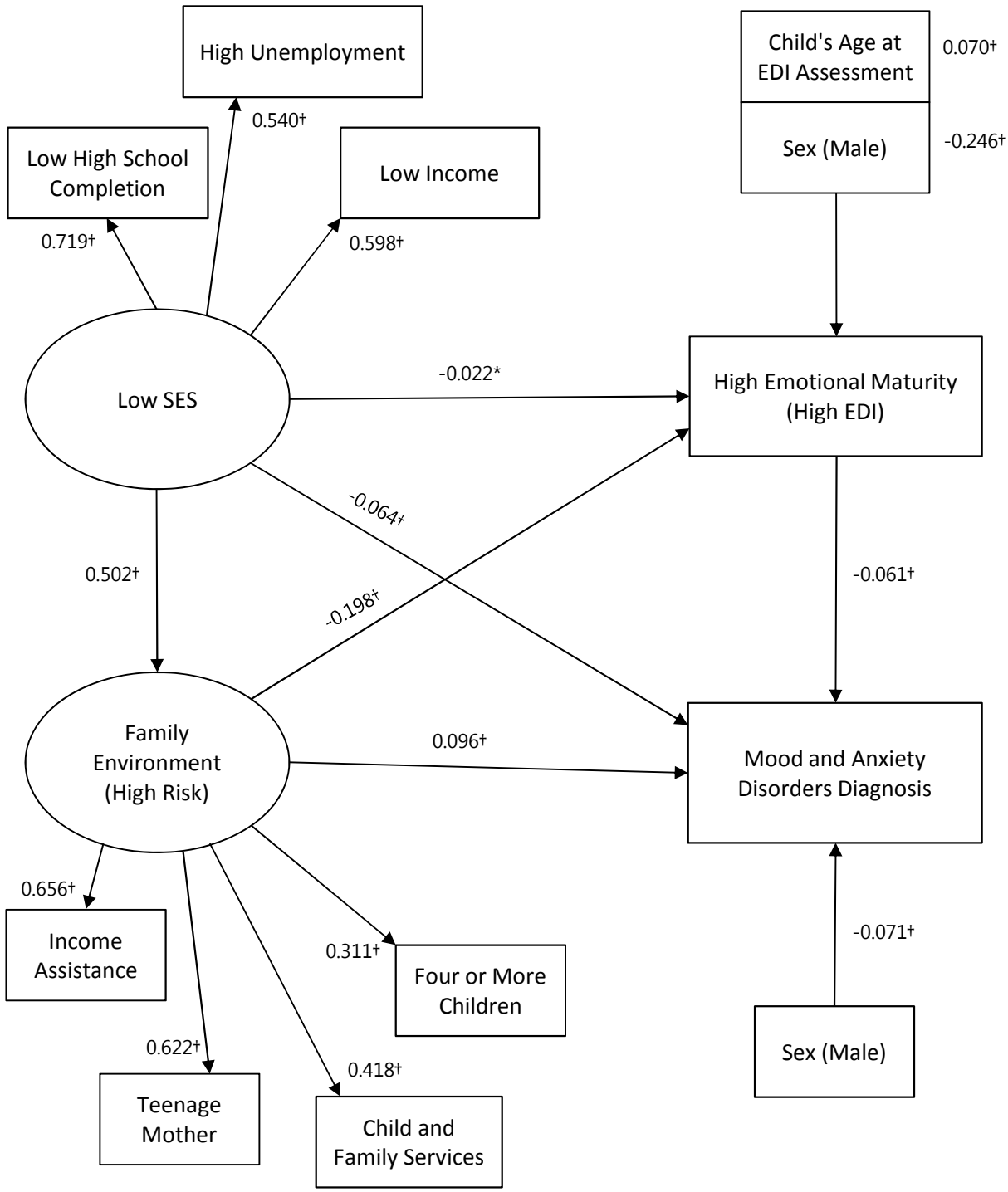
Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9367, NNFI=0.9032, RMSEA=0.0449, SRMSR=0.0275
All regression coefficients are standardized

Figure 7.2: Relationship Between Early Childhood Factors, Emotional Maturity (EDI), and Diagnosis of Conduct Disorder, Full Model



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9345, NNFI=0.9, RMSEA=0.0439, SRMSR=0.0262
All regression coefficients are standardized

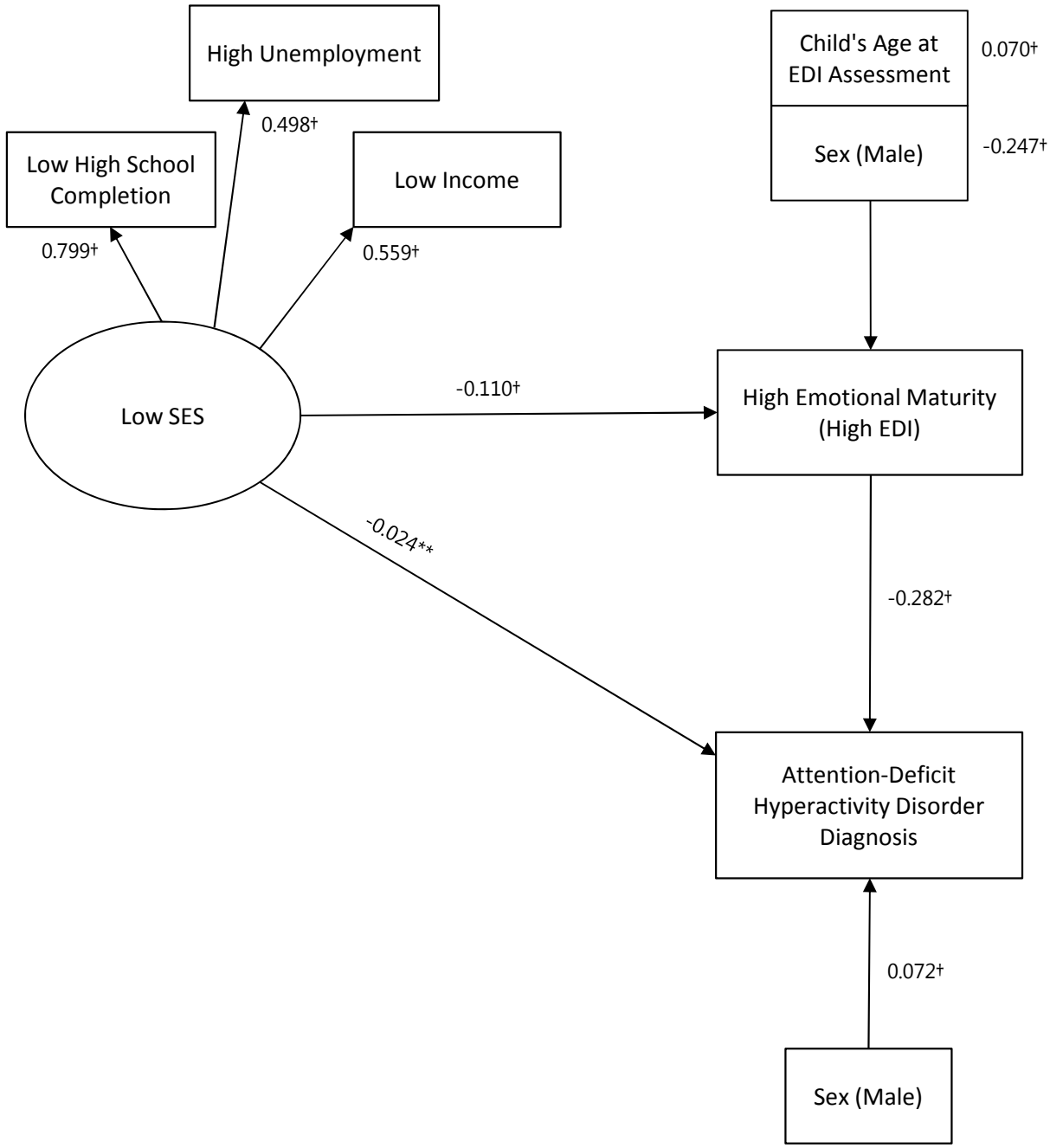
Figure 7.3: Relationship Between Early Childhood Factors, Emotional Maturity (EDI), and Diagnosis of Mood and Anxiety Disorders, Full Model



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9329, NNFI=0.8975, RMSEA=0.0442, SRMSR=0.0265
All regression coefficients are standardized

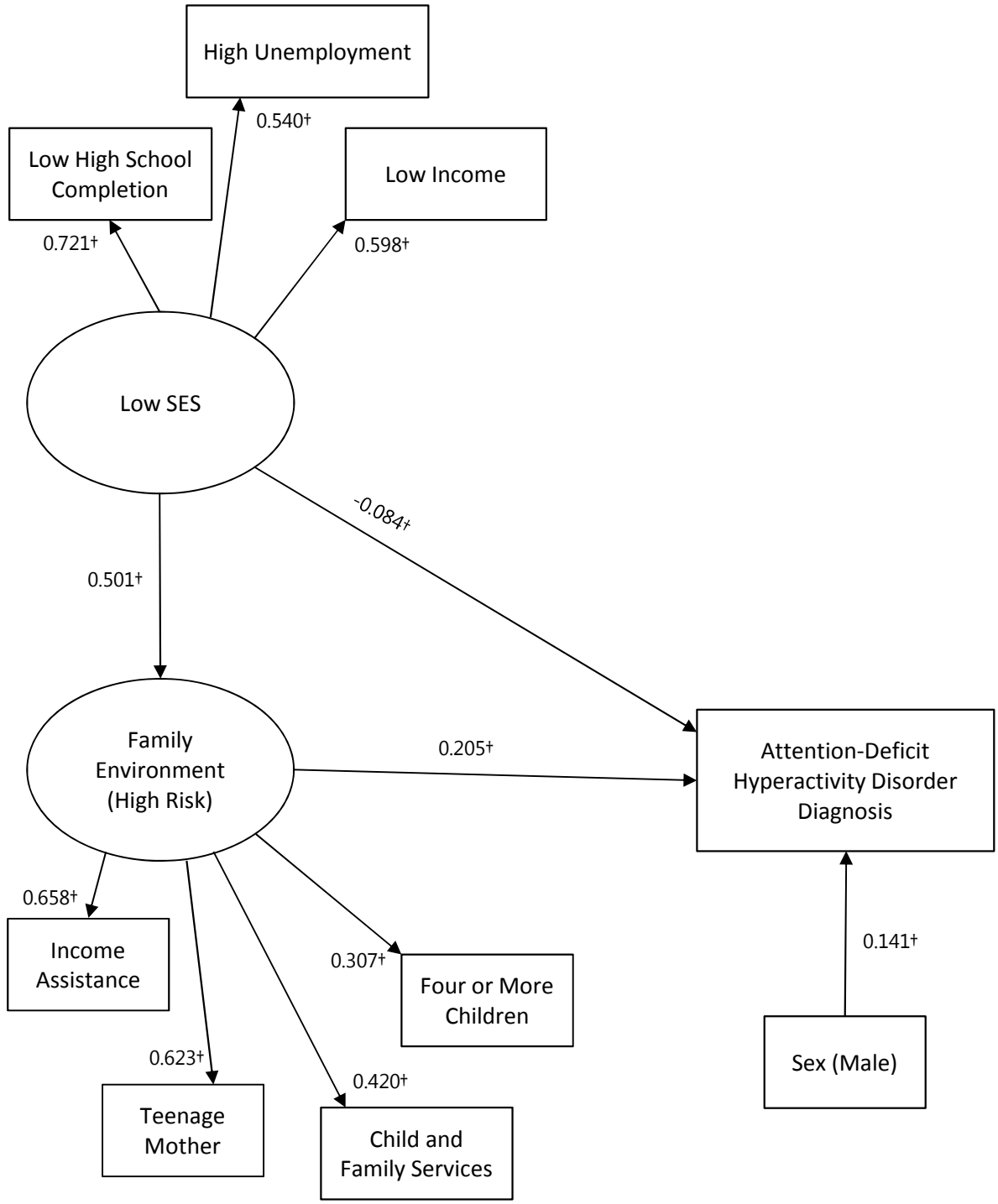
As hypothesized, we found emotional maturity and family environment are mediating factors. This means that the relationship between low SES and mental disorders is partially explained by emotional maturity and family environment. To illustrate these relationships, see Figure 7.4 that shows the mediation analyses testing whether emotional maturity is a mediating factor between low SES and ADHD. The pathway suggested in Figure 7.4 is that low SES is associated with low emotional maturity scores (-0.110) which in turn is associated with an ADHD diagnosis (-0.282). In Figure 7.5, we see that low SES is also associated with high risk family environment (0.501), which in turn is associated with a diagnosis of ADHD (0.205). The mediation analyses for conduct disorder and for mood and anxiety disorders follow the same pattern as the findings described for ADHD. The figures illustrating these are found in Appendix 10.

Figure 7.4: Examining Emotional Maturity (EDI) as Mediator Between Low SES and Diagnosis of Attention-Deficit Hyperactivity Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9891, NNFI=0.9746, RMSEA=0.0268, SRMSR=0.0133
All regression coefficients are standardized

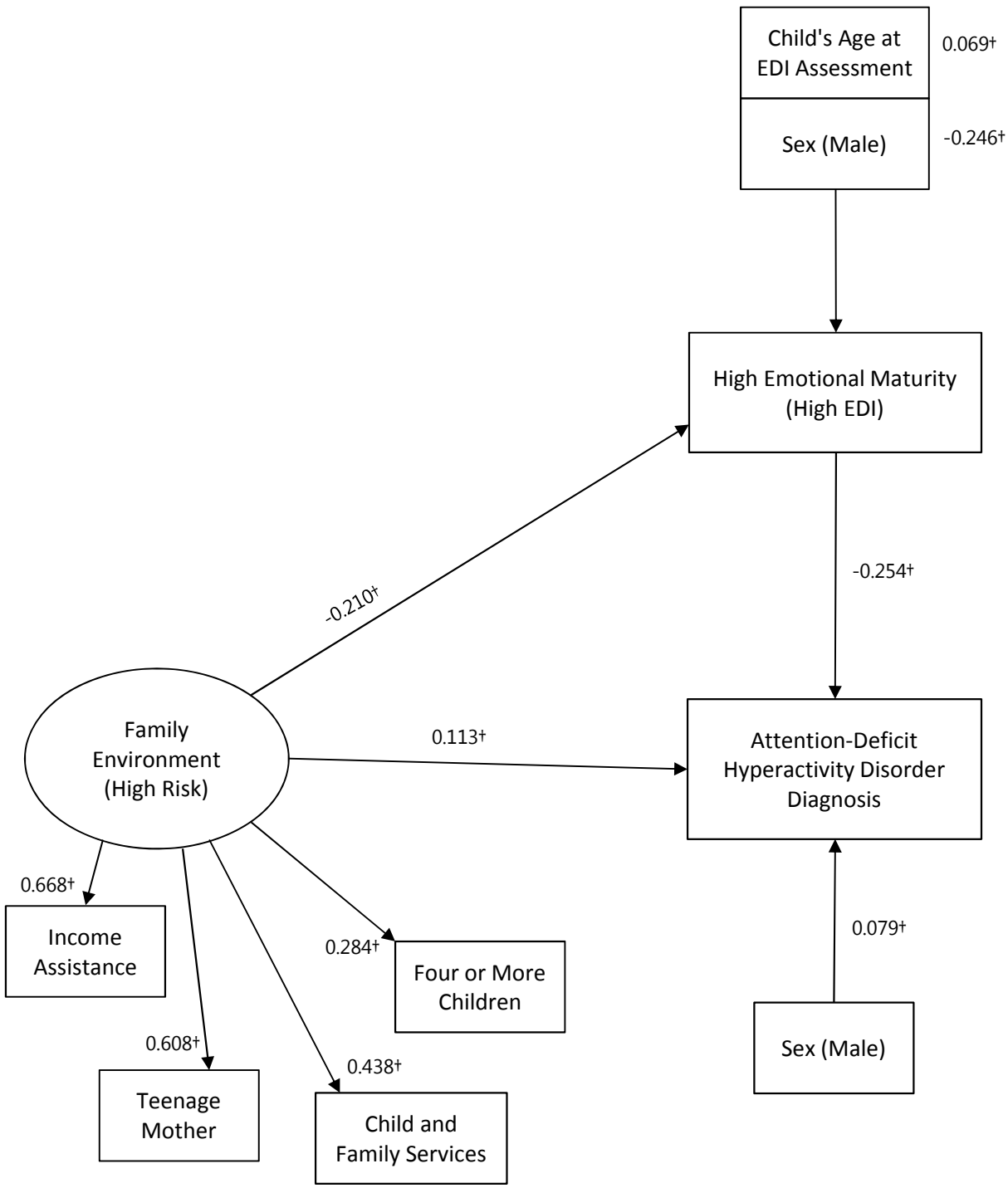
Figure 7.5: Examining Family Environment as Mediator Between Low SES and Diagnosis of Attention-Deficit Hyperactivity Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9275, NNFI=0.8913, RMSEA=0.0544, SRMSR=0.0324
All regression coefficients are standardized

As expected, in Figures 7.1, 7.2, 7.3, high risk family environment is associated with being diagnosed with ADHD (0.157), conduct disorder (0.112), and mood and anxiety disorders (0.096). As hypothesized, the relationship between high risk family environment and mental disorders is partially mediated or explained by low emotional maturity scores. To illustrate this relationship, see Figure 7.6 that shows the mediation analyses testing whether emotional maturity is a mediating factor between high risk family environment and ADHD. Being in a high risk family environment is negatively associated with high emotional maturity scores (-0.210), which in turn is negatively associated with being diagnosed with ADHD (-0.254). The mediation analyses for conduct disorder and for mood and anxiety disorders follow the same pattern as the findings described for ADHD. The figures illustrating these results are found in Appendix 10.

Figure 7.6: Examining Emotional Maturity (EDI) as Mediator Between Family Environment and Diagnosis of Attention-Deficit Hyperactivity Disorder

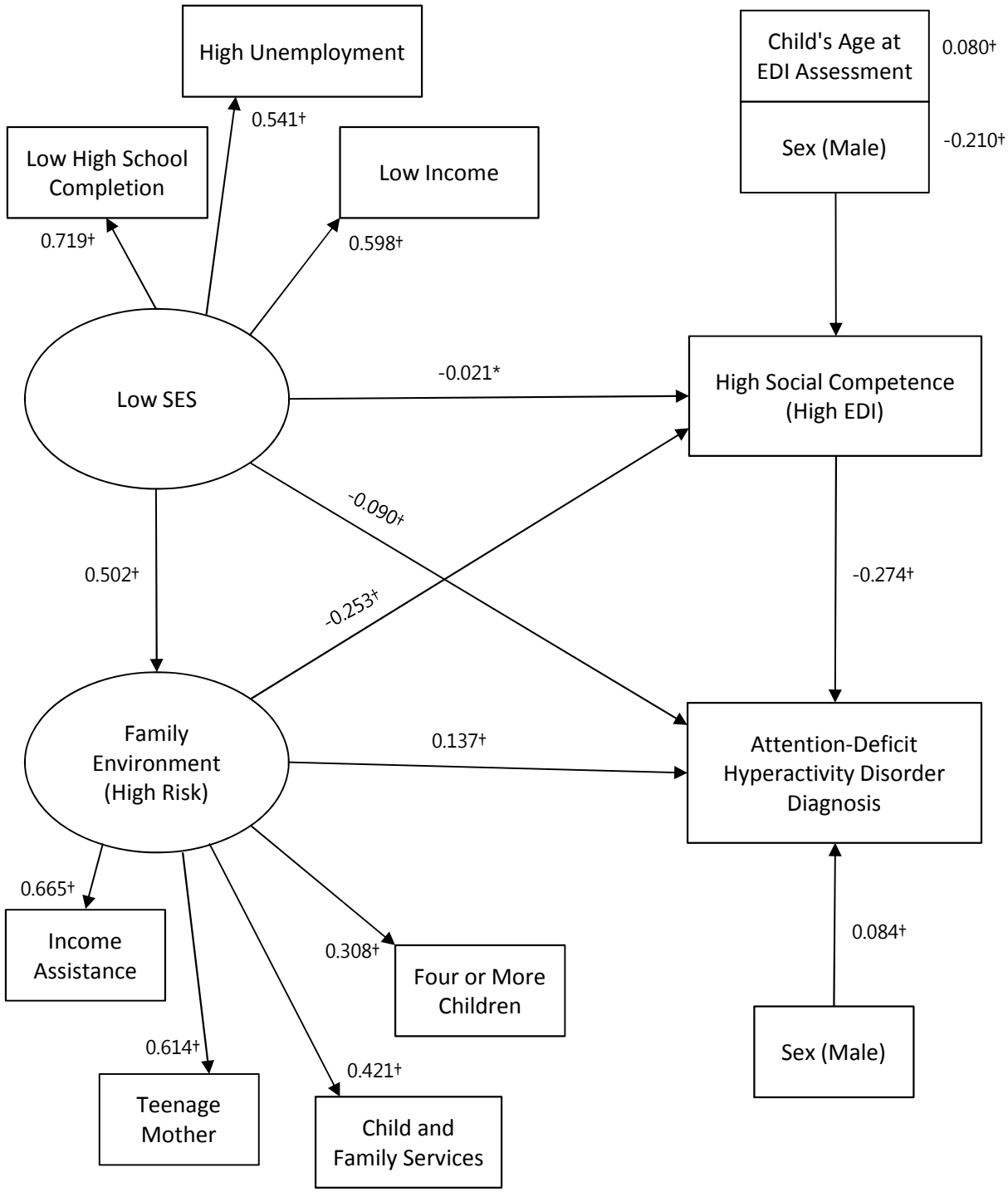


Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9742, NNFI=0.9519, RMSEA=0.0313, SRMSR=0.0168
All regression coefficients are standardized

Models Examining Social Competence, SES, Family Environment and Mental Disorders

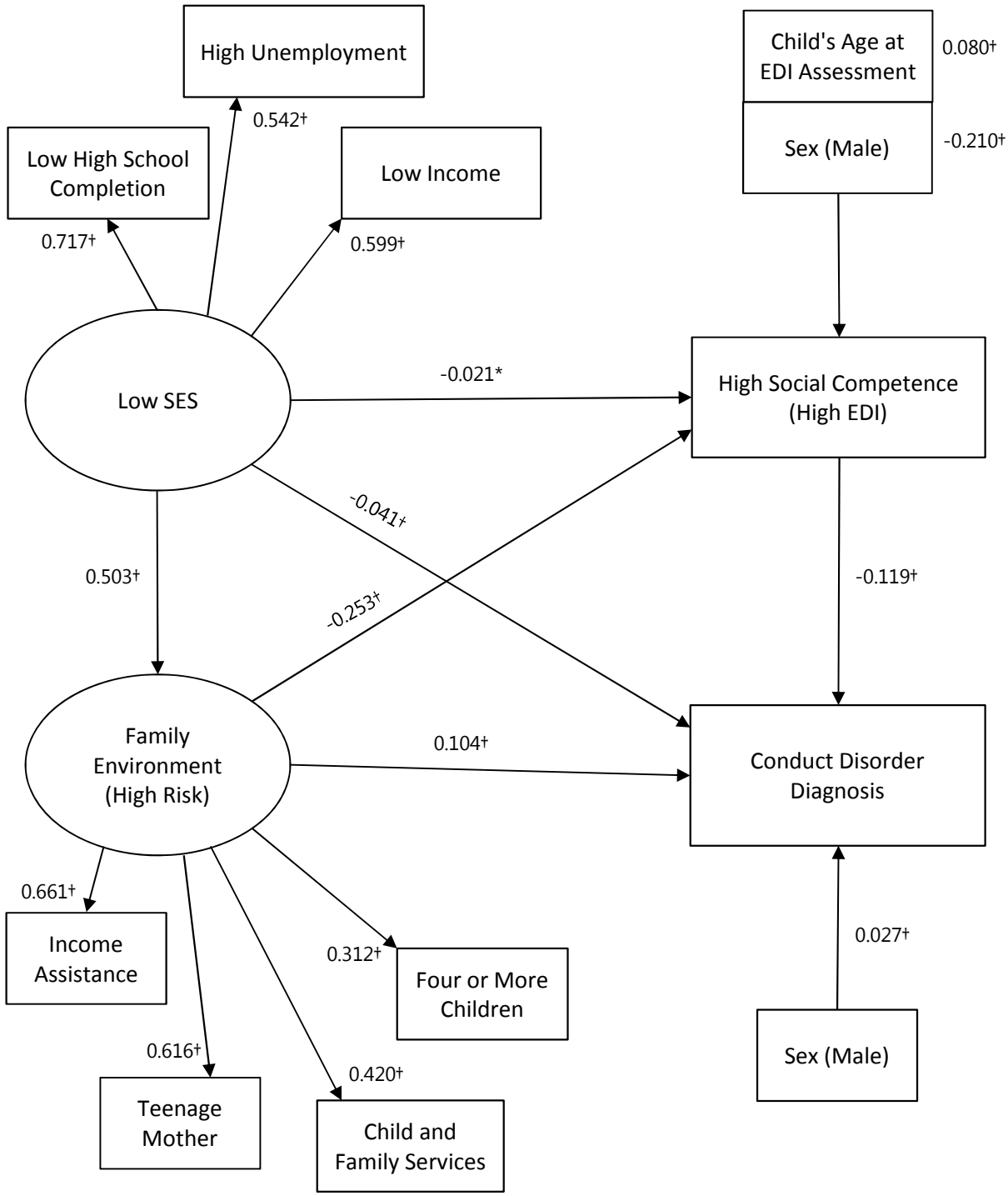
The results that include social competence in the model follow the same pattern as the models that included emotional maturity described above. These models are shown in Figure 7.7 for ADHD, Figure 7.8 for conduct disorder, and Figure 7.9 for mood and anxiety disorders. Social competence, like emotional maturity, is associated with the mental disorders examined. One difference observed is that the relationship between family environment and social competence (-0.253) is stronger in magnitude than the relationship between family environment and emotional maturity (-0.198). The mediation analyses of social competence followed the same pattern as the mediation analyses of emotional maturity. The figures for the mediation analyses are found in Appendix 10.

Figure 7.7: Relationship Between Early Childhood Factors, Social Competence (EDI), and Diagnosis of Attention-Deficit Hyperactivity Disorder, Full Model



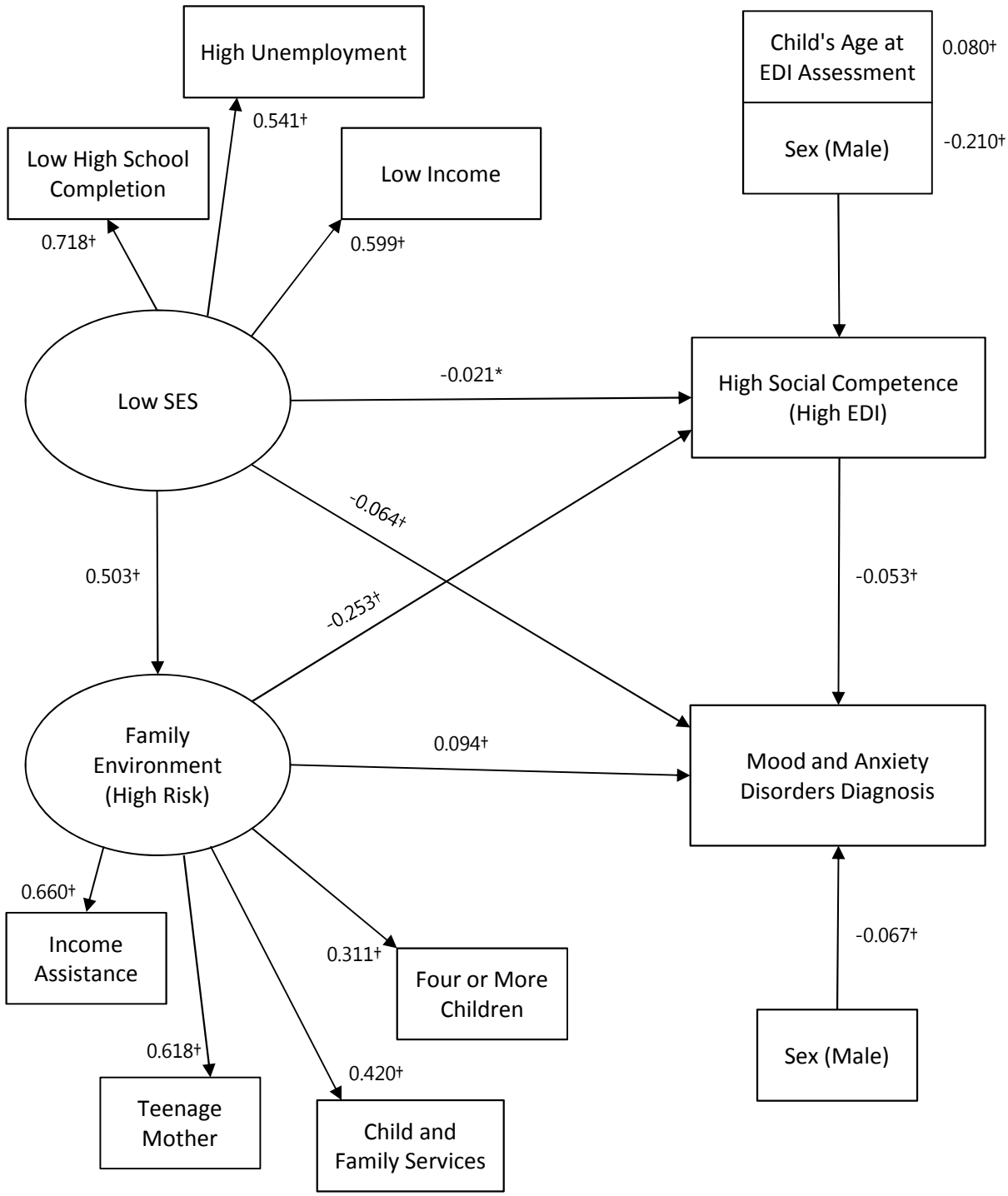
Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9361, NNFI=0.9024, RMSEA=0.0454, SRMSR=0.0279
All regression coefficients are standardized

Figure 7.8: Relationship Between Early Childhood Factors, Social Competence (EDI), and Diagnosis of Conduct Disorder, Full Model



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9335, NNFI=0.8984, RMSEA=0.0444, SRMSR=0.0266
All regression coefficients are standardized

Figure 7.9: Relationship Between Early Childhood Factors, Social Competence (EDI), and Diagnosis of Mood and Anxiety Disorders, Full Model



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9315, NNFI=0.8954, RMSEA=0.0448, SRMSR=0.0269
All regression coefficients are standardized

What Do These Results Mean?

Structural equation modelling permitted us to examine the association between early childhood factors and diagnoses in middle childhood, giving us insight into the factors that are important in the development of mental disorders. We found that low SES, high risk family environment, and low social and emotional development were directly associated with the diagnosis of mental disorders in middle childhood. These associations were also indirect, meaning that they were explained through other mediating factors. These findings have improved our understanding of which children are most at risk of developing mental disorders and point to several avenues for policy development. Consistent with our results, previous research has found numerous risk factors associated with mental disorders in children, including poverty, malnutrition, violence, inadequate parenting, child abuse and neglect, adolescent pregnancy, inadequate spacing, and early behavioural problems (Kieling et al., 2011; Patel, Flisher, Hetrick, & McGorry, 2007). While many relevant factors were examined, not all possible factors were included in our models. For example, we did not include genetic factors, level of access to mental health services, parenting styles, or programs that children received in early childhood.

This finding provides evidence for the need to invest in early childhood interventions to lower the prevalence of mental disorders in Manitoba's children. Given that EDI scores (measures of social and emotional development) are associated with mental disorders, providing early intervention programs that improve early childhood development are warranted. High quality early learning and child care has been shown to improve child development in general, particularly among children living in vulnerable families (NICHD Early Child Care Research Network, 2001; Tresch, 2011). Given that the family environment is both directly and indirectly (through emotional maturity and social competence) associated with mental disorders, providing resources and supports to high risk families would likely decrease the prevalence of mental disorders. The Government of Manitoba, working with the public health system, has implemented and evaluated a number of early childhood programs to support families. These include the Healthy Baby prenatal benefit and community support program, and the Families First home visiting program (Healthy Child Manitoba, 2016a). Increasing the reach of these programs could enhance their effectiveness in preventing mental disorders in children.

We found both expected and unexpected results when we examined the direct and indirect relationship between low SES and being diagnosed with a mental disorder. The indirect pathway through high risk family environment and child development is an expected finding. Living in a socially disadvantaged area has previously been associated with lower EDI scores (Santos, Brownell, Ekuma, Mayer, & Soodeen, 2012). High risk families are more likely to be living in low income areas. However, the direct pathway between low SES and mental disorders is not consistent with our hypothesis. The pattern of our results – having direct and indirect effects in opposite directions – suggest that there are other factors not included in our model (e.g., access to mental health services) that may explain the relationship between low SES and mental disorders in children. Access to mental health services was not a variable that was available in our analysis. Low SES families may have poorer access to mental health services, and of course, no mental disorder diagnosis can be captured without access to mental health professionals. The issue of access to mental health services for children living in disadvantaged areas should be further explored.

CHAPTER 8: SUMMARY OF RESULTS AND RECOMMENDATIONS

The purpose of this report was to gain a greater understanding of the mental health of children in Manitoba by using administrative data housed in the Repository at MCHP. The report provides a comprehensive baseline assessment of children's mental health before the launch of the province's Child and Youth Mental Health (CYMH) Strategy in 2015. We hope that the findings will provide valuable current and cross-departmental information to inform the continued development, implementation, and evaluation of the CYMH Strategy in Manitoba. In this final chapter, we summarize what we have found and make recommendations based on these findings.

Summary of Results

Diagnostic Prevalence of Mental Disorders

Over a four-year period, this study found that 14% of children in Manitoba received a diagnosis for at least one of the mental disorders that was examined in this study. With the exception of substance use disorders and psychotic disorders, prevalence estimates increased over the two time periods (2005/062008/09 and 2009/102012/13) for all other disorders examined. Externalizing disorders (consisting of ADHD, conduct disorder, and substance use disorders) were the most prevalent, followed by mood and anxiety disorders. Psychotic disorders were comparatively rare. A higher percentage of children were diagnosed with ADHD and conduct disorder in middle childhood (ages 6-12) than in adolescence (ages 13-19). Conversely, a higher percentage of older children were diagnosed with mood and anxiety disorders than younger children. We only reported substance use disorders and psychotic disorders in adolescents (ages 13-19) given the very low prevalence of these disorders in younger children.

The diagnostic prevalence of mental disorders differed by age, sex, and where the children lived. Mental disorders were more common in boys than girls, in particular for externalizing disorders and psychotic disorders. Exceptions to this were that the prevalence of mood and anxiety disorders was higher for girls than boys and the prevalence of substance use disorders was similar in girls and boys. The prevalence estimates of most mental disorders that we examined were higher in urban areas compared to rural areas. Substance use disorders and psychotic disorders were the exception, where the prevalence of substance use disorders was higher in rural areas and the prevalence of psychotic disorders was similar in urban and rural areas. In urban areas, an income gradient was found for nearly all mental disorders, meaning that increasing income was associated with a lower prevalence of the disorders. For ADHD the income gradient was opposite to that found in urban areas, meaning that with every increase in income a higher prevalence was observed. In rural areas, the results were mixed: an income gradient was found for substance use disorders and psychotic disorders with lower income associated with higher rates; and no income gradient was found for conduct disorder and mood and anxiety disorders.

Suicide and Attempted Suicide

In Manitoba during the four-year period 2009/10-2012/13, there were 74 deaths by suicide per 100,000 children and 459 attempted suicides per 100,000 children that resulted in hospitalization. We could not capture attempted suicides that did not result in hospitalization. No increases were found between the first and second time periods. Suicides and attempted suicides are rare in young children, and were therefore only calculated among adolescents aged 13-19 years. Attempted suicide was more common in girls than in boys. Higher rates of attempted suicide were found in rural areas compared to urban areas. Suicide and attempted suicide were more prevalent in lower income areas than in higher income areas. Among those who had attempted suicide or died by suicide, 78% had a diagnosis of a mental disorder in the same time period.

Developmental Disorders

In Manitoba the lifetime prevalence of developmental disorders in children increased over time from 2.5% to 2.9%. Similarly, the prevalence of autism spectrum disorder (ASD) increased over time from 1.0% to 1.4%. The prevalence of both indicators was higher for boys than girls, and higher in urban areas than in rural areas. In urban areas, an income gradient was found for developmental disorders and ASD, meaning that as income increased there was a lower prevalence of these disorders. In rural areas, no income gradient was found for developmental disorders. For ASD, , the income gradient in rural areas was opposite to that found in urban areas, meaning that as income increased there was a higher prevalence.

Healthcare Use, Social Services Use, and Justice Involvement

Children with diagnosed mental disorders, developmental disorders, and suicidal behaviours used more healthcare services, social services, and were more involved with the justice system than those with no disorders. As expected, given their diagnoses, children with mental and developmental disorders and suicidal behaviours were high users of mental health services, such as visits to a psychiatrist and to the Manitoba Adolescent Treatment Centre (MATC). However, in examining healthcare services before and after a suicide attempt, we found very modest increases in healthcare services use after an attempt.

Children with diagnosed mental and developmental disorders and suicidal behaviours are more likely to have been taken into the care of Child and Family Services (CFS), to have received other services from CFS, to have lived in social housing, to have received income assistance (IA) themselves, and to have lived in families receiving IA than children with no disorders. A higher percentage of these children have also been involved with the justice system as being accused of a crime or the victim of a crime compared to children with no disorders.

Educational Outcomes

Children with mental disorders, developmental disorders, and with suicidal behaviours had poorer educational outcomes and were less likely to complete high school compared to children with no disorders, suggesting that these disorders interfere with academic achievement.

Physical Health

With some exceptions, children with mental disorders, developmental disorders, and suicidal behaviours had a higher prevalence of asthma, diabetes, and atopic dermatitis than children with no disorders. The presence of these disorders and suicidal behaviours were also associated with higher childhood mortality rates. The causes of death included suicide, complications from injuries and poisoning, and congenital abnormalities.

Early Childhood Factors and Mental Disorders in Middle Childhood

As listed below, our results suggest many associations between early childhood factors and a diagnosis of ADHD, conduct disorder, or mood and anxiety disorders in middle childhood:

- Low emotional and social development scores, as measured by the Early Development Instrument, were associated with being diagnosed with a mental disorder.
- Living in a high risk family environment (i.e., a family with many parenting risk factors) was associated with being diagnosed with a mental disorder. This relationship was partially mediated or explained through low child development scores, meaning that a high risk family environment is also related to low child development scores, which is in turn related to being diagnosed with a mental disorder.

- Unexpectedly, low socioeconomic status (SES) was associated with a decreased chance of being diagnosed with a mental disorder, possibly due to barriers preventing low-income families from accessing adequate resources to identify and treat mental disorders in children or to data limitations in capturing mental disorders in rural areas. As expected, we found that the relationship between living in a low SES area and mental disorders was explained through other pathways. We found that low SES was associated with lower child development scores, which in turn was associated with being diagnosed with a mental disorder. Also, low SES area was associated with being from a high risk family, which in turn was associated with being diagnosed with a mental disorder.

Recommendations

Child and Youth Mental Health Strategy

Mental disorders, social factors, and injuries are the greatest threats to children around the world (Currie & Rossin-Slater, 2015). As found in this report, over a four-year period, a high proportion of Manitoba's children (14%) were diagnosed with a mental disorder. Since the prevalence estimates only include children who had received a diagnosis from a physician, this leaves out a significant proportion of children who had a disorder but had not received a diagnosis. Recognizing the risk to children, the Manitoba Government announced a Child and Youth Mental Health (CYMH) Strategy for this province in May 2015. Manitoba's new government prioritized mental health in its Speech from the Throne, and continued its commitment to the CYMH Strategy in the 2016 provincial budget. This Strategy has been informed by The Mental Health Commission of Canada's framework entitled *Evergreen: A Child and Youth Mental Health Framework for Canada* and includes courses of action adapted to the Manitoba context. The findings in this report strongly support a CYMH strategy that includes the recommendations described below.

Mental Health Promotion and Mental Illness Prevention for Children

Mental health promotion and mental illness prevention should be strengthened and scaled up in the CYHM Strategy to decrease the high prevalence of mental disorders in children. The National Research Council report (2009) stresses the importance of promoting health and preventing disorders from developing rather than waiting until a disorder is well established, has caused considerable harm, and is more difficult to treat. Mental disorders in children and youth are thought to be the result of a combination of genetic predisposition and exposure to significant adversity in the environment (Champagne, 2010). Nurturing environments (especially during the prenatal to preschool years) are required for all children to promote healthy socio-emotional development and to prevent the development of mental, emotional, and behavioural disorders. These environments can be created by the reduction of adverse childhood events (e.g., exposure to poverty, violence, abuse, and neglect) and by improving the skills of caregivers (e.g., parents, early childhood educators, and teachers) to promote prosocial behaviour and limit opportunities for problematic behaviours (Biglan et al., 2012). Manitoba has many fine examples of evidence-based programs to promote nurturing environments, such as the Families First home visiting program, Towards Flourishing Mental Health Promotion for Families, Healthy Baby, Roots of Empathy, PAX-Good Behaviour Game, Triple P Parenting, Abecedarian (pilot in Lord Selkirk), and Early Learning and Child Care (Healthy Child Manitoba, 2016b). Not all eligible families are accessing these programs, so concerted effort is required to improve their reach to serve more children and families across Manitoba.

Addressing the Needs of Children with Mental Disorders and Suicide Attempts Through Integrated Service Delivery

Given the high prevalence of mental disorders in Manitoba's children, adequate resources are required for the early detection, early intervention, and treatment of these disorders. This report did not evaluate mental health services provided in this province, other than observing modest increases in healthcare services use after a child was hospitalized for attempted suicide. Given that suicide attempts requiring hospitalization are markers of severe distress, we would have expected larger increases in healthcare services use. This suggests that improvement in services is required.

Currently, mental health services for children are delivered through health and education systems and through a modest private sector of psychologists and social workers. Services from these areas are, for the most part, delivered independently with little coordination. This report clearly shows that child mental health is not simply a psychiatric issue but that it affects all sectors of society. Compared to children without diagnosed mental disorders, children with mental disorders currently receive considerably more services from many sectors, including healthcare, education, and social services. Ideally, an integrated delivery system for children experiencing mental disorders and an improved system navigation and advocacy for families could better address their needs. For example, Underwood (2011) outlined how better integrated services between child welfare and mental health would improve living conditions for children and improve their mental health. The Great Smoky Mountains Study indicated that children were more likely to receive services when those services were based in schools compared to specialty mental health settings (Costello et al. 1996). A policy brief from the Manitoba Association of School Superintendents (MASS) stated that, "There is an urgent need to address the social and emotional health of children and youth in a planned, integrated, and holistic way. This will require the combined efforts of all ministries of the Healthy Child Committee of Cabinet, with the support of school divisions and all agencies that work with children and youth in our province" (Manitoba Association of School Superintendents, 2011).

Addressing the Needs of Children with Developmental Disorders and Increasing Supports to Their Families

This report found that 2.9% of Manitoba's children were diagnosed with a developmental disorder and that this prevalence has increased from an earlier time period. Children with developmental disorders are high users of health and social services, have poorer educational outcomes, and have more physical health conditions, which provides opportunities for inter-sectoral strategies in managing their care. For example, the number of children with developmental disorders taken into care was higher than children with no disorders, suggesting that families may not be accessing adequate supports and resources to care for their children at home. Given that early detection and interventions are critical to manage symptoms and support families, screening in early childhood is recommended (Johnson & Myers, 2007).

Short and Long-Term Strategies to Address Health Inequities

This report found that mental and developmental disorders, like other health outcomes, are more prevalent among children living in lower income areas. Furthermore, low socioeconomic status was associated with low child development scores, which in turn were associated with the diagnosis of mental disorders. These findings are consistent with other health indicators in children and with other international studies (Brownell et al., 2012; Wilkinson & Pickett, 2010). The association between low socioeconomic status and mental disorders in children is complex and bidirectional: living in poverty increases the risk of exposure to adversities, such as poor nutrition, violence, and lack of social networks, which are risk factors for the development of mental disorders. Mental disorders in turn are associated with poor academic outcomes and eventually unemployment (Patel et al., 2007). Our findings pointed to poorer access to mental health services among children from lower income areas, particularly in rural areas.

Improving the mental health of children requires both social and economic interventions, as well as health interventions. Increasing mental health services in disadvantaged areas and addressing barriers to accessing these services would improve early detection and treatment of mental disorders in children. Programs provided by the Manitoba Adolescent Treatment Centre, which are serving a number of northern and rural communities through telehealth services, should be examined and potentially expanded (MATC, 2016). Marmot et al. (2010) recommend proportional universalism whereby strategies and programs are targeted according to the level of disadvantage. Wilkinson and Pickett (2010) suggest a number of strategies to address income inequities from strategies to influence political will, alternate business models, policies of redistribution of wealth by taxes, and benefits to controlling earning disparities. Addressing the social determinants of mental health, such as income inequities, discrimination, poverty, and poor housing would decrease the prevalence of mental disorders.

Enhancing Child and Youth Mental Healthcare Competencies of all Human Service Providers

The World Health Organization (2005) has stated that "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." In short, mental health is an integral component of health. Given the high prevalence of mental disorders in children relative to other childhood illnesses, this is a particular concern for children's health. One of the challenges in improving children's mental health is the low capacity and motivation of non-specialist healthcare providers to provide healthcare services (Patel et al., 2007). Promoting mental health and preventing mental illness requires a skilled and informed workforce across sectors such as health, education, justice, social services, non-governmental organisations, and community-based centres (Barry & Jenkins, 2007). The knowledge needed is broad, ranging from understanding concepts in mental health, community development, policy, and practice development, as well as skills in teaching, facilitating, working intersectorally with communities and an array of service providers.

Research and Evaluation to Improve Prevention, Early Intervention, and Treatments for Children with Mental Disorders

Although tremendous progress has been made over the decades, research into mental disorders in children is a relatively new field. The focus has been on understanding *attachment* in early childhood, studying patterns of emotional and behavioural disturbance, and more recently using randomized controlled trials to assess treatment efficacy (Rutter, 2010). Compared to other medical fields, there is a paucity of clear and compelling evidence of effectiveness in the prevention and treatment of child mental disorders (Kutcher, 2011). Research is needed in psychological and pharmacological treatments, as well as preventive strategies. This could be improved by providing specific funding for research in these areas.

Concluding Remarks

This report presents the first comprehensive look at the mental health of children in Manitoba. The findings indicate that children's mental health needs are high and are increasing over time, but some services are decreasing or remain unchanged. Children diagnosed with mental disorders use significantly more services and have significantly poorer outcomes in the province's health, education, social services, and justice systems, all affecting the quality of children's lifetime success. This report shows that children's lives are significantly shortened, with higher mortality associated with several disorders, commonly linked to suicide. Our longitudinal findings show that mental disorders are associated with children's development before they start school, particularly in high risk family environments with greater social and economic needs. This reinforces the need for a considerable concerted and cross-sectoral shift to prevent mental illness before it starts, by tackling its root causes in early childhood across multiple systems and sectors. A whole-of-government approach, particularly during childhood, would reduce cost pressures on all major public services, in addition to creating hope and better lifelong outcomes for present and future generations of Manitoba's young people and their families and communities.

REFERENCES

American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (4th edition text revision)*. Washington, DC: American Psychiatric Association; 2000.

American Psychiatric Association. *Desk reference to the diagnostic criteria from DSM-5*. Arlington, VA: American Psychiatric Publishing; 2013.

Arseneault L, Cannon M, Witton J, Murray RM. Causal association between cannabis and psychosis: examination of the evidence. *Br J Psychiatry.* 2004;184:110-117.

Asarnow JR, Baraff LJ, Berk M, et al. An emergency department intervention for linking pediatric suicidal patients to follow-up mental health treatment. *Psychiatr Serv.* 2011;62(11):1303-1309.

Barkley RA, Fischer M, Smallish L, Fletcher K. Young adult outcome of hyperactive children: adaptive functioning in major life activities. *J Am Acad Child Adolesc Psychiatry.* 2006;45(2):192-202.

Barry MM, Jenkins R, ed. *Implementing Mental Health Promotion*. Edinburgh: Churchill Livingstone/Elsevier; 2007.

Biglan A, Flay B, Embry D, Sandler I. The critical role of nurturing environments for promoting human well-being. *The American Psychologist.* 2012;67(4):257-271.

Bijl RV, Ravelli A, van Gessen Z. Prevalence of psychiatric disorder in the general population: results of The Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Soc Psychiatry Psychiatr Epidemiol.* 1998;33(12):587-595.

Birmaher B, Arbelaez C, Brent D. Course and outcome of child and adolescent major depressive disorder. *Child Adolesc Psychiatr Clin N Am.* 2002;11(3):619-37, x.

Bisgaard H, Bonnelykke K. Long-term studies of the natural history of asthma in childhood. *J Allergy Clin Immunol.* 2010;126(2):187-197.

Bloom B, Jones LI, Freeman G. Summary health statistics for U.S. children: National Health Interview Survey, 2012. *Vital Health Stat 10.* 2013;(258):1-81.

Blumberg SJ, Bramlett MD, Kogan MD, Schieve LA, Jones JR, Lu MC. Changes in prevalence of parent-reported autism spectrum disorder in school-aged U.S. children: 2007 to 2011-2012. *Natl Health Stat Report.* 2013;(65):1-11, 1.

Boak A, Hamilton H, Adlaf E, Henderson J, Mann R. The mental health and well-bing of Ontario students, 1991-2015: Detailed OSDUHS findings. Centre for Addiction and Mental health. 2016. http://www.camh.ca/en/research/news_and_publications/ontario-student-drug-use-and-health-survey/Documents/2015%20OSDUHS%20Documents/2015OSDUHS_Detailed%20MentalHealthReport.pdf.

Boeing L, Murray V, Pelosi A, McCabe R, Blackwood D, Wrate R. Adolescent-onset psychosis: prevalence, needs and service provision. *Br J Psychiatry.* 2007;190:18-26.

Boyle CA, Boulet S, Schieve LA, et al. Trends in the prevalence of developmental disabilities in US children, 1997-2008. *Pediatrics.* 2011;127(6):1034-1042.

Breton JJ, Bergeron L, Valla JP, et al. Quebec child mental health survey: prevalence of DSM-III-R mental health disorders. *Journal of Child Psychiatry.* 1999;40(3):375-384.

Broome MR, Woolley JB, Tabraham P, et al. What causes the onset of psychosis? *Schizophr Res.* 2005;79(1):23-34.

Brownell M, Chartier M, Santos R, et al. How Are Manitoba's Children Doing? Manitoba Centre for Health Policy. October, 2012. http://mchp-appserv.cpe.umanitoba.ca/reference//mb_kids_report_WEB.pdf.

Burns B, Costello E, Angold A, et al. Children's mental health service use across service sectors. *Health Affairs (Millwood).* 1995;14(3):147-159.

Byck GR, Bolland J, Dick D, Ashbeck AW, Mustanski BS. Prevalence of mental health disorders among low-income African American adolescents. *Soc Psychiatry Psychiatr Epidemiol.* 2013;48(10):1555-1567.

Cantor-Graae E. The contribution of social factors to the development of schizophrenia: A review of recent findings. *Can J Psychiatry.* 2007;52(2):277-286.

Centers for Disease Control and Prevention. Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2010. *MMWR Surveill Summ.* 2014;63(2):1-21.

Champagne F. Epigenetic influences of social experiences across the lifespan. *Dev Psychobiol.* 2010;52(4):299-311.

Chartier M, Walker J, Naimark B. A population study of the relationship between childhood abuse and adult health: Health risk behaviors and mental health problems as mediators. *Am J Public Health.* 2009;99(5):847-854.

Chartier MJ, Walker JR, Stein MB. Considering comorbidity in social phobia. *Soc Psychiatry Psychiatr Epidemiol.* 2003;38(12):728-734.

Coker KL, Smith PH, Westphal A, Zonana HV, McKee SA. Crime and psychiatric disorders among youth in the US population: an analysis of the National Comorbidity Survey-Adolescent Supplement. *J Am Acad Child Adolesc Psychiatry.* 2014;53(8):888-98, 898.

Copeland W, Shanahan L, Costello EJ, Angold A. Cumulative prevalence of psychiatric disorders by young adulthood: a prospective cohort analysis from the Great Smoky Mountains Study. *J Am Acad Child Adolesc Psychiatry.* 2011;50(3):252-261.

Costello EJ, Angold A, Burns BJ, et al. The Great Smoky Mountains Study of Youth. Goals, design, methods, and the prevalence of DSM-III-R disorders. *Arch Gen Psychiatry.* 1996;53(12):1129-1136.

Currie J, Rossin-Slater M. Early-life origins of life-cycle well-being: research and policy implications. *J Policy Anal Manage.* 2015;34(1):208-242.

Dabelea D, Mayer-Davis EJ, Saydah S. Prevalence of type 1 and type 2 diabetes among children and adolescents from 2001 to 2009. *JAMA.* 2014;311(17):1778-1786.

Dalsgaard S, Ostergaard SD, Leckman JF, Mortensen PB, Pedersen MG. Mortality in children, adolescents, and adults with attention deficit hyperactivity disorder: a nationwide cohort study. *Lancet.* 2015.

Davis M, Banks S, Fisher W, Grudzinskas A. Longitudinal patterns of offending during the transition to adulthood in youth from the mental health system. *J Behav Health Serv Res.* 2004;31(4):351-366.

Delobel-Ayoub M, Ehlinger V, Klapouszczak D, et al. Socioeconomic Disparities and Prevalence of Autism Spectrum Disorders and Intellectual Disability. *PLoS One.* 2015;10(11):e0141964.

Dohrenwend BP, Levav I, Shrout PE, et al. Socioeconomic status and psychiatric disorders: the causation-selection issue. *Science.* 1992;255(5047):946-952.

Dombrowski S, Martin R, Huttunene M. Gestational exposure to cigarette smoke imperils the long-term physical and mental health of offspring. *Birth Defects Res A Clin Mol Teratol.* 2005;73(3):170-176.

Dopfner M, Breuer D, Wille N, Erhart M, Ravens-Sieberer U. How often do children meet ICD-10/DSM-IV criteria of attention deficit-/hyperactivity disorder and hyperkinetic disorder? Parent-based prevalence rates in a national sample--results of the BELLA study. *Eur Child Adolesc Psychiatry.* 2008;17 Suppl 1:59-70.

Durkin MS, Maenner MJ, Meaney FJ, et al. Socioeconomic inequality in the prevalence of autism spectrum disorder: evidence from a U.S. cross-sectional study. *PLoS One.* 2010;5(7):e11551.

Essau CA. Frequency and patterns of mental health services utilization among adolescents with anxiety and depressive disorders. *Depress Anxiety.* 2005;22(3):130-137.

Fergusson DM, Horwood LJ. Early disruptive behavior, IQ, and later school achievement and delinquent behavior. *J Abnorm Child Psychol.* 1995;23(2):183-199.

Finlayson G, Smith M, Burchill C, et al. Social Housing in Manitoba Part 1: Manitoba Social Housing Data. June, 2013. Manitoba Centre for Health Policy. Accessed May 13, 2016.

Fransoo R, Martens P, The Need to Know Team, et al. The 2013 RHA Indicators Atlas. Manitoba Centre for Health Policy. October, 2013. http://mchp-appserv.cpe.umanitoba.ca/reference//RHA_2013_web_version.pdf. Accessed June 6, 2016.

Gau SS, Chong MY, Chen TH, Cheng AT. A 3-year panel study of mental disorders among adolescents in Taiwan. *Am J Psychiatry.* 2005;162(7):1344-1350.

Government of Manitoba. Manitoba Government Invests Additional $2 Million in Child and Youth Mental Health. May 4, 2015. http://news.gov.mb.ca/news/index.html?archive=&item=34761. Accessed June 8, 2015.

Government of Manitoba. Child and Family Services Division. Government of Manitoba. 2016. http://www.gov.mb.ca/fs/about/cfs.html. Accessed May 3, 2016.

Graham H, Power C. Childhood disadvantage and health inequalities: a framework for policy based on lifecourse research. *Health and Development.* 2004;30(6):671-678.

Groholt B, Ekeberg O. Prognosis after adolescent suicide attempt: mental health, psychiatric treatment, and suicide attempts in a nine-year follow-up study. *Suicide Life Threat Behav.* 2009;39(2):125-136.

Healthy Child Manitoba. Healthy Baby. 2016a. http://www.gov.mb.ca/healthychild/healthybaby/index.html.

Healthy Child Manitoba. Programs, Supports and Strategies. Government of Manitoba. 2016b. http://www.gov.mb.ca/healthychild/programs/index.html.

Heiervang E, Stormark KM, Lundervold AJ, et al. Psychiatric disorders in Norwegian 8- to 10-year-olds: an epidemiological survey of prevalence, risk factors, and service use. *J Am Acad Child Adolesc Psychiatry.* 2007;46(4):438-447.

Hollis C. Developmental precursors of child- and adolescent-onset schizophrenia and affective psychoses: diagnostic specificity and continuity with symptom dimensions. *Br J Psychiatry.* 2003;182:37-44.

Hollis C. Schizophrenia and Allied Disorders. In: *Rutter's Child and Adolescent Psychiatry*. Oxford, UK: Blackwell Publishing Ltd.; 2008:737-758.

Horwood J, Salvi G, Thomas K, et al. IQ and non-clinical psychotic symptoms in 12-year-olds: results from the ALSPAC birth cohort. *Br J Psychiatry.* 2008;193(3):185-191.

Huffman LC, Wang NE, Saynina O, Wren FJ, Wise PH, Horwitz SM. Predictors of hospitalization after an emergency department visit for California youths with psychiatric disorders. *Psychiatr Serv.* 2012;63(9):896-905.

Irwin L, Siddiqi A, Hertzman C. Early childhood development: a powerful equalizer. World Health Organization's Commission on the Social Determinants of Health. March, 2007. http://whqlibdoc.who.int/hq/2007/a91213.pdf. Accessed June 6, 2016.

Johnson CP, Myers SM. Identification and evaluation of children with autism spectrum disorders. *Pediatrics.* 2007;120(5):1183-1215.

Kataoka S, Stein BD, Nadeem E, Wong M. Who gets care? Mental health service use following a school-based suicide prevention program. *J Am Acad Child Adolesc Psychiatry.* 2007;46(10):1341-1348.

Katon W, Lozano P, Russo J, McCauley E, Richardson L, Bush T. The prevalence of DSM-IV anxiety and depressive disorders in youth with asthma compared with controls. *J Adolesc Health.* 2007;41(5):455-463.

Katz A, Chateau D, Bogdanovic B, et al. Physician Integrated Network: A Second Look. Manitoba Centre for Health Policy. October, 2014. http://mchp-appserv.cpe.umanitoba.ca/reference//RHA_2013_web_version.pdf. Accessed June 6, 2016.

Katz A, Valdivia J, Chateau D, et al. A Comparison of Models of Primary Care Delivery in Winnipeg. Manitoba Centre for Health Policy. June, 2016. http://mchp-appserv.cpe.umanitoba.ca/reference//Models%20of%20Primary%20Care_Web_final.pdf. Accessed June 6, 2016.

Kendell RE, McInneny K, Juszczak E, Bain M. Obstetric complications and schizophrenia. Two case-control studies based on structured obstetric records. *Br J Psychiatry.* 2000;176:516-522.

Kessler RC, Avenevoli S, Costello EJ, et al. Prevalence, persistence, and sociodemographic correlates of DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. *Arch Gen Psychiatry.* 2012;69(4):372-380.

Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters E. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* 2005;62(6):593-602.

Kieling C, Baker-Henningham H, Belfer M, et al. Child and adolescent mental health worldwide: evidence for action. *Lancet.* 2011;378(9801):1515-1525.

Kozyrskyj AL, Mustard CA, Becker AB. Identifying children with persistent asthma from health care administrative records. *Can Respir J.* 2004;11(2):141-145.

Kuh D, Power C, Blane D, Bartley M. Social pathways between childhood and adult health. In: Kuh D, Ben-Shlomo Y, eds. *A Lifecourse Approach to Chronic Disease Epidemiology*. Oxford; 1997:169-199.

Kutcher S. Facing the challenge of care for child and youth mental health in Canada: a critical commentary, five suggestions for change and a call to action. *Healthc Q.* 2011;14 Spec No 2:14-21.

Langlois S, Morrison P. Suicide deaths and Suicide attempts. Statistics Canada. January, 2002. http://www.statcan.gc.ca/pub/82-003-x/2001002/article/6060-eng.pdf. Accessed April 19, 2016.

Levine LJ, Schwarz DF, Argon J, Mandell DS, Feudtner C. Discharge disposition of adolescents admitted to medical hospitals after attempting suicide. *Arch Pediatr Adolesc Med.* 2005;159(9):860-866.

Liptak GS, Stuart T, Auinger P. Health care utilization and expenditures for children with autism: data from U.S. national samples. *J Autism Dev Disord.* 2006;36(7):871-879.

Liu J. Childhood externalizing behavior: theory and implications. *J Child Adolesc Psychiatr Nurs.* 2004;17(3):93-103.

Manitoba Association of School Superintendents. Mental Health Framework for Students. 2011. http://mass.mb.ca/wp-content/uploads/2015/01/mental_health_framework.pdf.

Marmot M, Allen J, Golfblatt P, et al. Fair Sociey, Healthy Lives. The Marmot Review. February, 2010. http://www.instituteofhealthequity.org/projects/fair-society-healthy-lives-the-marmot-review.

MATC. Mental Health Services for Children, Youth and Families. 2016. http://www.matc.ca/.

Maulik PK, Mascarenhas MN, Mathers CD, Dua T, Saxena S. Prevalence of intellectual disability: a meta-analysis of population-based studies. *Res Dev Disabil.* 2011;32(2):419-436.

Meltzer H, Gatward R, Corbin T, Goodman R, Ford T. *Persistence, onset, risk factors and outcomes of childhood mental disorders*. London: The Stationary Office; 2003.

Merikangas KR, He JP, Burstein M, et al. Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry.* 2010;49(10):980-989.

Merikangas KR, He JP, Burstein M, et al. Service utilization for lifetime mental disorders in U.S. adolescents: results of the National Comorbidity Survey-Adolescent Supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry.* 2011;50(1):32-45.

Miettunen J, Murray GK, Jones P, et al. Longitudinal associations between childhood and adulthood externalizing and internalizing psychopathology and adolescent substance use. *Psychol Med.* 2014;44(8):1727-1738.

Mogensen N, Larsson H, Lundholm C, Almqvist C. Association between childhood asthma and ADHD symptoms in adolescence--a prospective population-based twin study. *Allergy.* 2011;66(9):1224-1230.

Mojtabai R, Stuart EA, Hwang I, Eaton WW, Sampson N, Kessler RC. Long-term effects of mental disorders on educational attainment in the National Comorbidity Survey ten-year follow-up. *Soc Psychiatry Psychiatr Epidemiol.* 2015;50(10):1577-1591.

Monasterio EB. Adolescent substance involvement use and abuse. *Prim Care.* 2014;41(3):567-585.

National Institute of Arthritis and Musculoskeletal and Skin Diseases. Term: Atopic Dermatitis. National Institute of Arthritis and Musculoskeletal and Skin Diseases. May, 2013. http://www.niams.nih.gov/health_info/atopic_dermatitis/. Accessed June 3, 2016.

National Research Council, Institute of Medicine (US) Committee on the Prevention of Mental Disorders and Substance Abuse Among Children YaYA. Preventing Mental, Emotional, and Behavioral Disorders Among Young People: Progress and Possibilities. National Academies Press. 2009. http://www.ncbi.nlm.nih.gov/books/NBK32775/pdf/Bookshelf_NBK32775.pdf.

NICHD Early Child Care Research Network. Nonmaternal care and family factors in early development: An overview of the NICHD Study of Early Child Care. *Journal of Applied Developmental Psychology.* 2001;22(5):457-492.

O'Rourke N, Hatcher L. *A step-by-step approach to using SAS for factor analysis and structural equation modeling*. Cary: SAS Institute Inc.; 1994.

Offord DR, Boyle MH, Szatmari P, et al. Ontario Child Health Study. II. Six-month prevalence of disorder and rates of service utilization. *Arch Gen Psychiatry.* 1987;44(9):832-836.

Ormel J, Raven D, van Oort F, et al. Mental health in Dutch adolescents: a TRAILS report on prevalence, severity, age of onset, continuity and co-morbidity of DSM disorders. *Psychol Med.* 2014;1-16.

Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. *Lancet.* 2007;369(9569):1302-1313.

Polanczyk GV, Salum GA, Sugaya LS, Caye A, Rohde LA. Annual Research Review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *J Child Psychol Psychiatry.* 2015;56(3):345-365.

Rapoport JL, Gogtay N. Childhood onset schizophrenia: support for a progressive neurodevelopmental disorder. *Int J Dev Neurosci.* 2011;29(3):251-258.

Rasic D, Hajek T, Alda M, Uher R. Risk of mental illness in offspring of parents with schizophrenia, bipolar disorder, and major depressive disorder: a meta-analysis of family high-risk studies. *Schizophr Bull.* 2014;40(1):28-38.

Romano E, Tremblay RE, Vitaro F, Zoccolillo M, Pagani L. Prevalence of psychiatric diagnoses and the role of perceived impairment: findings from an adolescent community sample. *J Child Psychol Psychiatry.* 2001;42(4):451-461.

Rutter M. Pathways from childhood to adult life. *J Child Psychol Psychiatry.* 1989;30(1):23-51.

Rutter M, Stevenson J. Using Epidemiology to Plan Services: A Conceptual Approach. In: Rutter M, Bishop D, Pine D et al. eds. *Rutter's Child and Adolescent Psychiatry*. Oxford: Blackwell Publishing; 2008:71-80.

Rutter M. Child and adolescent psychiatry: past scientific achievements and challenges for the future. *Eur Child Adolesc Psychiatry.* 2010;19(9):689-703.

Santos R, Brownell M, Ekuma O, Mayer T, Soodeen R-A. The Early Development Instrument (EDI) in Manitoba: Linking Socioeconomic Adversity and Biological Vulnerability at Birth to Children's Outcomes at Age 5. Manitoba Centre for Health Policy. May, 2012. http://mchp-appserv.cpe.umanitoba.ca/reference/MCHP_EDI_Report_WEB.pdf. Accessed May 29, 2013.

SAS [computer program]. Version 9.4. Cary, North Carolina;2011.

Schieve LA, Gonzalez V, Boulet SL, et al. Concurrent medical conditions and health care use and needs among children with learning and behavioral developmental disabilities, National Health Interview Survey, 2006-2010. *Res Dev Disabil.* 2012;33(2):467-476.

Scott EM, Hermens DF, Glozier N, Naismith SL, Guastella AJ, Hickie IB. Targeted primary care-based mental health services for young Australians. *Med J Aust.* 2012;196:136-140.

Shin SH. Need for and actual use of mental health service by adolescents in the child welfare system. *Children and Youth Services Review.* 2005;27(10):1071-1083.

Sikich L. Diagnosis and evaluation of hallucinations and other psychotic symptoms in children and adolescents. *Child Adolesc Psychiatr Clin N Am.* 2013;22(4):655-673.

Statistics Canada. Statistics Canada Table. 102-0551: Death and mortality rate, by selected grouped causes, age group and sex, Canada, annual. CANSIM. December 9, 2015. http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=1020551&&pattern=&stByVal=1&p1=1&p2=49&tabMode=dataTable&csid=. Accessed April 19, 2016.

Steel Z, Marnane C, Iranpour C, et al. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980-2013. *Int J Epidemiol.* 2014;43(2):476-493.

Steinberg L, Aldea I, Messias E. Asthma, Depression, and Suicidality: Results from the 2007, 2009, and 2011 Youth Risk Behavior Surveys. *J Nerv Ment Dis.* 2015;203(9):664-669.

Tresch M. Child care - Early childhood education and care: Child Care and the Development of Young Children (0–2). Encyclopedia on Early Childhood Development. 2011. http://www.child-encyclopedia.com/child-care-early-childhood-education-and-care/according-experts/child-care-and-development-young.

Tsai JD, Chang SN, Mou CH, Sung FC, Lue KH. Association between atopic diseases and attention-deficit/hyperactivity disorder in childhood: a population-based case-control study. *Ann Epidemiol.* 2013;23(4):185-188.

Underwood E. Improving mental health outcomes for children and youth exposed to abuse and neglect. *Healthc Q.* 2011;14 Spec No 2:22-31.

Van Ameringen M, Mancini C, Farvolden P. The impact of anxiety disorders on educational achievement. *J Anxiety Disord.* 2003;17(5):561-571.

Vaurio L, Riley E, Mattson S. Neuropsychological comparison of children with heavy prenatal alcohol exposure and an IQ-matched comparison group. *J Int Neuropsychol Soc.* 2011;17(3):463-473.

Visser SN, Lesesne CA, Perou R. National estimates and factors associated with medication treatment for childhood attention-deficit/hyperactivity disorder. *Pediatrics.* 2007;119 Suppl 1:S99-106.

Waddell C, McEwan K, Shepherd CA, Offord DR, Hua JM. A public health strategy to improve the mental health of Canadian children. *Can J Psychiatry.* 2005;50(4):226-233.

Walker L, Verins I, Moodie R, Webster K. 8. Responding to the Social and Economic Determinants of Mental Health. A Conceptual Framework for Action. The World Health Organization. 2005. http://www.who.int/mental_health/evidence/MH_Promotion_Book.pdf. Accessed May 10, 2016.

Wandell P, Ljunggren G, Wahlstrom L, Carlsson AC. Diabetes and psychiatric illness in the total population of Stockholm. *J Psychosom Res.* 2014;77(3):169-173.

Wildman BG, Kinsman AM, Logue E, Dickey DJ, Smucker WD. Presentation and management of childhood psychosocial problems. *J Fam Pract.* 1997;44(1):77-84.

Wilkinson R, Pickett K. *The Spirit Level: Why Equality is Better for Everyone*. Toronto: Pengiun Books; 2010.

Woodward LJ, Fergusson DM. Life course outcomes of young people with anxiety disorders in adolescence. *J Am Acad Child Adolesc Psychiatry.* 2001;40(9):1086-1093.

World Health Organization. Promoting mental health: summary report: A Report of the World Health Organization, Department of Mental Health and Substance Abuse in collaboration with the Victorian Health Promotion Foundation and The University of Melbourne. World Health Organization. 2005. http://www.who.int/mental_health/evidence/en/promoting_mhh.pdf.

World Health Organization. International Classification of Diseases (ICD). 2014. https://web.archive.org/web/20140212190115/http://www.who.int/classifications/icd/en/.

Wright A, Hiebert-Murphy D, Gosek G. Supporting Aboriginal Children and Youth with Learning and/or Behavioural Disabilities in the Care of Aboriginal Child Welfare Agencies. Faculty of Social Work, University of Manitoba. 2005. http://www.fncaringsociety.com/sites/default/files/docs/SupportingAboriginalChildren.pdf. Accessed April 14, 2016.

Yaghmaie P, Koudelka CW, Simpson EL. Mental health comorbidity in patients with atopic dermatitis. *J Allergy Clin Immunol.* 2013;131(2):428-433.

Youngstrom EA, Birmaher B, Findling RL. Pediatric bipolar disorder: validity, phenomenology, and recommendations for diagnosis. *Bipolar Disord.* 2008;10(1 Pt 2):194-214.

Appendix Table 1.1: Definitions and Codes of the Indicators Used in this Report

Mental Health	
Indicator	**Definition**
Attention-Deficit Hyperactivity Disorder (ADHD)	1. 1+ hospitalizations with diagnosis of hyperkinetic syndrome (ICD-9-CM code 314 or ICD-10 code F90) in one fiscal year, OR, 2. 1+ physician claims with diagnosis of hyperkinetic syndrome (ICD-9-CM code 314) in one fiscal year, OR, 3. 2+ Rx for ADHD drugs in one fiscal year without a diagnosis in the same fiscal year of: - conduct disorder (312/F63, F91, F92) - disturbance of emotions (313/F93, F94) - cataplexy/narcalepsy (347/G47.4), OR, 4. 1 Rx for ADHD drugs in one fiscal year with diagnosis of hyperkinetic syndrome (ICD-9-CM code 314 or ICD-10 code F90) in the previous 3 years.
Conduct Disorders	One or more hospitalizations with diagnosis of conduct disorders • ICD-9: 312 • ICD-10: F91 (All F91 codes except F91.3 - oppositional disorder) One or more physician visits with a diagnosis of conduct disorders • ICD-9: 312
Indicator	**Definition**
Substance Use Disorders	• one or more hospitalization with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs: ICD-9-CM codes 291 (alcoholic psychoses), 292 (drug psychoses), 303 (alcohol dependence), 304 (drug dependence), or 305 (nondependent abuse of drugs) or ICD-10-CA codes F10-F19 and F55; OR (Substance Abuse Diagnoses Codes: ICD-9-CM: 291, 292, 303, 304, 305 ICD-10-CA: F10-F19, F55) Z50.2 and Z50.3 • one or more physician visits with a diagnosis for alcohol or drug psychoses, alcohol or drug dependence, or nondependent abuse of drugs: ICD-9-CM codes 291 (alcoholic psychoses), 292 (drug psychoses), 303 (alcohol dependence), 304 (drug dependence), or 305 (nondependent abuse of drugs).
Externalizing Disorders	A diagnosis of any of the following mental health indicators: 1. ADHD 2. Conduct Disorder 3. Substance Use Disorder

Appendix Table 1.1: Continued

Indicator	Defintion
Mood and Anxiety Disorders	1. 1+ hospitalizations with diagnosis codes: ICD9 296.1-296.8, 300.0, 300.2, 300.3, 300.4, 300.7, 309 or 311; ICD10 F31-F33, F341, F38.0, F38.1, F40, F41.0, F41.1, F41.2, F41.3, F41.8, F41.9, F42, F43.1, F43.2, F43.8, F53.0, or F93.0 OR, 2. 1+ hospitalizations with diagnosis codes: ICD9 300; ICD10 F32, F341, F40, F41, F42, F44, F45.0, F45.1, F45.2, F48, F68.0 or F99 and one or more prescriptions for an antidepressant or mood stabilizer: ATC codes N05AN01, N05BA, N06A, N05BE01 OR, 3. 1+ physician visits with a diagnosis code: ICD9 296, 311 OR, 4. 1+ physician visits with a diagnosis code: ICD9 300 and one or more prescriptions for an antidepressant or mood stabilizer: ATC codes N05AN01, N05BA, N06A, N05BE01 OR, 5. 3+ physician visits with a diagnosis code: ICD9 300, 309.
Psychotic Disorders	• One or more hospitalizations with a diagnosis of psychotic disorders: o ICD-9-code - 295 (schizophrenic disorders) or 297 (delusional disorders) or 298 (other nonorganic psychoses) o ICD-10 codes - F11.5, F12.5, F13.5, F14.5, F15.5, F16.5, F17.5, F18.5, F19.5 (psychotic disorders due to opioids, cannabinoids…etc.), F20 (schizophrenia), F22 (delusional disorder), F23 (acute and transient psychotic disorders), F24 (induced delusional disorder), F25 (schizoaffective disorders), F28 (other nonorganic psychotic disorders), F29 (unspecified nonorganic psychosis). • One or more physician visits with a diagnosis of psychotic disorders: o ICD-9-code - 295 (schizophrenic disorders) or 297 (delusional disorders) or 298 (other nonorganic psychoses)
Schizophrenia	One or more hospitalizations with a diagnosis for schizophrenia (ICD-9-CM code 295; ICD-10-CA codes F20, F21, F23.2, F25) OR One or more physician visits with a diagnosis for schizophrenia (ICD-9-CM code 295).
Any Mental Disorder	A diagnosis of any of the following mental health indicators: 1. ADHD 2. Conduct Disorders 3. Substance Use Disorders 4. Mood and Anxiety Disorders 5. Psychotic Disorders

Appendix Table 1.1: Continued

Indicator	Definition
Suicide	Manitoba Vital Statistics death record (where age at death is less than or equal to 19) with one of the following ICD codes as the primary cause of death: ICD-9-CM codes: 1. Accidental Poisoning: E8509, E8529, E8502, E8629, E8699 2. Self inflicted poisoning: E950-E952 3. Self inflicted injury by hanging, strangulation and suffocation: E953 4. Self inflicted injury by drowning: E954 5. Self inflicted injury by firearms and explosives: E955 6. Self inflicted injury by smoke, fire, flames, steam, hot vapours and hot objects: E958.1, E958.2 7. Self inflicted injury by cutting and piercing instruments: E956 8. Self inflicted injury by jumping from high places: E957 9. Self inflicted injury by jumping or lying before a moving object: E958.0 10. Self inflicted injury by crashing of motor vehicles: E958.5 11. Self inflicted injury by other and unspecified means: E958.3, E958.4, E958.6-E958.9 12. Poisoning with undetermined intent: NOTE: there were no supporting ICD9 codes included from source: Fransoo et al. (2009) and Martens et al. (2010) 13. Late effects of self inflicted injury: E959 NOTE: there were no supporting ICD10 codes included from source: Fransoo et al. (2009) and Martens et al. (2010) ICD-10-CA codes: 1. Accidental Poisoning: X40-X42, X46, X47 2. Self inflicted poisoning: X60-X69 3. Self inflicted injury by hanging, strangulation and suffocation: X70 4. Self inflicted injury by drowning: X71 5. Self inflicted injury by firearms and explosives: X72-X75 6. Self inflicted injury by smoke, fire, flames, steam, hot vapours and hot objects: X76, X77 7. Self inflicted injury by cutting and piercing instruments: X78, X79 8. Self inflicted injury by jumping from high places: X80 9. Self inflicted injury by jumping of lying before a moving object: X81 10. Self inflicted injury by crashing motor vehicle: X82 11. Self inflicted injury by other and unspecified means: X83, X84 12. Poisoning with undetermined intent: Y10-Y12, Y16, Y17 NOTE: there were no supporting ICD9 codes included from source: Fransoo et al. (2009) and Martens et al. (2010) 13. Late effects of self inflicted injury: NOTE: there were no supporting ICD10 codes incuded from source: Fransoo et al. (2009) and Martens et al. (2010)

Appendix Table 1.1: Continued

Indicator	Description
Suicide Attempt	Suicide Attempts (as defined in the METIS 2010 deliverable) are defined by an inpatient hospitalization with a diagnosis code for suicide and self-inflicted injury or with a diagnosis code for accidental poisoning combined with a psychiatric tariff code from medical claims during hospital stay or within 30 days of discharge. ICD-9-CM codes: E950-E959 1. Accidental Poisoning: E850-E854, E858, E862, E868 2. Self inflicted poisoning: E950-E952 3. Self inflicted injury by hanging, strangulation and suffocation: E953 4. Self inflicted injury by drowning: E954 5. Self inflicted injury by firearms and explosives: E955 6. Self inflicted injury by smoke, fire, flames, steam, hot vapours and hot objects: E958.1, E958.2 7. Self inflicted injury by cutting and piercing instruments: E956 8. Self inflicted injury by jumping from high places: E957 9. Self inflicted injury by jumping or lying before a moving object: E958.0 10. Self inflicted injury by crashing of motor vehicle: E958.5 11. Self inflicted injury by other and unspecified means: E958.3, E958.4, E958.6-E958.9 12. Poisoning with undetermined intent: NOTE: there were no supporting ICD-9-CM codes included from source: Fransoo et al. (2009) and Martens et al. (2010) 13. Late effects of self inflicted injury: E959 NOTE: there were no supporting ICD-10-CA codes included from source: Fransoo et al. (2009) and Martens et al. (2010) ICD-10-CA codes: 1. Accidental Poisoning: X40-X42, X44, X46, X47 2. Self inflicted poisoning: X60-X69 3. Self inflicted injury by hanging, strangulation and suffocation: X70 4. Self inflicted injury by drowning: X71 5. Self inflicted injury by firearms and explosives: X72-X75 6. Self inflicted injury by smoke, fire, flames, steam, hot vapours and hot objects: X76, X77 7. Self inflicted injury by cutting and piercing instruments: X78, X79 8. Self inflicted injury by jumping from high places: X80 9. Self inflicted injury by jumping of lying before a moving object: X81 10. Self inflicted injury by crashing motor vehicle: X82 11. Self inflicted injury by other and unspecified means: X83, X84 12. Poisoning with undetermined intent: Y10-Y12, Y16, Y17 NOTE: there were no supporting ICD-9-CM codes included from source: Fransoo et al. (2009) and Martens et al. (2010) 13. Late effects of self inflicted injury: NOTE: there were no supporting ICD-10-CA codes included from source: Fransoo et al. (2009) and Martens et al. (2010) • Ultimately, the overall SUICIDE ATTEMPT DEFINITION will include those PHINs that attempted suicide or were admitted into the hospital for accidental poisoning (supported by a psychiatric tariff code either during the hospital stay or within 30 days post-discharge).

Appendix Table 1.1: Continued

Indicator	Description
Developmental Disorders	In the Medical Services 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 availabl 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: 1. 317 = Mild Mental Retardation (MR) 2. 318 = Other MR 3. 319 = Unspecified MR 4. 299 = Autism and other psychoses with origin specific to childhood In the hospital discharge data, the following ICD-10-CA codes were used to select cases of Developmental Disorders(NOTE: In Manitoba, for data beginning on April 1, 2004, up to 25 diagnoses can be coded in an abstract using ICD-10-CA): 1. F70.0, F70.1, F70.8, F70.9 = Mild mental retardation; 2. F71.0, F71.1, F71.8, F71.9 = Moderate mental retardation; 3. F72.0, F72.1, F72.8, F72.9 = Severe mental retardation; 4. F73.0, F73.1, F73.8, F73.9 = Profound mental retardation; 5. F78.0, F78.1, F78.8, F78.9 = Other mental retardation; 6. F79.0, F79.1, F79.8, F79.9 = Unspecified mental retardation; 7. F84.0, F84.1, F84.3, F84.4, F84.5, F84.8, F84.9 = Pervasive developmental disorders; 8. Q86.1, Q86.2, Q86.8 = Congenital malformation syndromes due to known exogenous causes, not elsewhere classified; 9. Q87.0, Q87.1, Q87.2, Q87.3, Q87.5, Q87.8 = Other specified congenital malformation syndromes affecting multiple systems; 10. Q89.8 = Other specified congenital malformations; 11. Q90.0, Q90.1, Q90.2, Q90.9 = Down's syndrome; 12. Q91.0, Q91.1, 91.2, Q91.3, 91.4, Q91.5, 91.6, Q91.7 = Edward's syndrome and Patau's syndrome; 13. 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 14. Q99.2 = Fragile X chromosome (note: P04.3 'Fetus and newborn affected by maternal use of alcohol' presented unreliable coding and therefore was excluded) <u>Education Data</u> In the Manitoba Education & Training (MET) 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. 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. <u>FASD Clinic Data</u> From the FASD clinic data, individuals were included if they had the following diagnoses in the variable DIA_Diagnosis: "ARBD", "ARND", "ARND/ARBD", "FAS", FAS/ARBD", "Partia FAS".
Autism	In Brownell et al. (2008), children with ASD were identified using diagnoses on hospital and physician records and information from education records on special school funding received for students with ASD. An individual was considered to have ASD if he/she had at least one of the following: one or more hospitalizations with any one of the recorded ICD-10-CA diagnostic codes as F84.0-F84.5, F84.8, or F84.9 one or more physician claims with the diagnosis code 299 identified as "ASD" within the variable CATEORGYN of the Manitoba Education Special Needs data file. (Children with ASD were previously identified by the code "AUT" in this variable within the education data.)

Appendix Table 1.1: Continued

Health and Social Services Use	
Indicator	**Definition**
Physician Visits	1) Adjusted rate per child; 2) Physician visits over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) Visits to a licensed physician in an outpatient setting in Manitoba. A physician can be a General Physician / General Practitioner (GP), Family Physician (FP) or a specialist physician. Outpatient settings generally include office visits, walk-in clinics, home visits, personal care home (PCH)/nursing home visits and visits to outpatient departments in a hospital. Visits to patients who are inpatients (admitted to an acute care hospital) are not considered ambulatory visits. Outpatient surgeries
Psychiatrist Visits	1) Adjusted rate per child; 2) Physician visits over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) Visits to a licensed psychiatrist in an outpatient setting in Manitoba. Outpatient settings generally include office visits, walk-in clinics, home visits, personal care home (PCH)/nursing home visits and visits to outpatient departments in a hospital. Visits to patients who are inpatients (admitted to an acute care hospital) are not considered
Inpatient Hospitalizations	1) Adjusted rate per 1000 child; 2) Hospitalizations over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) An episode of care is defined as a continuous time in one or more hospitals, including all direct transfers between hospitals and/or ICUs.
Indicator	**Description**
Injury Hospitalizations	1) Adjusted rate per 1000 child; 2) External cause of injuries resulted hospitalizations over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) External cause of injury codes is used to define environmental events, circumstances and conditions such as the cause of injury, poisoning, and other adverse effects related to injury morbidity and mortality. Injury Hospitalizations were defined as any inpatient hospitalization with an external cause of injury diagnosis code (also known as an E-code) in any of the 16 / 25 diagnoses fields: ICD-9-CM codes E800-E999**, ICD-10-CA codes V01-Y89**. ** Excluded from the count of hospitalizations due to injury are those related to medical error and drug complications as follows: • misadventures during surgical or medical care: ICD-9-CM codes E870-E876; ICD-10-CA codes Y60-Y69, Y88.1 • reactions or complications due to medical care: ICD-9-CM codes E878-E879; ICD-10-CA codes Y70-Y84, Y88.2, Y88.3 • adverse effects due to drugs: ICD-9-CM codes E930-E949; ICD-10-CA codes Y40-Y59, Y88.0 Transfers between hospitals were tracked and only hospital episodes were counted, not individual separations, to reduce double-counting. All Manitoba hospitals were included; PCHs and Long-Term Care facilities were excluded (Riverview, Deer Lodge, Rehabilitation Centre for Children and Adolescent Treatment Centre). Newborn birth injuries or deaths, stillbirths, and brain deaths are also excluded.
Manitoba Adolescent Treatment Centre Services	1) Adjusted percentage; 2) Children's contacts with MATC over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) Percentage of children who used MATC services. The Manitoba Adolescent Treatment Centre (MATC) data contains summary information on mental health services provided to Manitoba children and youth.

Appendix Table 1.1: Continued

Indicator	Definition
Children in Care	1) Adjusted percentage; 2) Children ever in care over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) A child who was ever in care: 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.
Any Child and Family Service	1) Adjusted percentage; 2) Children ever in protection or received voluntary family services over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) A child who received services from Child and Family Services, a branch of the Community Service Delivery division of the Department of Manitoba Families that provides a comprehensive continuum of child protection (e.g.: foster care) and family support services in Manitoba in accordance with The Child and Family Services Act and The
Income Assistance – Family	1) Adjusted percentage; 2) A family was receiving Income Assistance (IA) over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) All children living within a family unit that was receiving income assistance (IA) were identified.
Income Assistance – Young Adult	1) Adjusted percentage; 2) Young adults aged 18-19 who were receiving Income Assistance (IA) over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) Once an individual turns 18 years of age they are no longer considered dependents and may thereafter apply for their own income assistance, regardless of whether they
Social Housing	1) Adjusted percentage; 2) Children's contacts with TMS over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) The Tenant Management System (TMS) is used to manage and track clients that reside in Manitoba Housing's approximately 14 000 residential dwelling units. These units
Involvement with the Justice System – Accused	1) Adjusted percentage; 2) Children's involvement in Prosecution Information and Scheduling Management (PRISM) for being charged (including only being accused, NO cautions/warned, crown opinion, crown caution, no charge laid, warrant) in PRISM over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children aged 13-19 with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) 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
Involvement with the Justice System - Victim	1) Adjusted percentage; 2) Children's involvement in PRISM for being a victim (including being a victim, a complainant, a protected person, a deceased victim) in PRISM over the last fiscal year of the two study periods 2008/09 & 2012/13; 3) Population of children with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; 4) PRISM is an incident-tracking system developed and maintained by Manitoba Justice's Prosecution Service. This system was designed to provide information to

Appendix Table 1.1: Continued

Education	
Indicator	**Description**
Grade 3: Numeracy Assessment	• Adjusted percentage; • Grade 3 students who were 'meeting' or 'approaching' expectations on all four numeracy competencies in 2009/10-2012/13; • Population of Grade 3 students with a numeracy assessment in 2009/10-2012/13, with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; • Teacher assessment of number skills for students in Grade 3 of publicly funded schools in Manitoba. The four numeracy competencies are assessed early in the school yea 1. predicts an element in a repeating pattern; 2. understands that the equal symbol represents an equality of the terms found on either side of the symbol; 3. understands that a given whole number may be represented in a variety of ways; and 4. uses various mental mathematic strategies to determine answers to addition and subtraction questions up to the number 18.
Grade 3: Reading Assessment	• Adjusted percentage • Grade 3 students who were 'meeting' or 'approaching' expectations on all three reading competencies in 2009/10-2012/13; • Population of Grade 3 students with a reading assessment in 2009/10-2012/13, with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; • Teacher assessment of reading skills for students in Grade 3 of publicly funded schools in Manitoba. The three reading competencies are assessed early in the school year: 1. reflects on and sets reading goals; 2. uses strategies during reading to make sense of texts; and 3. demonstrates comprehension.

Appendix Table 1.1: Continued

Indicator	Definition
Grace 7: Mathematics Assessment	• Adjusted percentage • Grade 7 students who were 'meeting' or 'approaching' expectations on all five mathematics competencies in 2009/10-2012/13; • Population of Grade 7 students with an assessment of mathematical skills in 2009/10-2012/13, with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; • Teacher assessment of mathematical skills for students in Grade 7 of publicly funded schools in Manitoba. The five mathematic competencies are assessed halfway throug the school year: 1. orders fractions; 2. orders decimal numbers; 3. understands that a given number may be represented in a variety of ways; 4. uses number patterns to solve mathematical problems; and 5. uses a variety of strategies to calculate and explain a mental mathematics problem.
Grade 7: Student Engagement	• Adjusted percentage • Grade 7 students who had 'established' (nearly always demonstrate the described behaviour) or 'were developing' (frequently demonstrate the described behaviour) on a five measures of engagement in 2009/10-2012/13; • Population of Grade 7 students with an assessment of their engagement in 2009/10-2012/13, with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; • Teacher assessment of engagement for students in Grade 7 of publicly funded schools in Manitoba. The five measures of engagement are assessed halfway through the school year: 1. demonstrates an interest in his/her learning; 2. engages in self-assessment; 3. aware of learning goals as a unit of study and/or personal learning goals; 4. participates in lessons; and 5. accepts responsibility for assignments.

Appendix Table 1.1: Continued

Indicator	Definition
Grade 8: Reading and Writing Assessment	• Adjusted percentage • Grade 8 students who were 'meeting' or 'approaching' expectations on all six reading and writing competencies in 2009/10-2012/13; • Population of Grade 8 students with an assessment of their reading and writing competencies in 2009/10-2012/13, with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13; • Teacher assessment of reading comprehension and writing of informal texts for students of publicly funded schools in Manitoba. The six competencies are assessed in the first term of the school year: 1. understands key ideas and messages in a variety of texts; 2. interprets a variety of texts; 3. responds critically to a variety of texts; 4. generates, selects and organizes ideas to support the reader's understanding; 5. chooses language (word choices and sentence patterns) to make an impact on the reader; and 6. uses conventions (spelling, grammar, and/or punctuation) and resources to edit and proofread to make meaning clear.
High School Completion	Adjusted percentage whereby the student has completed the requirements for high school • High school completion included individuals who: 1. were identified as graduates in the "year-end status" variable; or 2. earned at least 28 high school credits prior to 2008/09; or 3. earned at least 29 high school credits in 2008/09; or 4. earned at least 30 high school credits from 2009/10 onward; or 5. earned at least four Grade 12 credits during high school. Population was a cohort of Grade 9 students who were residents of Manitoba followed for six years up until 2008/09 and 2012/13, with or without mental health problems by December 31, 2008/2012 over 2005/06-2008/09 & 2009/10-2012/13.

Appendix Table 1.1: Continued

Physical Health	
Indicator	**Description**
Asthma	In the second time period, the asthma prevalence was determined for a cohort of children who were 6-19 years on December 31, 2012 and who met the following criteria over a 2-year period. Similarly, in the first time period, the prevalence was determined for children who were 6-19 years on December 21, 2008. 1. 1+ Hospitalizations in 2 years (any dx code): ICD-9 (493), or ICD_10-CA (J45) 2. 1+ Physician visits in 2 years (prefix=7): ICD-9 (493) 3. 1+ Prescriptions in 2 years: R03, R06AX17, R05CA10 (with several DINs deleted after being reviewed). They are: '01900552', '02394936', '02409720', '02394936', '02418282', '02418401', '00328944', '02359456', '02376938', '02408872'
Diabetes	In the second time period, the diabetes prevalence was determined for a cohort of children who were 0-19 years on December 31, 2012 and who met the following criteria over a 3-year period. Similarly, in the first time period, the prevalence was determined for children who were 0-19 years on December 31, 2008. 1. 1+ hospitalizations with diagnosis code 250 (ICD-9 CM) or E10-E14 (ICD-10) in any diagnosis field over 3 years of data (any dx code), OR, 2. 2+ physician claims with diagnosis code 250 over 3 years of data (prefix=7), OR, 3. 2+ prescriptions for diabetic drugs over 3 years of data.
Atopic Dermatitis	1. 1 or more hospitalizations, where one of the 16 or 25 recorded diagnoses was one of: a. ICD9-CM: i. 691: Atopic dermatitis and related conditions, ii. 692: Contact dermatitis and other eczema, or iii. 693: dermatitis due to substances taken internally (eg. food, drugs, other specified, unspecified) b. ICD10-CA: i. L20: Atopic dermatitis, ii. L23: Allergic contact dermatitis, iii. L25: Unspecified contact dermatitis, or iv. L27: Dermatitis due to substances taken internally 2. At least 1 physician visit where the diagnosis was either 691, 692 or 693.
Child Mortality	1) Crude and adjusted rate per 100,000 children; 2) From Manitoba Vital Statistics records: deaths (all causes) over the four years of each of the two study periods: 2005/06-2008/09 & 2009/10-2012/13; Age at death was <= 19; 3) Population of children with or without mental health problems as of December 31, 2008 (first study period) or as of December 31, 2012 (second study period).

APPENDIX 2: COHORT DEVELOPMENT

In the count for each time period, we included persons who were between the ages 0-19 when they were diagnosed with the disorder. The age group depends on the disorder we are examining; 0-19 is an example of an age group. The advantage of this method is that children who "age out" are not counted. For example, if a child is 19 and diagnosed with substance use disorder at the beginning of the time period, they will be included in the count of the numerator. However, if the child (now adult) only has a record at age 20 later in that time period, they would not be included in the count.

The figure below illustrates several examples of how we counted the children with disorders at the age of diagnosis. Child A was diagnosed at age 13 before April 1, 2005 and therefore was not counted in the mental disorder prevalence in either time period. Child B was diagnosed at age 13, during first time period and was counted in Time 1 in the 13-19 age group. Child C was first diagnosed before April 1, 2005 and not diagnosed in Time 1, therefore was not counted in Time 1. The second diagnosis for Child C was at age 20 in Time 2, therefore child was outside 0-19 age range and was not included. Child D was diagnosed at several time points and was counted at both Time 1 and Time 2.

Appendix Figure 2.1: Cohort Development

	April 1, 2005	Time 1 (March 31, 2009)	Time 2 (March 31, 2013)	
Child A:	x (age=13)			Child is NOT included
Child B:	x (age=11)	x (age=13)		Child is included in Time 1, age group = 13-19
Child C:	x (age=12)		x (age=20)	Child is NOT included
Child D:	x (age=7)	x (age=10)	x (age=14)	Child is included in Time 1, age group = 6-12 AND ALSO included in Time 2, age group = 13-19

APPENDIX 3: NUMBER OF CHILDREN DIAGNOSED FOR THE FIRST TIME BY AGE AND DISORDER

Attention-Deficit Hyperactivity Disorder

Appendix Table 3.1: Number of Children Diagnosed for the First Time with Attention-Deficit Hyperactivity Disorder by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	100	121
2	140	173
3	234	321
4	407	528
5	628	758
6	882	1,039
7	850	1,100
8	801	875
9	664	757
10	490	612
11	474	496
12	374	397
13	359	358
14	289	348
15	255	319
16	217	265
17	148	207
18	79	139
19	67	128

Conduct Disorder

Appendix Table 3.2: Number of Children Diagnosed for the First Time with Conduct Disorder by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	283	254
2	353	364
3	442	416
4	384	446
5	295	401
6	283	309
7	256	314
8	258	289
9	200	226
10	207	223
11	178	192
12	175	172
13	191	179
14	182	188
15	156	167
16	187	135
17	128	88
18	34	41
19	22	22

Substance Use Disorders

Appendix Table 3.3: Number of Children Diagnosed for the First Time with Substance Use Disorder by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	26	51
2	11	11
3	s	13
4	s	s
5	s	s
6	9	7
7	s	8
8	6	7
9	6	9
10	17	13
11	21	19
12	61	48
13	184	119
14	338	270
15	481	382
16	566	484
17	529	482
18	536	624
19	530	598

s indicates suppressed due to small numbers

Mood and Anxiety Disorders

Appendix Table 3.4: Number of Children Diagnosed for the First Time with Mood and Anxiety Disorders by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	55	69
2	80	45
3	123	61
4	101	48
5	84	94
6	116	134
7	132	185
8	199	235
9	201	287
10	312	303
11	328	379
12	456	489
13	699	788
14	969	1,152
15	1,196	1,499
16	1,461	1,733
17	1,498	1,846
18	1,504	1,893
19	1,655	2,065

Psychotic Disorders

Appendix Table 3.5: Number of Children Diagnosed for the First Time with Psychotic Disorders by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	s	6
2	s	s
3	s	s
4	s	s
5	s	s
6	s	s
7	7	s
8	10	s
9	18	6
10	10	11
11	19	16
12	16	30
13	45	45
14	60	74
15	82	99
16	95	108
17	132	134
18	130	160
19	127	152

s indicates suppressed due to small numbers

Schizophrenia

Appendix Table 3.6: Number of Children Diagnosed for the First Time with Schizophrenia by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	s	s
2	s	s
3	s	s
4	s	s
5	s	s
6	s	s
7	s	s
8	s	s
9	s	s
10	s	s
11	s	s
12	s	8
13	10	12
14	8	19
15	32	26
16	28	31
17	62	56
18	92	105
19	81	113

s indicates suppressed due to small numbers

Suicide

Appendix Table 3.7: Number of Children who Died by Suicide by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	s	s
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	0	0
10	0	0
11	s	s
12	s	s
13	8	s
14	9	6
15	17	18
16	10	12
17	16	14
18	14	17
19	14	20

s indicates suppressed due to small numbers

Attempted Suicide

Appendix Table 3.8: Number of Children who Attempted Suicide for the First Time by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	0	0
2	0	s
3	0	0
4	0	0
5	0	0
6	0	0
7	0	s
8	0	0
9	0	0
10	s	0
11	6	s
12	20	14
13	31	28
14	59	83
15	82	101
16	98	101
17	64	62
18	62	64
19	57	65

s indicates suppressed due to small numbers

Developmental Disorders

Appendix Table 3.9: Number of Children Diagnosed for the First Time with Developmental Disorders by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	240	191
2	172	218
3	205	229
4	247	244
5	333	312
6	231	167
7	175	157
8	179	134
9	165	130
10	174	150
11	126	114
12	130	100
13	143	93
14	120	119
15	99	92
16	91	84
17	70	69
18	46	44
19	37	32

Autism Spectrum Disorder

Appendix Table 3.10: Number of Children Diagnosed for the First Time with Autism Spectrum Disorder by Age

Age (years)	2005/06-2008/09	2009/10-2012/13
1 and under	39	41
2	143	200
3	169	213
4	140	167
5	111	145
6	72	87
7	57	91
8	71	75
9	69	85
10	77	85
11	64	59
12	66	54
13	41	49
14	52	51
15	41	49
16	35	35
17	31	27
18	27	26
19	17	23

APPENDIX 4: DIAGNOSIS BY PHYSICIAN TYPE BY DISORDER

Attention-Deficit Hyperactivity Disorder

Appendix Table 4.1: Percentage of Children with Attention-Deficit Hyperactivity Disorder by Healthcare Professional

	2008	2012
Psychiatrist	11.34%	8.90%
Pediatrician	54.03%	54.20%
General Practitioner	28.91%	31.90%
Other Medical Doctor	0.38%	0.60%

Conduct Disorder

Appendix Table 4.2: Percentage of Children with Conduct Disorder by Healthcare Professional

	2008	2012
Psychiatrist	7.93%	8.52%
Pediatrician	70.25%	68.18%
General Practitioner	20.70%	21.59%
Other Medical Doctor	1.12%	1.71%

Substance Use Disorders

Appendix Table 4.3: Percentage of Children with Substance Use Disorder by Healthcare Professional

	2008	2012
Psychiatrist	24.23%	26.83%
Pediatrician	11.97%	4.32%
General Practitioner	60.54%	64.00%
Other Medical Doctor	3.27%	4.85%

Mood and Anxiety Disorders

Appendix Table 4.4: Percentage of Children with Mood and Anxiety Disorders by Healthcare Professional

	2008	2012
Psychiatrist	9.23%	8.31%
Pediatrician	13.08%	12.05%
General Practitioner	74.48%	75.78%
Other Medical Doctor	3.21%	3.86%

Psychotic Disorders

Appendix Table 4.5: Percentage of Children with Psychotic Disorders by Healthcare Professional

	2008	2012
Psychiatrist	64.79%	66.77%
Pediatrician	4.28%	3.14%
General Practitioner	29.71%	27.81%
Other Medical Doctor	1.22%	2.27%

Schizophrenia

Appendix Table 4.6: Percentage of Children with Schizophrenia by Healthcare Professional

	2008	2012
Psychiatrist	57.07%	56.21%
Pediatrician	3.40%	2.81%
General Practitioner	39.53%	40.98%

Developmental Disorder

Appendix Table 4.7: Percentage of Children with Developmental Disorders by Healthcare Professional

	2008	2012
Psychiatrist	13.37%	12.14%
Pediatrician	30.42%	34.49%
General Practitioner	5.87%	7.05%
Other Medical Doctor	2.69%	2.56%
Education*	39.23%	34.83%
Manitoba FASD	8.41%	8.94%

* These children were identified as recipients of education funding following a diagnosis of a Developmental Disorder from a healthcare professional

Autism Spectrum Disorder

Appendix Table 4.8: Percentage of Children with Autism Spectrum Disorder by Healthcare Professional

	2008	2012
Psychiatrist	25.79%	20.63%
Pediatrician	48.46%	52.79%
General Practitioner	8.29%	10.37%
Other Medical Doctor	4.15%	4.50%
Education*	13.31%	11.72%

* These children were identified as recipients of education funding following a diagnosis of Autism Spectrum Disorder from a healthcare professional

APPENDIX 5: COUNTS, PERCENTAGES, AND RATES, BY DISORDER, HEALTH REGION, AND COMMUNITY AREA

Attention-Deficit Hyperactivity Disorder

Appendix Table 5.1: Counts and Percentages of Children Aged 6-19 with Attention-Deficit Hyperactivity Disorder by Health Region

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	1,321	3.5%	3.5%	1,670	4.2%	4.4%
Winnipeg	7,293	6.2%	6.3%	8,345	7.1%	7.6%
Prairie Mountain Health	1,609	5.4%	5.6%	1,768	6.1%	6.4%
Interlake-Eastern	1,210	5.1%	5.1%	1,250	5.5%	5.8%
Northern	631	3.2%	3.2%	667	3.5%	3.5%
Public Trustee	554	33.5%	33.5%	1,007	31.3%	34.1%
Manitoba	12,628	5.5%	5.5%	14,714	6.4%	6.8%

Appendix Table 5.2: Counts and Percentages of Children Aged 6-19 with Attention-Deficit Hyperactivity Disorder by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	1,234	6.3%	6.4%	1,492	7.4%	7.9%
St. James/Assiniboine South	1,231	7.7%	8.0%	1,268	8.5%	9.0%
St. Vital/St. Boniface	1,312	6.5%	6.6%	1,426	7.2%	7.6%
River East/Transcona	1,587	6.7%	6.8%	1,762	7.8%	8.1%
Seven Oaks/Inkster	805	4.5%	4.5%	963	5.0%	5.1%
Downtown/Point Douglas	1,023	5.1%	5.1%	1,348	6.7%	6.8%

Appendix Table 5.3: Prevalence of Attention-Deficit Hyperactivity Disorder in Children Aged 6-19 by Sex and Health Region

Age-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**5.1%**	**1.5%**	**5.8%**	**2.3%**
Winnipeg	**8.8%**	**3.1%**	**9.8%**	**3.9%**
Prairie Mountain Health	**7.4%**	**3.0%**	**8.4%**	**3.3%**
Interlake-Eastern	**7.4%**	**2.3%**	**8.0%**	**2.7%**
Northern	**4.6%**	**1.4%**	**5.0%**	**1.6%**
Manitoba	**7.7%**	**2.8%**	**8.7%**	**3.5%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Conduct Disorder

Appendix Table 5.4: Counts and Percentages of Children Aged 6-19 with Conduct Disorder by Health Region

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	293	0.8%	0.8%	386	1.0%	0.9%
Winnipeg	2,040	1.7%	1.7%	2,091	1.8%	1.8%
Prairie Mountain Health	310	1.0%	1.0%	224	0.8%	0.8%
Interlake-Eastern	332	1.4%	1.4%	304	1.3%	1.4%
Northern	223	1.1%	1.1%	217	1.2%	1.1%
Public Trustee	194	11.7%	11.5%	336	10.4%	10.6%
Manitoba	3,392	1.5%	1.5%	3,558	1.5%	1.5%

Appendix Table 5.5: Counts and Percentages of Children Aged 6-19 with Conduct Disorder by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	315	1.6%	1.6%	338	1.7%	1.7%
St. James/Assiniboine South	271	1.7%	1.7%	271	1.8%	1.9%
St. Vital/St. Boniface	277	1.4%	1.4%	285	1.4%	1.4%
River East/Transcona	464	2.0%	1.9%	445	2.0%	2.0%
Seven Oaks/Inkster	297	1.6%	1.6%	319	1.6%	1.6%
Downtown/Point Douglas	413	2.1%	2.1%	429	2.1%	2.1%

Appendix Table 5.6: Prevalence of Conduct Disorder in Children Aged 6-19 by Sex and Health Region

Age-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**1.0%**	**0.5%**	**1.1%**	**0.7%**
Winnipeg	**1.9%**	**1.4%**	**1.9%**	**1.5%**
Prairie Mountain Health	**1.2%**	**0.8%**	**0.9%**	**0.6%**
Interlake-Eastern	**1.6%**	**1.1%**	**1.5%**	**1.1%**
Northern	**1.3%**	**0.9%**	**1.4%**	**0.7%**
Manitoba	**1.6%**	**1.1%**	**1.7%**	**1.2%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Substance Use Disorders

Appendix Table 5.7: Counts and Percentages of Adolescents Aged 13-19 with Substance Use Disorders by Health Region

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	295	1.5%	1.5%	270	1.3%	1.3%
Winnipeg	1,602	2.6%	2.6%	1,364	2.2%	2.0%
Prairie Mountain Health	516	3.2%	3.1%	458	3.0%	2.9%
Interlake-Eastern	376	3.0%	3.0%	390	3.1%	3.0%
Northern	672	6.9%	7.2%	676	7.3%	7.4%
Public Trustee	122	13.4%	14.0%	200	10.8%	10.6%
Manitoba	3,583	3.0%	3.0%	3,358	2.8%	2.6%

Appendix Table 5.8: Counts and Percentages of Adolescents Aged 13-19 with Substance Use Disorders by Winnipeg Community Area

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	205	2.0%	1.9%	184	1.7%	1.6%
St. James/Assiniboine South	168	1.9%	1.9%	173	2.1%	2.0%
St. Vital/St. Boniface	254	2.4%	2.3%	211	2.0%	1.9%
River East/Transcona	261	2.1%	2.1%	234	1.9%	1.8%
Seven Oaks/Inkster	197	2.1%	2.1%	144	1.4%	1.3%
Downtown/Point Douglas	513	5.1%	5.1%	413	4.0%	3.9%

Appendix Table 5.9: Prevalence of Substance Use Disorders in Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, adolescents diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	1.6%	1.4%	**1.5%**	**1.0%**
Winnipeg	**2.4%**	**2.6%**	1.9%	2.1%
Prairie Mountain Health	3.0%	3.1%	2.9%	2.8%
Interlake-Eastern	2.7%	3.1%	2.8%	3.3%
Northern	6.4%	7.5%	**6.5%**	**8.4%**
Manitoba	2.7%	3.0%	2.4%	2.9%

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Externalizing Disorders

Appendix Table 5.10: Counts and Percentages of Children Aged 6-19 with Externalizing Disorders by Health Region

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	1,744	4.7%	4.5%	2,120	5.4%	5.3%
Winnipeg	9,826	8.4%	8.3%	10,613	9.1%	9.1%
Prairie Mountain Health	2,221	7.4%	7.6%	2,279	7.9%	8.0%
Interlake-Eastern	1,743	7.3%	7.3%	1,761	7.7%	7.8%
Northern	1,384	7.1%	7.5%	1,425	7.6%	8.0%
Public Trustee	708	42.8%	43.7%	1,252	38.9%	41.0%
Manitoba	17,636	7.7%	7.7%	19,457	8.5%	8.5%

Appendix Table 5.11: Counts and Percentages of Children Aged 6-19 with Externalizing Disorders by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	1,754	8.9%	8.9%	2,014	10.0%	10.1%
St. James/Assiniboine South	1,670	10.4%	10.5%	1,712	11.5%	11.6%
St. Vital/St. Boniface	1,843	9.2%	9.0%	1,922	9.7%	9.7%
River East/Transcona	2,312	9.8%	9.6%	2,441	10.8%	10.8%
Seven Oaks/Inkster	1,299	7.2%	7.2%	1,426	7.3%	7.3%
Downtown/Point Douglas	1,949	9.8%	10.2%	2,190	10.9%	11.3%

Appendix Table 5.12: Prevalence of Externalizing Disorders in Children Aged 6-19 by Sex and Health Region

Age-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**6.5%**	**2.7%**	**7.3%**	**3.3%**
Winnipeg	**11.3%**	**5.3%**	**12.0%**	**5.9%**
Prairie Mountain Health	**9.6%**	**5.1%**	**10.5%**	**5.2%**
Interlake-Eastern	**9.8%**	**4.6%**	**10.3%**	**5.1%**
Northern	**8.7%**	**5.6%**	**9.1%**	**6.1%**
Manitoba	**10.2%**	**5.0%**	**11.0%**	**5.7%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Mood and Anxiety Disorders

Appendix Table 5.13: Counts and Percentages of Children Aged 6-19 with Mood and Anxiety Disorders by Health Region

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	1,806	4.8%	4.8%	1,977	5.0%	5.0%
Winnipeg	7,769	6.6%	6.7%	9,309	7.9%	8.1%
Prairie Mountain Health	2,127	7.1%	6.5%	2,317	8.1%	7.8%
Interlake-Eastern	1,379	5.8%	5.7%	1,700	7.5%	6.9%
Northern	963	4.9%	4.9%	1,064	5.6%	5.6%
Public Trustee	281	17.0%	19.5%	544	16.9%	17.3%
Manitoba	14,325	6.2%	6.2%	16,911	7.4%	7.3%

Appendix Table 5.14: Counts and Percentages of Children Aged 6-19 with Mood and Anxiety Disorders by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	1,364	6.9%	6.7%	1,574	7.8%	8.0%
St. James/Assiniboine South	1,250	7.8%	7.7%	1,434	9.7%	9.9%
St. Vital/St. Boniface	1,308	6.5%	6.6%	1,557	7.8%	8.0%
River East/Transcona	1,649	7.0%	7.1%	1,932	8.5%	8.2%
Seven Oaks/Inkster	898	5.0%	5.0%	1,122	5.8%	5.6%
Downtown/Point Douglas	1,266	6.3%	6.3%	1,656	8.2%	7.8%

Appendix Table 5.15: Prevalence of Mood and Anxiety Disorders in Children Aged 6-19 by Sex and Health Region

Age-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**4.2%**	**7.0%**	**4.7%**	**6.7%**
Winnipeg	**6.8%**	**8.5%**	**8.0%**	**10.3%**
Prairie Mountain Health	**6.0%**	**8.9%**	**6.8%**	**11.1%**
Interlake-Eastern	**5.2%**	**8.1%**	**6.3%**	**9.6%**
Northern	**4.4%**	**6.9%**	**5.1%**	**7.7%**
Manitoba	**6.2%**	**8.0%**	**7.2%**	**9.5%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Psychotic Disorders

Appendix Table 5.16: Counts and Percentages of Adolescents Aged 13-19 with Psychotic Disorders by Health Region

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	70	0.36%	0.37%	59	0.29%	0.29%
Winnipeg	379	0.61%	0.59%	459	0.73%	0.69%
Prairie Mountain Health	90	0.56%	0.56%	78	0.52%	0.51%
Interlake-Eastern	77	0.61%	0.62%	97	0.78%	0.79%
Northern	151	1.56%	1.66%	146	1.58%	1.59%
Public Trustee	51	5.60%	6.17%	85	4.58%	4.69%
Manitoba	818	0.68%	0.68%	924	0.76%	0.75%

Appendix Table 5.17: Counts and Percentages of Adolescents Aged 13-19 with Psychotic Disorders by Winnipeg Community Area

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	64	0.62%	0.62%	82	0.76%	0.75%
St. James/Assiniboine South	34	0.39%	0.39%	39	0.47%	0.46%
St. Vital/St. Boniface	59	0.56%	0.56%	65	0.61%	0.61%
River East/Transcona	72	0.57%	0.58%	75	0.61%	0.59%
Seven Oaks/Inkster	35	0.38%	0.38%	45	0.44%	0.44%
Downtown/Point Douglas	114	1.14%	1.15%	149	1.46%	1.46%

Appendix Table 5.18: Prevalence of Psychotic Disorders in Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, adolescents diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	0.41%	0.26%	**0.37%**	**0.18%**
Winnipeg	**0.73%**	**0.37%**	**0.83%**	**0.51%**
Prairie Mountain Health	0.54%	0.48%	0.55%	0.43%
Interlake-Eastern	**0.74%**	**0.41%**	**0.94%**	**0.56%**
Northern	1.78%	1.32%	**2.02%**	**1.03%**
Manitoba	**0.77%**	**0.50%**	**0.88%**	**0.55%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Schizophrenia

Appendix Table 5.19: Counts and Percentages of Adolescents Aged 13-19 with Schizophrenia by Health Region

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	37	0.19%	0.20%	30	0.15%	0.14%
Winnipeg	179	0.29%	0.27%	209	0.33%	0.30%
Prairie Mountain Health	52	0.32%	0.33%	34	0.23%	0.22%
Interlake-Eastern	30	0.24%	0.24%	38	0.31%	0.30%
Northern	57	0.59%	0.63%	68	0.74%	0.74%
Public Trustee	27	2.97%	3.69%	48	2.59%	2.79%
Manitoba	382	0.32%	0.32%	427	0.35%	0.34%

Appendix Table 5.20: Counts and Percentages of Adolescents Aged 13-19 with Schizophrenia by Winnipeg Community Area

Age- and sex-adjusted, adolescents diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	24	0.23%	0.23%	34	0.31%	0.29%
St. James/Assiniboine South	17	0.19%	0.19%	22	0.26%	0.25%
St. Vital/St. Boniface	23	0.22%	0.22%	28	0.26%	0.26%
River East/Transcona	33	0.26%	0.26%	41	0.33%	0.31%
Seven Oaks/Inkster	17	0.18%	0.18%	18	0.17%	0.17%
Downtown/Point Douglas	64	0.64%	0.64%	66	0.64%	0.64%

Appendix Table 5.21: Prevalence of Schizophrenia in Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, adolescents diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**0.27%**	**0.11%**	**0.22%**	**0.04%**
Winnipeg	**0.38%**	**0.14%**	**0.42%**	**0.16%**
Prairie Mountain Health	0.37%	0.24%	0.24%	0.18%
Interlake-Eastern	**0.36%**	**0.10%**	0.38%	0.18%
Northern	**0.85%**	**0.32%**	**1.06%**	**0.37%**
Manitoba	**0.42%**	**0.18%**	**0.45%**	**0.19%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Any Mental Disorder

Appendix Table 5.22: Counts and Percentages of Children Aged 6-19 with Any Mental Disorder by Health Region

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	3,256	8.7%	8.6%	3,730	9.5%	9.4%
Winnipeg	15,817	13.5%	13.6%	17,723	15.1%	15.2%
Prairie Mountain Health	3,917	13.1%	12.8%	4,111	14.3%	14.1%
Interlake-Eastern	2,802	11.8%	11.8%	3,095	13.6%	13.2%
Northern	2,053	10.5%	10.3%	2,173	11.5%	11.3%
Public Trustee	832	50.3%	54.7%	1,498	46.5%	50.5%
Manitoba	28,684	12.5%	12.5%	32,337	14.1%	14.0%

Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

Appendix Table 5.23: Counts and Percentages of Children Aged 6-19 with Any Mental Disorder by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	2,650	13.4%	13.2%	3,040	15.1%	14.9%
St. James/Assiniboine South	2,464	15.4%	15.6%	2,649	17.8%	17.9%
St. Vital/St. Boniface	2,700	13.5%	13.5%	2,980	15.0%	14.9%
River East/Transcona	3,402	14.4%	14.7%	3,710	16.4%	16.5%
Seven Oaks/Inkster	1,858	10.3%	10.3%	2,172	11.2%	11.3%
Downtown/Point Douglas	2,706	13.6%	13.6%	3,205	16.0%	15.8%

Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

Appendix Table 5.24: Prevalence of Any Mental Disorder in Children Aged 6-19 by Sex and Health Region

Age-adjusted, children diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	10.5%	8.4%	**11.9%**	**9.0%**
Winnipeg	**18.1%**	**12.2%**	**19.4%**	**14.2%**
Prairie Mountain Health	15.5%	12.7%	16.8%	14.1%
Interlake-Eastern	**15.2%**	**11.0%**	**16.3%**	**12.8%**
Northern	12.6%	10.1%	13.6%	11.3%
Manitoba	**16.1%**	**11.6%**	**17.6%**	**13.3%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Note: Any Mental Disorder includes the following disorders: ADHD, conduct disorder, substance use disorders, mood and anxiety disorders, and psychotic disorders (including schizophrenia)

Suicide

Appendix Table 5.25: Counts and Rates of Suicide Among Adolescents Aged 13-19 by Health Region

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Rate	Adjusted Rate	Count	Crude Rate	Adjusted Rate
Southern Health/Santé Sud	s	s	s	s	s	s
Winnipeg	26	42.2	41.8	29	46.2	45.4
Prairie Mountain Health	12	74.6	73.7	12	79.7	78.4
Interlake-Eastern	16	126.9	127.7	15	120.6	118.6
Northern	23	237.2	238.8	27	292.6	289.6
Public Trustee	s	s	s	s	s	s
Manitoba	88	73.2	73.2	91	74.8	73.5

s indicates suppressed due to small numbers

Appendix Table 5.26: Counts and Rates of Suicide Among Adolescents Aged 13-19 by Winnipeg Community Area

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Rate	Adjusted Rate	Count	Crude Rate	Adjusted Rate
Fort Garry/River Heights	s	s	s	s	s	s
St. James/Assiniboine South	s	s	s	s	s	s
St. Vital/St. Boniface	s	s	s	s	s	s
River East/Transcona	s	s	s	s	s	s
Seven Oaks/Inkster	s	s	s	s	s	s
Downtown/Point Douglas	14	139.4	139.5	16	156.3	156.8

s indicates suppressed due to small numbers

Appendix Table 5.27: Rate of Suicide Among Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, per 100,000 adolescents, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	20.34	32.31	17.88	38.22
Winnipeg	**51.00**	**32.77**	44.82	38.76
Prairie Mountain Health	73.04	75.45	64.20	89.25
Interlake-Eastern	92.16	165.46	81.00	195.72
Northern	245.68	231.67	215.93	274.03
Manitoba	75.00	71.32	65.92	84.36

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Attempted Suicide

Appendix Table 5.28: Counts and Rates of Attempted Suicide Among Adolescents Aged 13-19 by Health Region

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Rate	Adjusted Rate	Count	Crude Rate	Adjusted Rate
Southern Health/Santé Sud	50	260.4	258.5	40	197.2	196.3
Winnipeg	119	192.9	191.8	213	339.6	321.8
Prairie Mountain Health	115	715.1	719.5	99	657.5	688.4
Interlake-Eastern	52	412.4	415.2	64	514.7	509.8
Northern	152	1567.3	1536.0	115	1246.3	1232.6
Public Trustee	22	2417.6	2425.5	39	2101.3	1990.9
Manitoba	510	424.4	424.4	570	469	458.7

Appendix Table 5.29: Counts and Rates of Attempted Suicide Among Adolescents Aged 13-19 by Winnipeg Community Area

Age- and sex-adjusted, per 100,000 adolescents, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Rate	Adjusted Rate	Count	Crude Rate	Adjusted Rate
Fort Garry/River Heights	8	77.0	72.7	24	222.3	214.9
St. James/Assiniboine South	13	148.7	140.8	34	408.5	380.1
St. Vital/St. Boniface	18	171.1	166.0	21	197.3	186.2
River East/Transcona	17	135.3	131.4	38	308.8	283.0
Seven Oaks/Inkster	23	246.5	235.3	19	183.8	179.4
Downtown/Point Douglas	39	388.3	386.4	74	722.7	689.5

Appendix Table 5.30: Rate of Attempted Suicide Among Adolescents Aged 13-19 by Sex and Health Region

Age-adjusted, per 100,000 adolescents, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**120.18**	**410.07**	132.90	254.02
Winnipeg	**106.76**	**278.87**	**117.56**	**564.03**
Prairie Mountain Health	**400.95**	**1,035.26**	**431.88**	**909.46**
Interlake-Eastern	**244.72**	**588.59**	**256.16**	**769.63**
Northern	**802.96**	**2,328.30**	**650.69**	**1,812.84**
Manitoba	**225.45**	**628.29**	**213.38**	**728.88**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Developmental Disorders

Appendix Table 5.31: Counts and Percent of Children Aged 0-19 with Developmental Disorders by Health Region

Age- and sex-adjusted, children ever diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	975	1.9%	2.0%	1,197	2.1%	2.3%
Winnipeg	4,057	2.5%	2.5%	4,934	3.0%	3.0%
Prairie Mountain Health	924	2.3%	2.3%	1,039	2.5%	2.6%
Interlake-Eastern	757	2.4%	2.3%	846	2.7%	2.7%
Northern	736	2.6%	2.6%	878	3.0%	3.1%
Public Trustee	418	20.9%	14.1%	515	13.2%	8.3%
Manitoba	7,867	2.5%	2.5%	9,409	2.9%	2.9%

Note: Children in each time period were considered to have a diagnosis of developmental disorders if they met the criteria over the course of their lifetime

Appendix Table 5.32: Counts and Percent of Children Aged 0-19 with Developmental Disorders by Winnipeg Community Area

Age- and sex-adjusted, children ever diagnosed with disorder, four-year time periods

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	618	2.3%	2.4%	770	2.8%	2.9%
St. James/Assiniboine South	557	2.6%	2.8%	640	3.2%	3.3%
St. Vital/St. Boniface	664	2.4%	2.5%	797	2.9%	3.0%
River East/Transcona	708	2.2%	2.4%	889	2.8%	3.0%
Seven Oaks/Inkster	561	2.3%	2.3%	675	2.5%	2.6%
Downtown/Point Douglas	934	3.2%	2.8%	1,153	3.8%	3.4%

Note: Children in each time period were considered to have a diagnosis of developmental disorders if they met the criteria over the course of their lifetime

Appendix Table 5.33: Lifetime Prevalence of Developmental Disorders in Children Aged 0-19 by Sex and Health Region

Age-adjusted, children ever diagnosed with disorder, four-year time periods

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**2.3%**	**1.2%**	**2.8%**	**1.4%**
Winnipeg	**3.3%**	**1.4%**	**4.0%**	**1.6%**
Prairie Mountain Health	**2.7%**	**1.5%**	**3.2%**	**1.5%**
Interlake-Eastern	**2.9%**	**1.3%**	**3.3%**	**1.5%**
Northern	**3.0%**	**1.7%**	**3.8%**	**1.8%**
Manitoba	**3.1%**	**1.4%**	**3.6%**	**1.6%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Note: Children in each time period were considered to have a diagnosis of developmental disorders if they met the criteria over the course of their lifetime

Autism Spectrum Disorder

Appendix Table 5.34: Counts and Percent of Children Aged 0-19 with Autism Spectrum Disorder by Health Region

Age- and sex-adjusted, children diagnosed with disorder

Health Region	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Southern Health/Santé Sud	375	0.7%	0.7%	544	1.0%	1.0%
Winnipeg	1,988	1.2%	1.2%	2,719	1.7%	1.7%
Prairie Mountain Health	331	0.8%	0.8%	442	1.1%	1.1%
Interlake-Eastern	278	0.9%	0.9%	345	1.1%	1.1%
Northern	174	0.6%	0.6%	247	0.9%	0.9%
Public Trustee	61	3.0%	2.9%	81	2.1%	2.1%
Manitoba	3,207	1.0%	1.0%	4,378	1.3%	1.4%

Note: Children in each time period were considered to have a diagnosis of Autism Spectrum Disorder if they met the criteria over the course of their lifetime

Appendix Table 5.35: Counts and Percent of Children Aged 0-19 with Autism Spectrum Disorder by Winnipeg Community Area

Age- and sex-adjusted, children diagnosed with disorder

Community Area	2005/06-2008/09			2009/10-2012/13		
	Count	Crude Percent	Adjusted Percent	Count	Crude Percent	Adjusted Percent
Fort Garry/River Heights	377	1.4%	1.4%	511	1.8%	1.9%
St. James/Assiniboine South	309	1.5%	1.5%	391	1.9%	2.0%
St. Vital/St. Boniface	356	1.3%	1.3%	482	1.7%	1.7%
River East/Transcona	355	1.1%	1.1%	505	1.6%	1.6%
Seven Oaks/Inkster	240	1.0%	1.0%	329	1.2%	1.2%
Downtown/Point Douglas	291	1.0%	1.0%	458	1.5%	1.5%

Note: Children in each time period were considered to have a diagnosis of Autism Spectrum Disorder if they met the criteria over the course of their lifetime

Appendix Table 5.36: Lifetime Prevalence of Autism Spectrum Disorder in Children Aged 0-19 by Sex and Health Region

Age-adjusted, children ever diagnosed with disorder

Health Region	2005/06-2008/09		2009/10-2012/13	
	Males	Females	Males	Females
Southern Health/Santé Sud	**1.1%**	**0.3%**	**1.5%**	**0.4%**
Winnipeg	**1.9%**	**0.5%**	**2.5%**	**0.7%**
Prairie Mountain Health	**1.2%**	**0.4%**	**1.6%**	**0.5%**
Interlake-Eastern	**1.4%**	**0.3%**	**1.7%**	**0.4%**
Northern	**0.9%**	**0.3%**	**1.3%**	**0.4%**
Manitoba	**1.5%**	**0.4%**	**2.1%**	**0.6%**

bold indicates a statistically significant difference between males and females for that health region ($p<0.05$)

Note: Children in each time period were considered to have a diagnosis of Autism Spectrum Disorder if they met the criteria over the course of their lifetime

APPENDIX 6: COMORBIDITY FOR THE FIRST TIME PERIOD

Appendix Table 6.1: Percentage of Children with a Mental Disorder who also had a Comorbid Disorder, Diagnosed between 2005/06-2008/09

			Mental Health Comorbidities (%)							
			ADHD*	Conduct	Substance Use	Mood and Anxiety	Schizophrenia	Suicide and Attempted Suicide	Developmental	Child had only the Specified Disorder
Mental Health Disorder	**ADHD***	(n=12,628)		11.7	2.7	14.8	0.4	0.4	13.6	71.1
	Conduct	(n=3,392)	43.7		7.1	26.9	1.3	1.1	16.3	37.2
	Substance Use	(n=3,583)	9.4	6.7		38.4	4.0	4.9	4.0	53.7
	Mood and Anxiety	(n=14,325)	13.0	6.4	9.6		1.6	2.4	5.7	72.1
	Schizophrenia	(n=382)	14.4	11.3	37.2	61.3		5.8	17.5	18.6
	Suicide and Attempted Suicide	(n=542)	8.5	7.2	32.1	63.8	4.1		5.7	27.7
	Developmental	(n=5,539)	21.8	7.0	1.8	10.3	0.9	0.4		70.3

* Attention-Deficit Hyperactivity Disorder

APPENDIX 7: ADJUSTED RATES AND PERCENTAGES FOR SCHIZOPHRENIA BY SERVICE USE INDICATOR

Appendix Table 7.1: Service Use by Adolescents with Schizophrenia

Age- and sex-adjusted rates, adolescents aged 13-19

	2008/09	2012/13
Physician Visits (per child)		
Schizophrenia (1,2)	6.61	6.72
No Disorders	2.09	1.97
Psychiatrist Visits (%)		
Schizophrenia (1,2)	35.25	35.94
No Disorders (t)	0.20	0.15
Inpatient Hospitalizations (per child)		
Schizophrenia (1,2)	30.75	30.52
No Disorders (t)	1.69	1.49
Injury Hospitalizations (per child)		
Schizophrenia (1,2)	4.90	3.91
No Disorders (t)	0.59	0.47
Receiving Services from Manitoba Adolescent Treatment Centre (%)		
Schizophrenia (1,2)	14.78	18.68
No Disorders	0.57	0.60
Interactions with Child and Family Services (per child)		
Schizophrenia (1,2)	23.15	20.19
No Disorders (t)	5.59	3.14
Children in Care (per child)		
Schizophrenia (1,2)	14.23	11.31
No Disorders (t)	1.80	0.77
Living in a Family on Income Assistance (%)		
Schizophrenia (1,2)	43.08	41.29
No Disorders	6.03	6.46
Young Adult on Income Assistance (ages 18-19, %)		
Schizophrenia (1,2)	57.80	46.74
No Disorders	4.67	5.47
Living in Social Housing (%)		
Schizophrenia (1,2)	8.90	11.47
No Disorders (t)	3.12	4.05
Justice System Involvement: Accused (%)		
Schizophrenia (1,2)	12.32	12.49
No Disorders (t)	2.96	2.14
Justice System Involvement: Victim (%)		
Schizophrenia (1,2)	3.59	3.76
No Disorders (t)	1.32	1.06

1 indicates rate was statistically different from No Disorder average in first time period ($p<0.01$)

2 indicates rate was statistically different from No Disorder average in second time period ($p<0.01$)

t indicates change over time was statistically significant ($p<0.05$)

Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

APPENDIX 8: CRIMES OF WHICH CHILDREN WERE VICTIMS AND ACCUSED

Appendix Table 8.1: Most Common Criminal Accusations by Disorder

Adolescents aged 13-19

Developmental Disability		No Disorder	
Charge	**Percent**	**Charge**	**Percent**
Failure to Compy with Condition on a Recognizance or Undertaking	7.0%	Failure to Comply with Sentencing/Disposition	4.3%
Failure to Comply with Sentencing/Disposition	6.7%	Assault	4.3%
Assault	5.9%	Mischief	3.8%
Failure to Comply with Sentencing/Disposition, two charges	4.8%	Theft Under $5,000	3.1%
Mischief	3.9%	Failure to Compy with Condition on a Recognizance or Undertaking	3.1%
Theft Under $5,000	3.3%	Failure to Comply with Promise to Appear for the Purpose of the Identification Of Criminals Act or to Attend Court	2.9%
Uttering Threats	3.3%	Failure to Comply with Sentencing/Disposition, two charges	2.8%
Failure to Compy with Condition on a Recognizance or Undertaking, two charges	3.3%	Possess Weapon for a Purpose Dangerous to the Public Peace	2.8%
Assault with a Weapon	3.0%	Failure To Comply With Conditions Of Undertaking	2.7%
Failure to Comply with Promise to Appear for the Purpose of the Identification Of Criminals Act or to Attend Court	2.8%	Failure to Compy with Condition on a Recognizance or Undertaking, two charges	2.3%
Externalizing Disorders		**Mood/Anxiety Disorder**	
Charge	**Percent**	**Charge**	**Percent**
Failure to Comply with Sentencing/Disposition	6.7%	Assault	8.4%
Failure to Compy with Condition on a Recognizance or Undertaking	5.1%	Failure to Compy with Condition on a Recognizance or Undertaking	4.9%
Failure to Comply with Sentencing/Disposition, two charges	4.5%	Failure to Comply with Sentencing/Disposition	4.1%
Mischief	4.2%	Failure to Comply with Promise to Appear for the Purpose of the Identification Of Criminals Act or to Attend Court	3.4%
Theft Under $5,000	3.6%	Mischief	3.3%
Assault	3.1%	Theft Under $5,000	3.1%
Failure to Compy with Condition on a Recognizance or Undertaking, two charges	3.1%	Assault with a Weapon	3.0%
Possess Weapon for a Purpose Dangerous to the Public Peace	3.1%	Failure To Comply With Conditions Of Undertaking	2.6%
Failure To Comply With Conditions Of Undertaking	2.9%	Uttering Threats	2.4%
Uttering Threats	2.8%	Failure to Comply with Sentencing/Disposition, two charges	2.4%
Psychotic Disorder		**Suicide/Suicide Attempts**	
Charge	**Percent**	**Charge**	**Percent**
Failure to Comply with Sentencing/Disposition	7.2%	Assault	6.8%
Assault	5.7%	Failure to Compy with Condition on a Recognizance or Undertaking	6.2%
Failure to Compy with Condition on a Recognizance or Undertaking	5.7%	Failure to Comply with Sentencing/Disposition	5.7%
Mischief	3.8%	Failure to Comply with Sentencing/Disposition, two charges	4.6%
Theft Under $5,000	3.6%	Failure to Compy with Condition on a Recognizance or Undertaking, two charges	4.0%
Uttering Threats	3.6%	Mischief	4.0%
Possess Weapon for a Purpose Dangerous to the Public Peace	3.1%	Theft Under $5,000	4.0%
Assault with a Weapon	2.9%	Assault with a Weapon	2.9%
Failure To Comply With Conditions Of Undertaking	2.7%	Uttering Threats	2.9%
Failure to Comply with Promise to Appear for the Purpose of the Identification Of Criminals Act or to Attend Court	2.5%	Break and Enter with the Intent to Commit an Indictable Offence	2.4%

Appendix Table 8.2: Most Common Crimes Against Children Aged 0-19 by Disorder

Developmental Disorder		No Disorder	
Charge	**Percent**	**Charge**	**Percent**
Assault	17.4%	Assault	11.6%
Assault with a Weapon	6.6%	Assault with a Weapon	5.3%
Uttering Threats	5.2%	Uttering Threats	4.6%
Failure to Compy with Condition on a Recognizance or	4.7%	Possess Weapon for a Purpose Dangerous to the Public Peace	4.2%
Failure to Comply with Sentencing/Disposition	4.2%	Robbery	3.2%
Mischief	3.8%	Assault Causing Bodily Harm	2.7%
Possess Weapon for a Purpose Dangerous to the Public Peace	3.8%	Failure to Compy with Condition on a Recognizance or	2.7%
Failure to Compy with Condition on a Recognizance or	3.3%	Failure to Comply with Sentencing/Disposition	2.4%
Failure to Comply with Probation	2.8%	Mischief	2.4%
Failure To Comply With Conditions Of Undertaking, two	2.8%	Sexual Assault	2.3%

Appendix Table 8.3: Most Common Crimes Against Children Aged 6-19 by Disorder

Externalizing Disorders		Mood and Anxiety Disorders		No Disorder	
Charge	**Percent**	**Charge**	**Percent**	**Charge**	**Percent**
Assault	11.5%	Assault	18.2%	Assault	12.0%
Assault with a Weapon	6.0%	Assault with a Weapon	5.6%	Assault with a Weapon	5.4%
Uttering Threats	5.3%	Uttering Threats	4.0%	Uttering Threats	4.7%
Possess Weapon for a Purpose Dangerous to the Public Peace	4.2%	Assault Causing Bodily Harm	3.2%	Possess Weapon for a Purpose Dangerous to the Public Peace	4.2%
Failure to Comply with Sentencing/Disposition	3.9%	Assault, two charges	3.1%	Robbery	3.3%
Failure to Compy with Condition on a Recognizance or Undertaking	3.9%	Failure to Comply with Sentencing/Disposition	3.1%	Assault Causing Bodily Harm	2.7%
Robbery	3.2%	Possess Weapon for a Purpose Dangerous to the Public Peace	2.9%	Failure to Compy with Condition on a Recognizance or Undertaking	2.7%
Mischief	2.8%	Failure to Comply with Probation	2.6%	Failure to Comply with Sentencing/Disposition	2.5%
Assault Causing Bodily Harm	2.7%	Failure to Comply with Conditions of Undertaking	2.6%	Mischief	2.5%
Failure to Comply with Conditions of Undertaking	2.7%	Mischief	2.5%	Failure to Comply with Conditions of Undertaking	2.2%

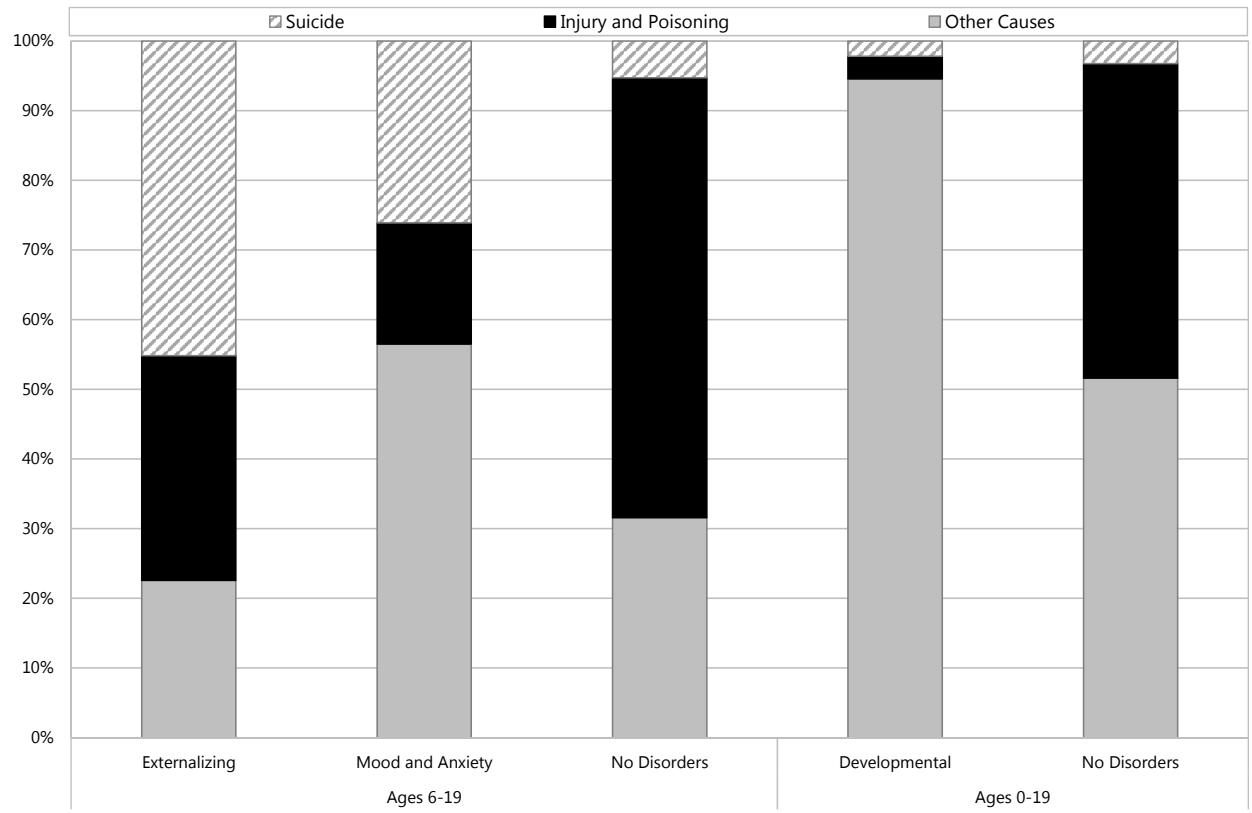
Appendix Table 8.4: Most Common Crimes Against Adolescents Aged 13-19 by Disorder

Psychotic Disorders		Suicide/Attempted Suicide		No Disorder	
Charge	**Percent**	**Charge**	**Percent**	**Charge**	**Percent**
Assault	14.3%	Assault	10.4%	Assault	12.3%
Failure To Comply With Conditions Of Undertaking	6.0%	Assault with a Weapon	7.3%	Assault with a Weapon	5.4%
Uttering Threats	6.0%	Uttering Threats	6.3%	Uttering Threats	4.6%
Aggravated Assault	3.6%	Failure to Comply with Sentencing/Disposition	6.3%	Possess Weapon for a Purpose Dangerous to the Public Peace	4.2%
Assault with a Weapon, two charges	3.6%	Assault Causing Bodily Harm	5.2%	Robbery	3.3%
Assault, no charges laid	2.4%	Failure to Compy with Condition on a Recognizance or Undertaking	5.2%	Assault Causing Bodily Harm	2.9%
Failure To Comply With Conditions Of Undertaking, four charges	2.4%	Possess Weapon for a Purpose Dangerous to the Public Peace	5.2%	Failure to Compy with Condition on a Recognizance or Undertaking	2.8%
Failure to Compy with Condition on a Recognizance or Undertaking	2.4%	Failure To Comply With Conditions Of Undertaking	4.2%	Mischief	2.7%
Failure to Compy with Condition on a Recognizance or Undertaking, two charges	2.4%	Failure to Compy with Condition on a Recognizance or Undertaking, two charges	4.2%	Failure to Comply with Sentencing/Disposition	2.6%
Failure to Compy with Condition on a Recognizance or Undertaking, five charges	2.4%	Sexual Assault	4.2%	Failure To Comply With Conditions Of Undertaking	2.2%

APPENDIX 9: CAUSES OF DEATH FOR CHILDREN, BY DISORDER

Appendix Figure 9.1: Cause of Child Death by Disorder, 2005/06-2008/09

Age- and sex-adjusted



Note: No Disorders refers to children with no mental disorder, no developmental disorder, and no suicide/attempted suicide

APPENDIX 10: STRUCTURAL EQUATION MODELLING

Appendix A – Additional Methods

Imputations to Replace Missing Values

Imputations were done to limit the number of missing values. These imputations were necessary so that we could include as many children in our analyses as possible. No imputations were carried out for EDI scores. There are slightly different sample sizes for the analyses using the emotional and social domains of the EDI because of the differences in missing scores in both domains. For example, if the "age at testing" variable was missing, it was assumed that the EDI was administered on February 15 of the year of EDI assessment. The child's age was calculated using that date.

Appendix B – Description of Study Cohort Used for SEM

The study cohort we used for conducting the SEM included 21,802 children who were assessed with the EDI in school years 2005/06 and 2006/07. Appendix Table 10.1 shows the percentage of children with the factors used in the modelling. In this study cohort, 51% of the children were boys and, on average, they were 5.7 years old when the EDI was administered. We found that 10.6% had been diagnosed with ADHD, 4.0% with conduct disorder, 6.2% with mood and anxiety disorders, and 16.2% of children had a least one of the three disorders. Regarding early childhood factors, 42.2% lived in low income areas, 8.8% of children were from families who received services from Child and Family Services, and 14.8% had a mother who had been a teen at her first child's birth. The mean scores for the emotional maturity and social competence domains on the EDI were 7.90 and 8.26, respectively.

Appendix Table 10.1: Count and Percentage of Children by Variables in Structural Equation Modelling
Total N= 21,802

Variables in Structural Equation Modelling	Count	Percent or Mean
ADHD	2,301	10.55%
Conduct Disorder	864	3.96%
Mood and Anxiety Disorder	1,355	6.22%
Any Disorder	3,533	16.20%
Sex (Male)	11,088	50.86%
Low income area	9,204	42.22%
Family on income assistance (IA)	4,475	20.53%
Mother was a teenager at first child's birth	3,233	14.83%
Family receiving Child and Family Services (CFS)	1,928	8.84%
Family has four or more children	3,098	14.21%
Mean low high school completion area	21,802	30.95%
Mean high unemployment area	21,802	5.69
Mean social competence score (EDI)	21,795	8.26
Mean emotional maturity score (EDI)	21,597	7.90
Mean child's age at EDI assessment	21,802	5.70

Appendix C – Mediation Analyses – Examining the Inter-Relationships Between Early Childhood Factors and ADHD

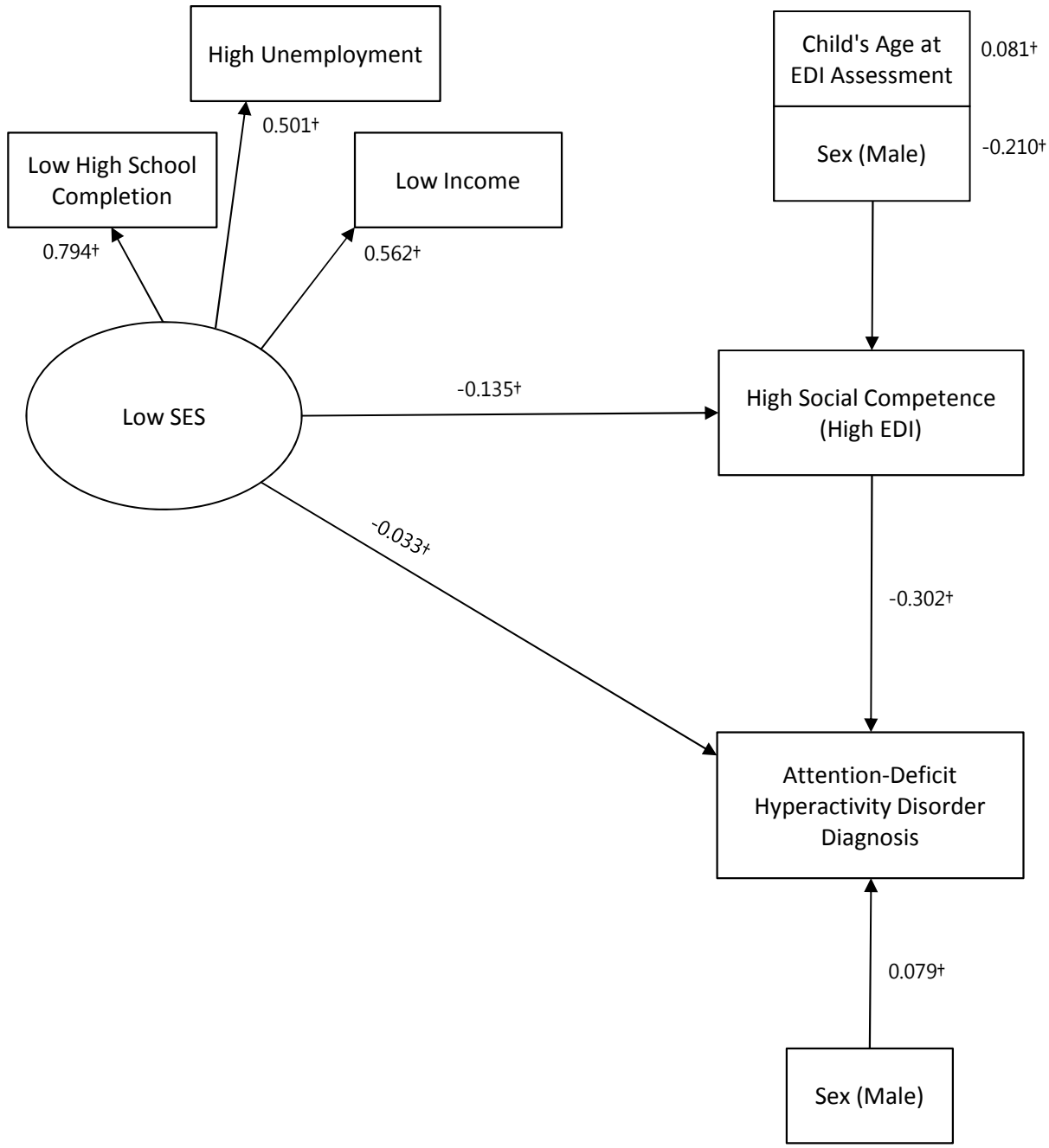
As illustrated in Figures 7.4, 7.5, and 7.6 in Chapter 7 and Appendix Figures 10.1, and 10.2 below, we conducted mediation analyses to determine whether emotional maturity and social competence mediated or explained the relationship between living in a low SES area and being diagnosed with ADHD. As indicated in Appendix Table 10.2, the p-values for the SES-Emotional Maturity-ADHD Model and the SES-Social Competence-ADHD Model are statistically significant. A direct effect indicates that the association between SES and ADHD remains statistically significant. An indirect effect means that the relationship between SES and ADHD is partially mediated or explained by both emotional maturity and social competence.

Appendix Table 10.2: Testing for Mediation in the Relationships between Early Childhood Factors and Attention-Deficit Hyperactivity Disorder Using Structural Equation Modeling

Models	Direct Effect (p-value)	Indirect Effect (p-value)	Total Effect (p-value)
SES, Emotional Maturity, ADHD	**-0.025 (0.001)**	**0.031 (<0.0001)**	0.007 (0.405)
SES, Social Competence, ADHD	**-0.033 (<0.0001)**	**0.041 (<0.0001)**	0.008 (0.307)
SES, Family, ADHD	**-0.084 (<0.0001)**	**0.103 (<0.0001)**	0.019 (0.024)
Family, Emotional Maturity, ADHD	**0.113 (<0.0001)**	**0.053 (<0.0001)**	**0.167 (<0.0001)**
Family, Social Competence, ADHD	**0.094 (<0.0001)**	**0.072 (<0.0001)**	**0.166 (<0.0001)**

bold values indicate statistically significant effect

Appendix Figure 10.1: Examining Social Competence (EDI) as Mediator Between Low SES and Diagnosis of Attention-Deficit Hyperactivity Disorder

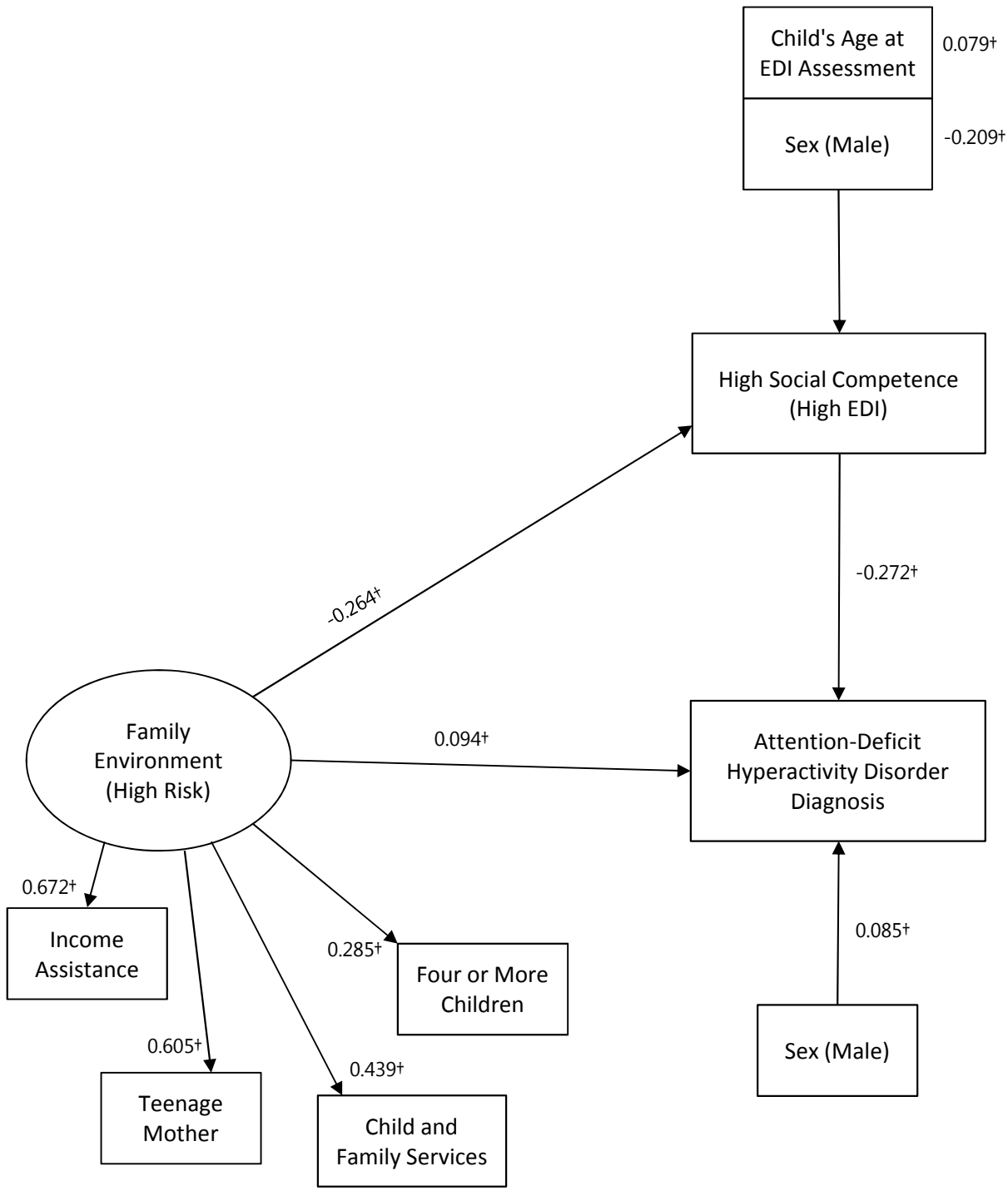


Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9866, NNFI=0.9688, RMSEA=0.0297, SRMSR=0.0148
All regression coefficients are standardized

As illustrated in Figure 7.5 in Chapter 7, family environment partially mediates or explains the relationship between SES and ADHD. Appendix Table 10.2 indicates that SES is associated with ADHD directly and indirectly through family enviroment.

As illustrated in Figure 7.6 in Chapter 7 and Appendix Figure 10.2 below, emotional maturity and social competence partially mediate or explain the relationship between family environment and ADHD. Appendix Table 10.2 indicates that family environment is associated with ADHD directly and indirectly through emotional maturity and social competence.

Appendix Figure 10.2: Examining Social Competence (EDI) as Mediator Between Family Environment and Diagnosis of Attention-Deficit Hyperactivity Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9733, NNFI=0.9501, RMSEA=0.0322, SRMSR=0.0171
All regression coefficients are standardized

Appendix D – Mediation Analyses – Examining Pathways Between Early Childhood Factors and Conduct Disorder

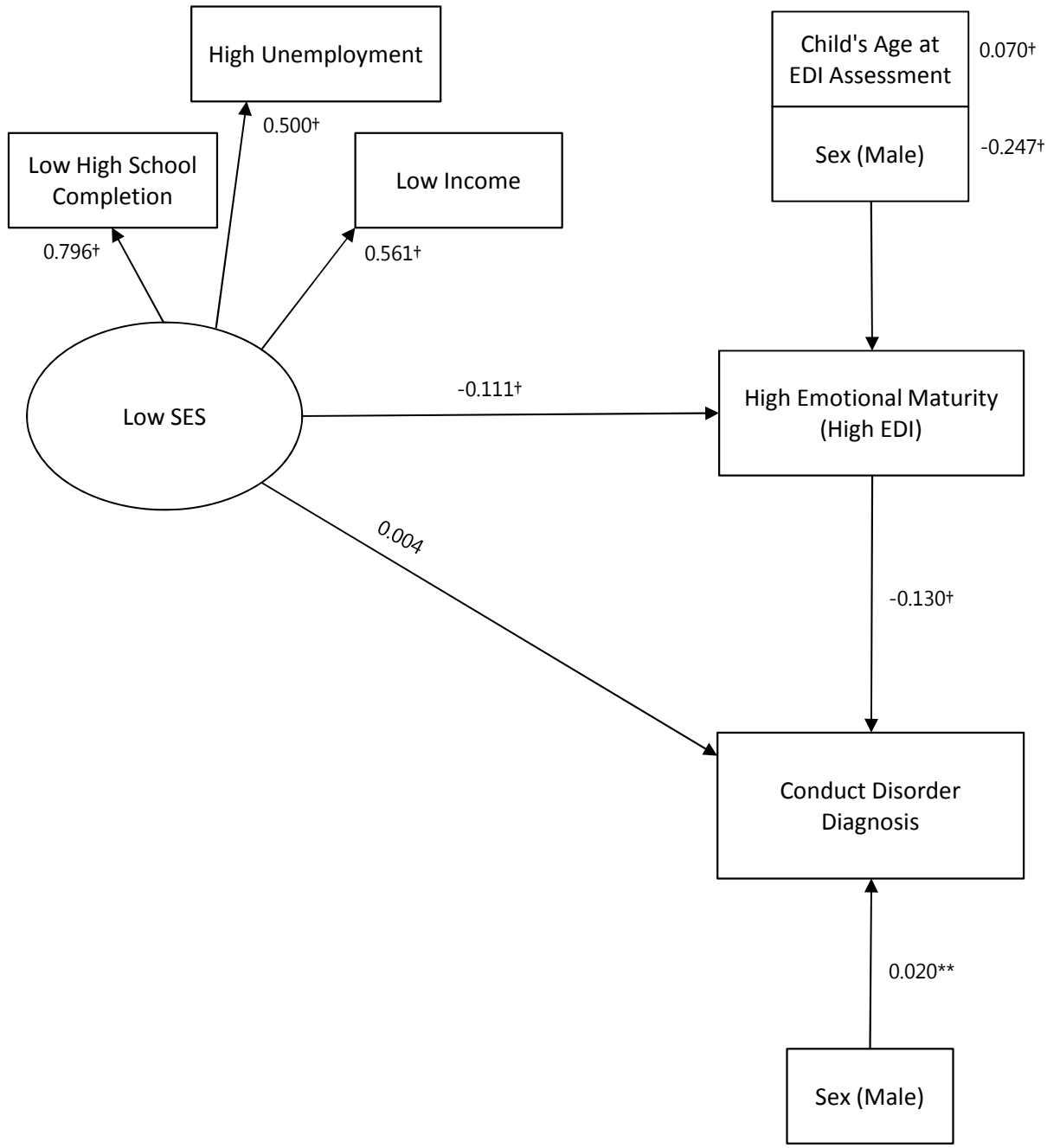
As illustrated in Appendix Figures 10.3 and 10.4, we conducted mediation analyses to determine whether emotional maturity and social competence mediated or explained the relationship between living in a low SES area and being diagnosed with conduct disorder. As indicated in Appendix Table 10.3, the p-values for the SES-Emotional Maturity-Conduct Disorder model and the SES-Social Competence-Conduct Disorder model are statistically significant for indirect effect but not direct effect. A statistically significant indirect effect means that the relationship between SES and conduct disorder is fully mediated or explained by both emotional maturity and social competence. There is no association between living in a low SES area and being diagnosed with conduct disorder when emotional maturity and social competence are included in the model.

Appendix Table 10.3: Testing for Mediation in the Relationships between Early Childhood Factors and Conduct Disorder Using Structural Equation Modeling

Models	Direct Effect (p-value)	Indirect Effect (p-value)	Total Effect (p-value)
SES, Emotional Maturity, Conduct Disorder	0.004 (0.598)	**0.014 (<0.0001)**	0.019 (0.021)
SES, Social Competence, Conduct Disorder	0.001 (0.915)	**0.019 (<0.0001)**	0.020 (0.013)
SES, Family, Conduct Disorder	**-0.038 (0.000)**	**0.066 (<0.0001)**	**0.028 (0.001)**
Family, Emotional Maturity, Conduct Disorder	**0.092 (<0.0001)**	**0.023 (<0.0001)**	**0.115 (<0.0001)**
Family, Social Competence, Conduct Disorder	**0.084 (<0.0001)**	**0.031 (<0.0001)**	**0.115 (<0.0001)**

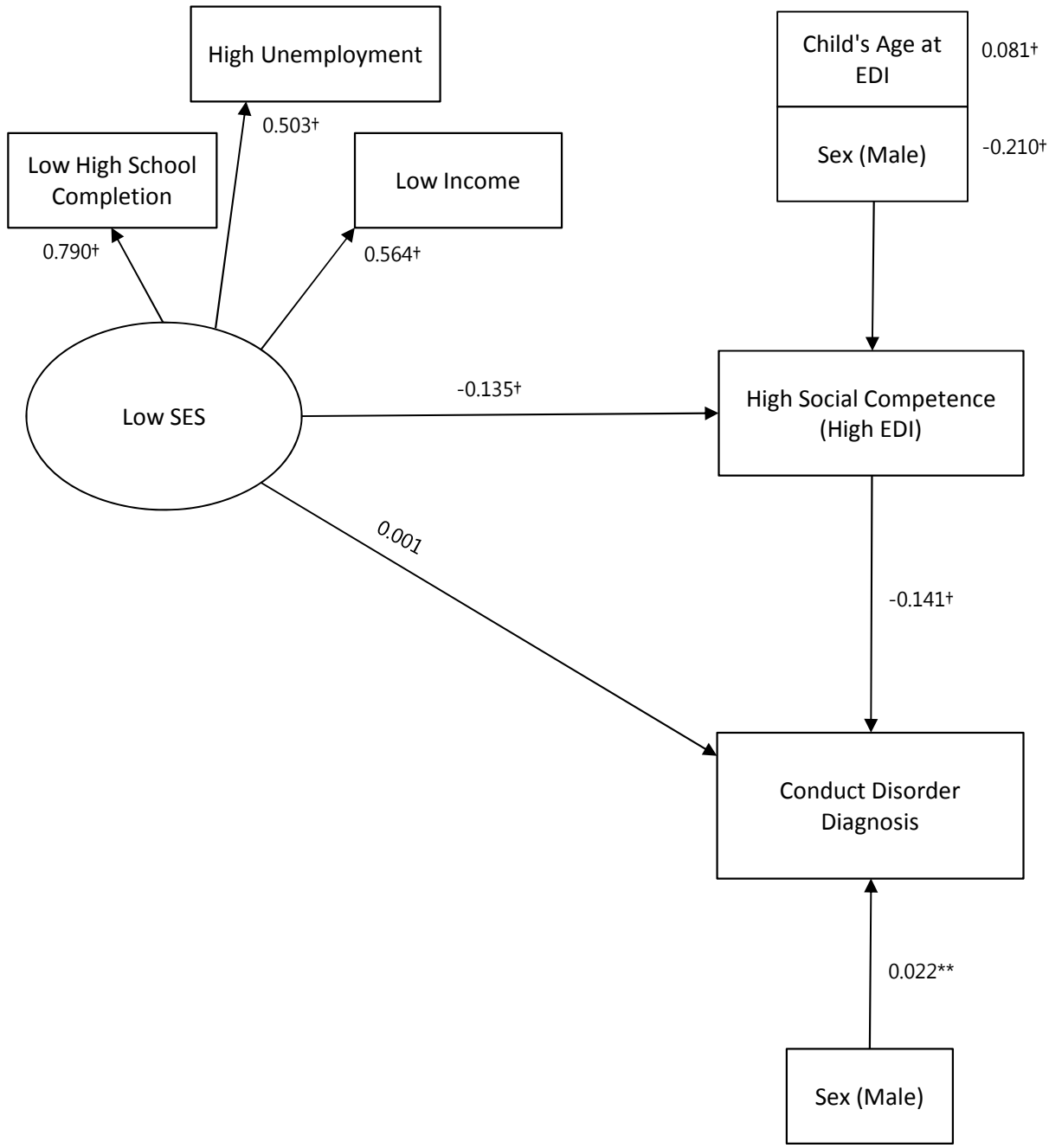
bold values indicate statistically significant effect

Appendix Figure 10.3: Examining Emotional Maturity (EDI) as Mediator Between Low SES and Diagnosis of Conduct Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.989, NNFI=0.9744, RMSEA=0.025, SRMSR=0.0119
All regression coefficients are standardized

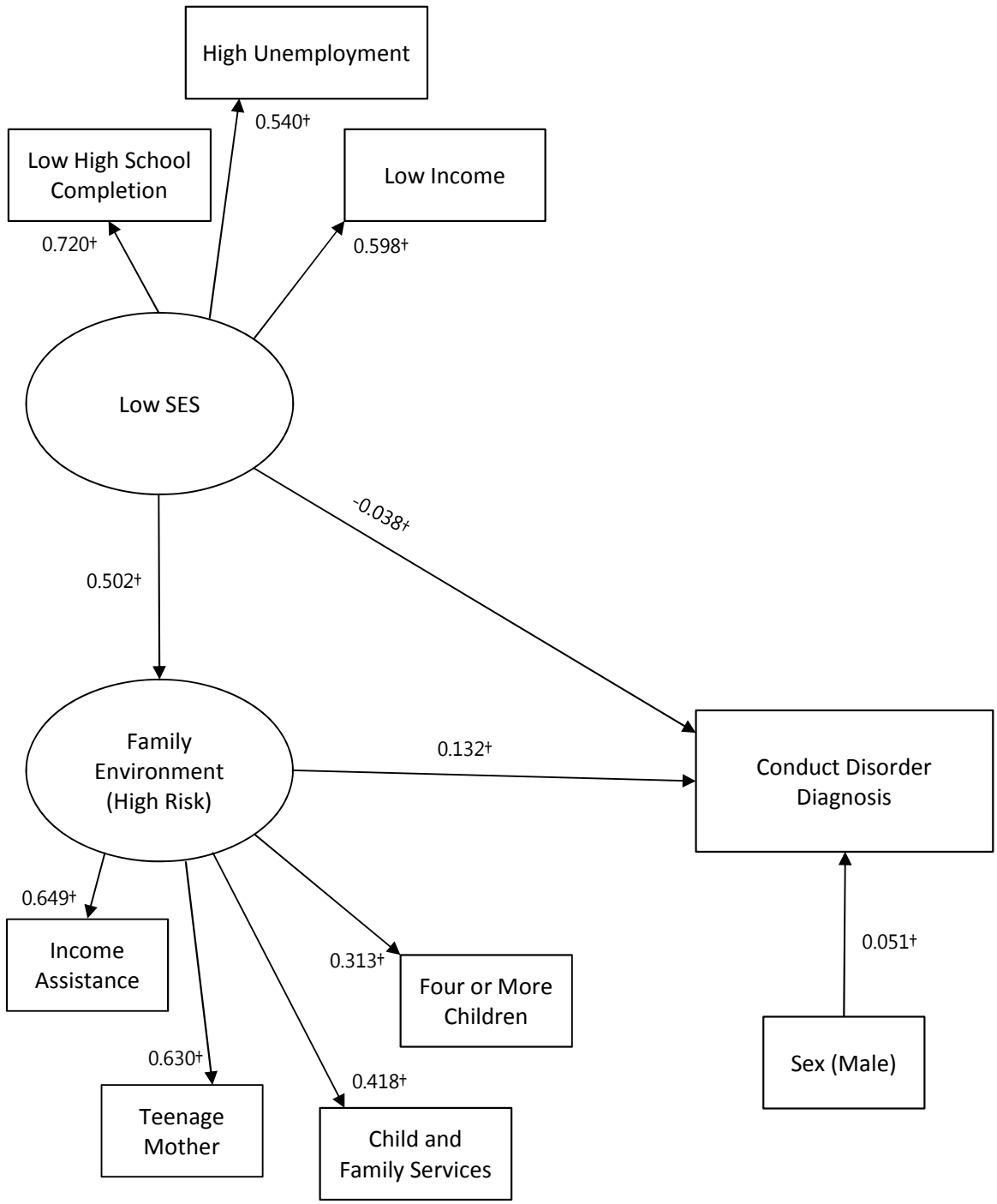
Appendix Figure 10.4: Examining Social Competence (EDI) as Mediator Between Low SES and Diagnosis of Conduct Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9853, NNFI=0.9656, RMSEA=0.0288, SRMSR=0.0136
All regression coefficients are standardized

As illustrated in Appendix Figure 10.5, family environment partially mediates or explains the relationship between SES and conduct disorder. Appendix Table 10.3 indicates that SES is associated with conduct disorder directly and indirectly through family environment.

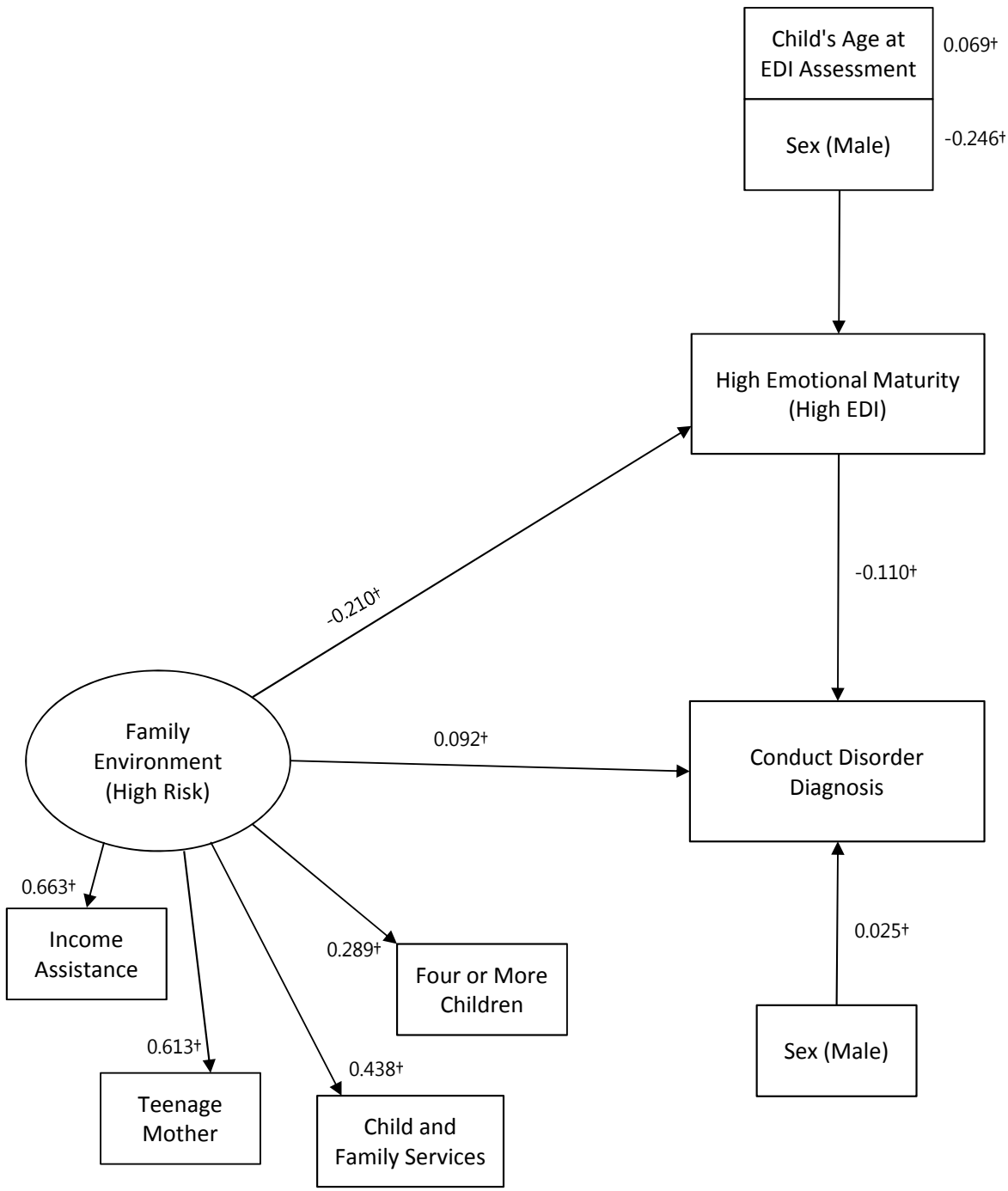
Appendix Figure 10.5: Examining Family Environment as Mediator Between Low SES and Diagnosis of Conduct Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9298, NNFI=0.8947, RMSEA=0.0526, SRMSR=0.0307
All regression coefficients are standardized

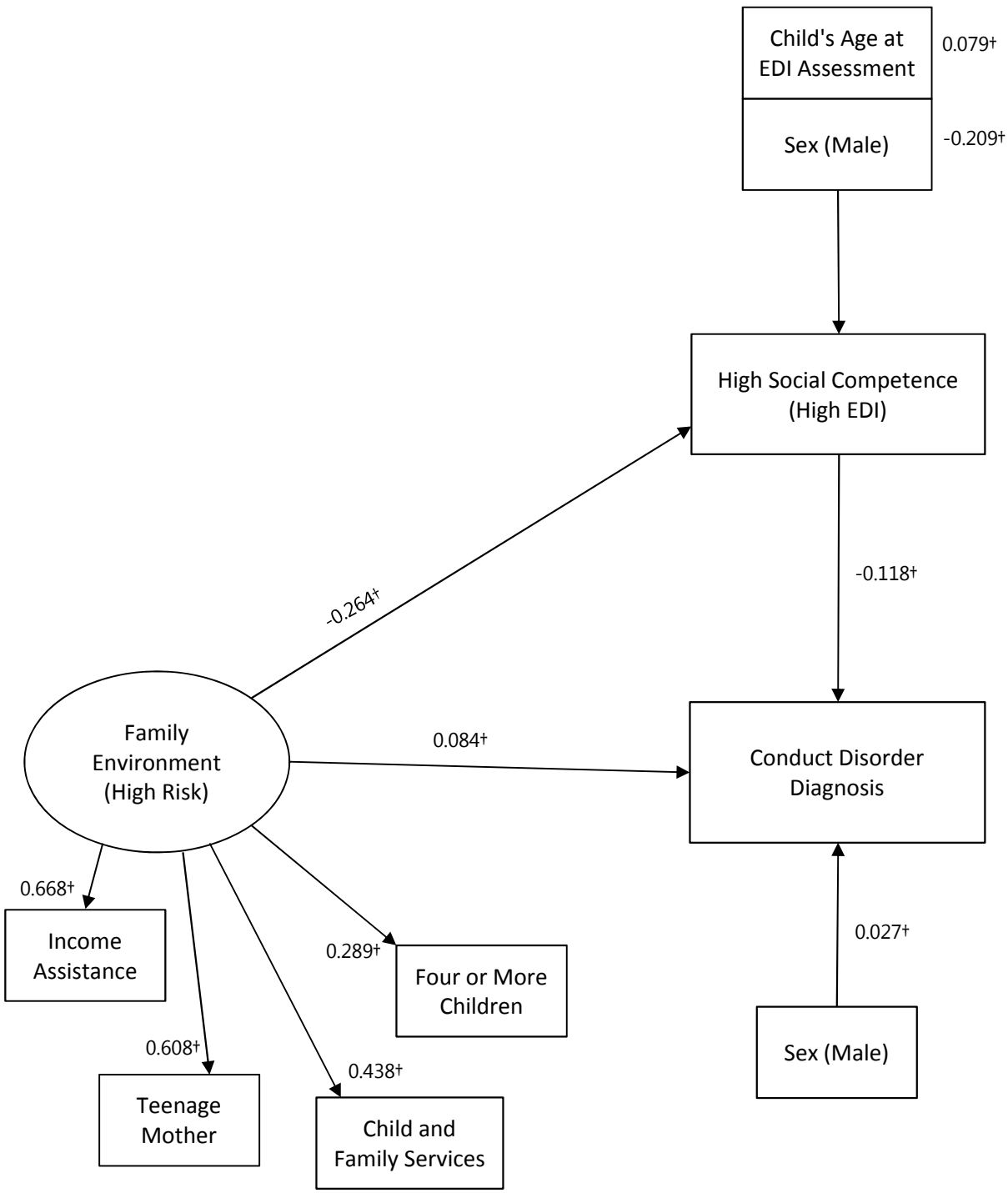
As illustrated in Appendix Figure 10.6 and Appendix Figure 10.7, emotional maturity and social competence partially mediate or explain the relationship between family environment and conduct disorder. Appendix Table 10.3 indicates that family environment is associated with conduct disorder directly and indirectly through emotional maturity and social competence.

Appendix Figure 10.6: Examining Emotional Maturity (EDI) as Mediator Between Family Environment and Diagnosis of Conduct Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.976, NNFI=0.9552, RMSEA=0.0278, SRMSR=0.0143
All regression coefficients are standardized

Appendix Figure 10.7: Examining Social Competence (EDI) as Mediator Between Family Environment and Diagnosis of Conduct Disorder



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9748, NNFI=0.953, RMSEA=0.0286, SRMSR=0.0146
All regression coefficients are standardized

Appendix E – Mediation Analyses – Examining Pathways Between Early Childhood Factors, and Mood and Anxiety Disorders

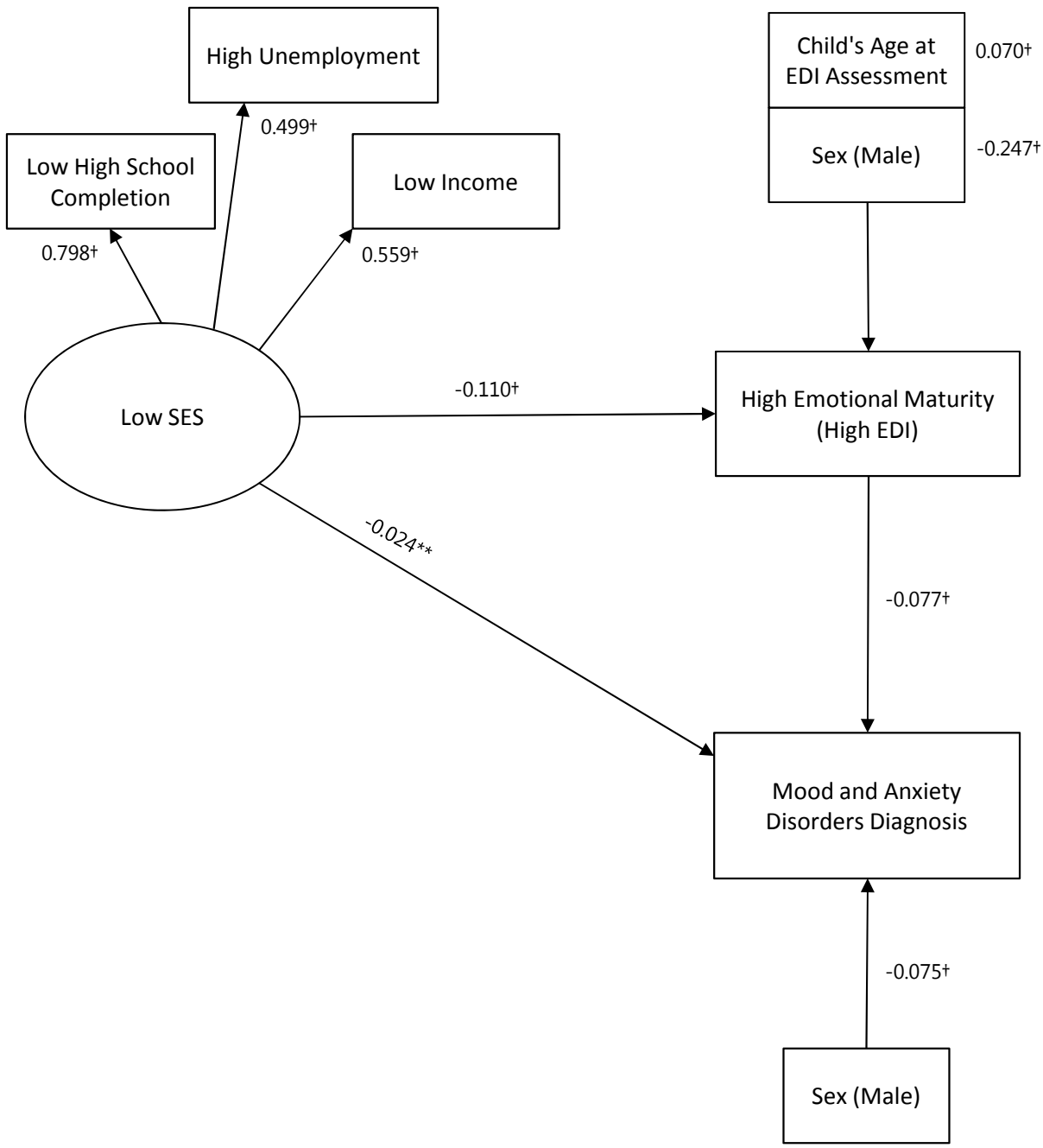
As illustrated in Appendix Figures 10.8 and 10.9, we conducted mediation analyses to determine whether emotional maturity and social competence mediated or explained the relationship between living in a low SES area and being diagnosed with mood and anxiety disorders. As indicated in Appendix Table 10.4, the pvalues for the SES-Emotional Maturity-Mood and Anxiety Disorders model and the SES-Social Competence-Mood and Anxiety Disorders model are statistically significant. Direct effect indicates that the association between SES and mood and anxiety disorders remains statistically significant. The indirect effect means that the relationship between SES and mood and anxiety disorders is partially mediated or explained by both emotional maturity and social competence.

Appendix Table 10.4: Testing for Mediation in the Relationships between Early Childhood Factors and Mood and Anxiety Disorder Using Structural Equation Modeling

Models	Direct Effect (p-value)	Indirect Effect (p-value)	Total Effect (p-value)
SES, Emotional Maturity, Mood/Anxiety	**-0.024 (0.003)**	**0.009 (<0.0001)**	-0.015 (0.056)
SES, Social Competence, Mood/Anxiety	**-0.025 (0.002)**	**0.010 (0.010)**	-0.015 (0.063)
SES, Family, Mood/Anxiety	**-0.062 (<0.0001)**	**0.053 (<0.0001)**	-0.009 (0.279)
Family, Emotional Maturity, Mood/Anxiety	**0.065 (<0.0001)**	**0.013 (<0.0001)**	**0.077 (<0.0001)**
Family, Social Competence, Mood/Anxiety	**0.063 (<0.0001)**	**0.014 (<0.0001)**	**0.077 (<0.0001)**

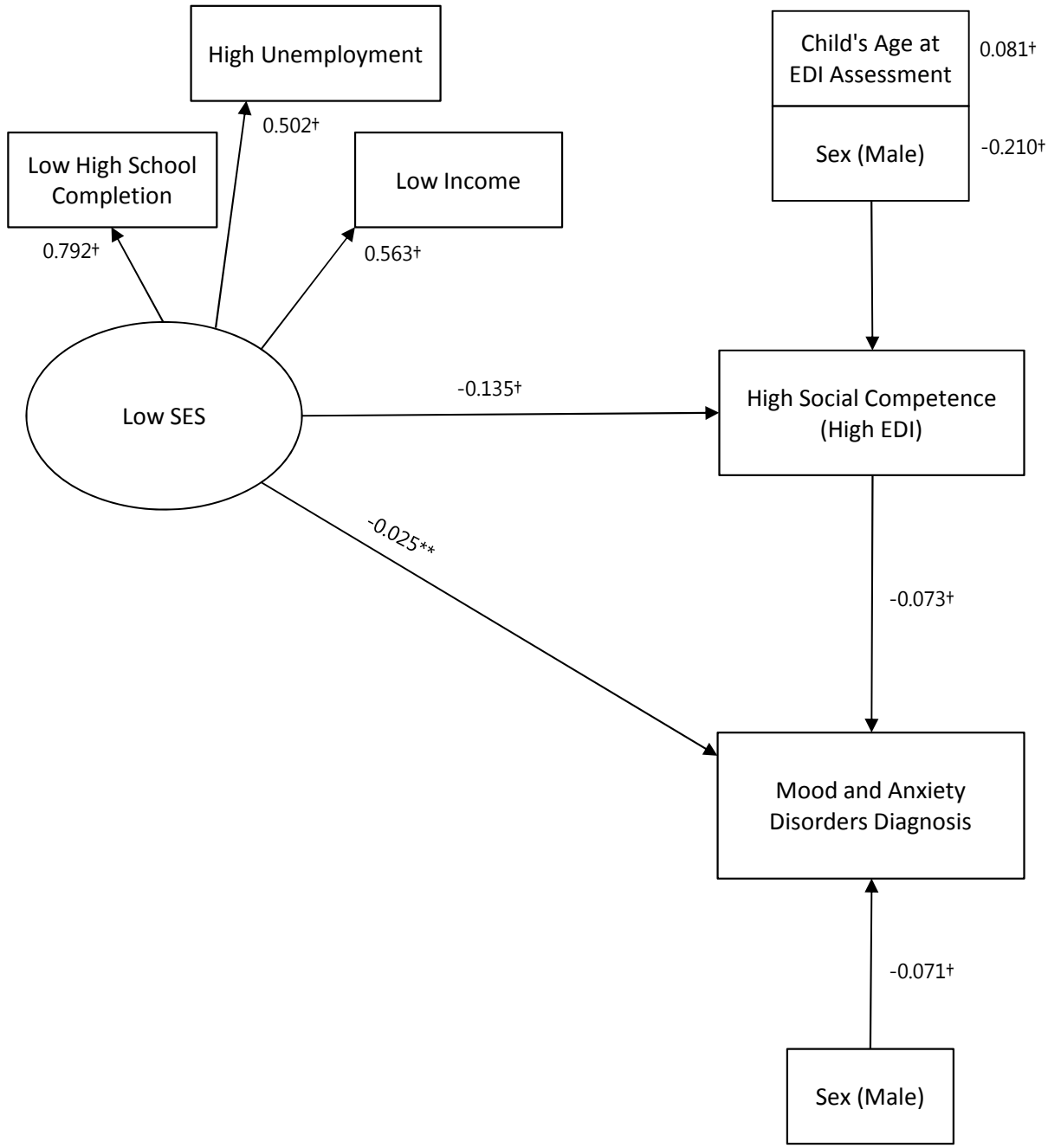
bold values indicate statistically significant effect

Appendix Figure 10.8: Examining Emotional Maturity (EDI) as Mediator Between Low SES and Diagnosis of Mood and Anxiety Disorders



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9882, NNFI=0.9724, RMSEA=0.0257, SRMSR=0.0125
All regression coefficients are standardized

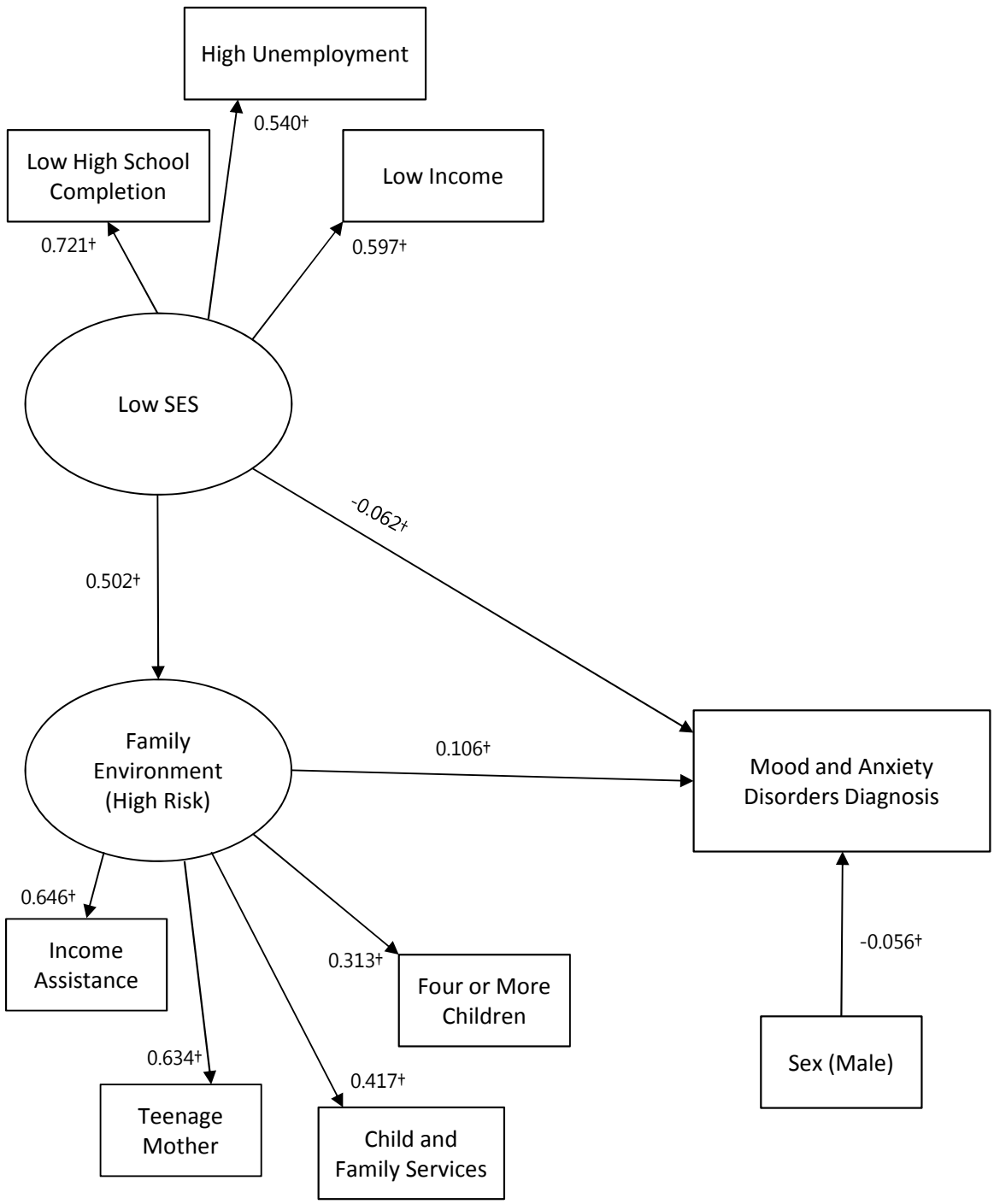
Appendix Figure 10.9: Examining Social Competence (EDI) as Mediator Between Low SES and Diagnosis of Mood and Anxiety Disorders



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9838, NNFI=0.9621, RMSEA=0.0298, SRMSR=0.0142
All regression coefficients are standardized

As illustrated in Appendix Figure 10.10, family environment partially mediates or explains the relationship between SES and mood and anxiety disorders. Appendix Table 10.4 indicates that SES is associated with mood and anxiety disorders directly and indirectly through family environment.

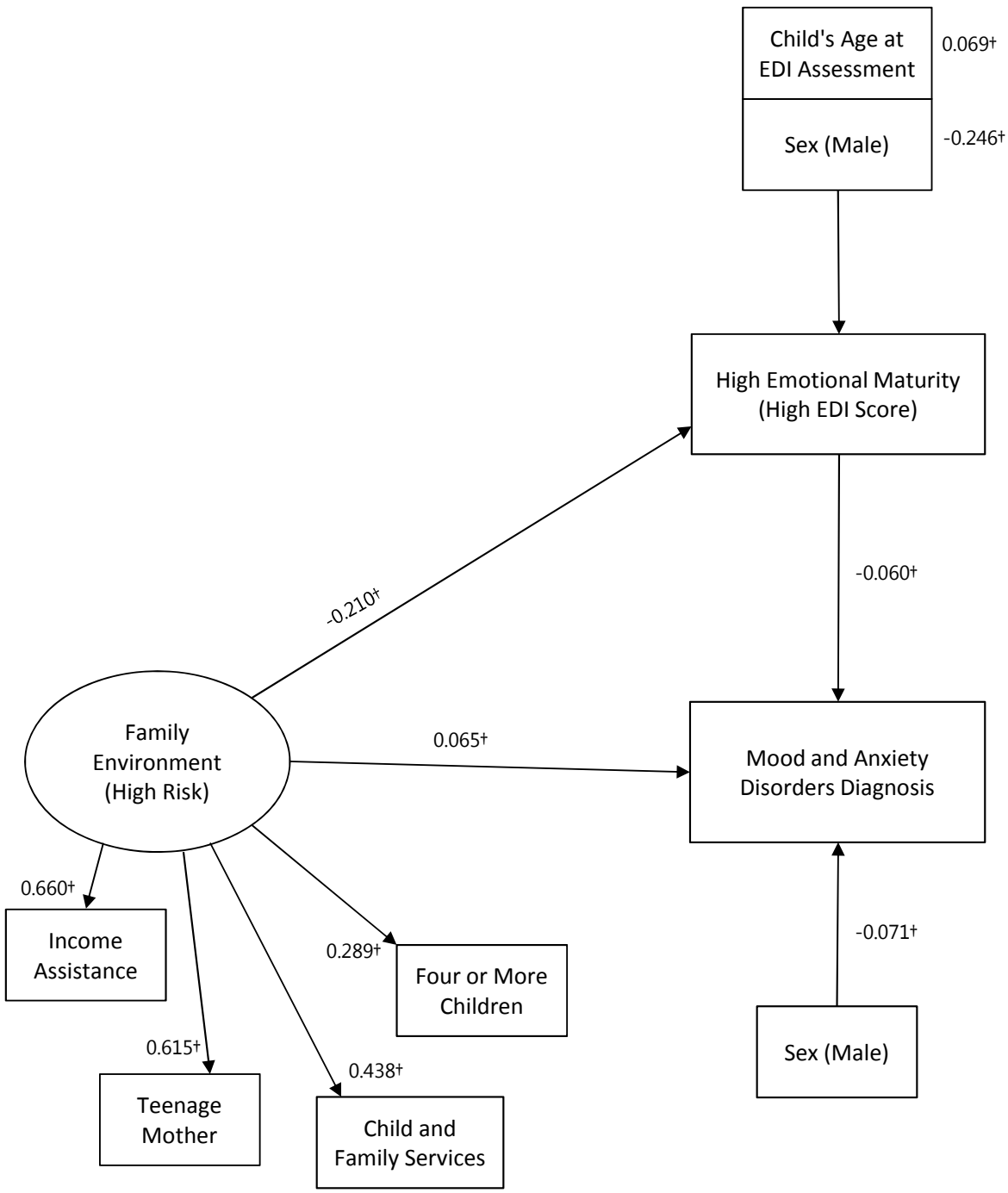
Appendix Figure 10.10: Examining Family Environment as Mediator Between Low SES and Diagnosis of Mood and Anxiety Disorders



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9299, NNFI=0.8948, RMSEA=0.0525, SRMSR=0.0308
All regression coefficients are standardized

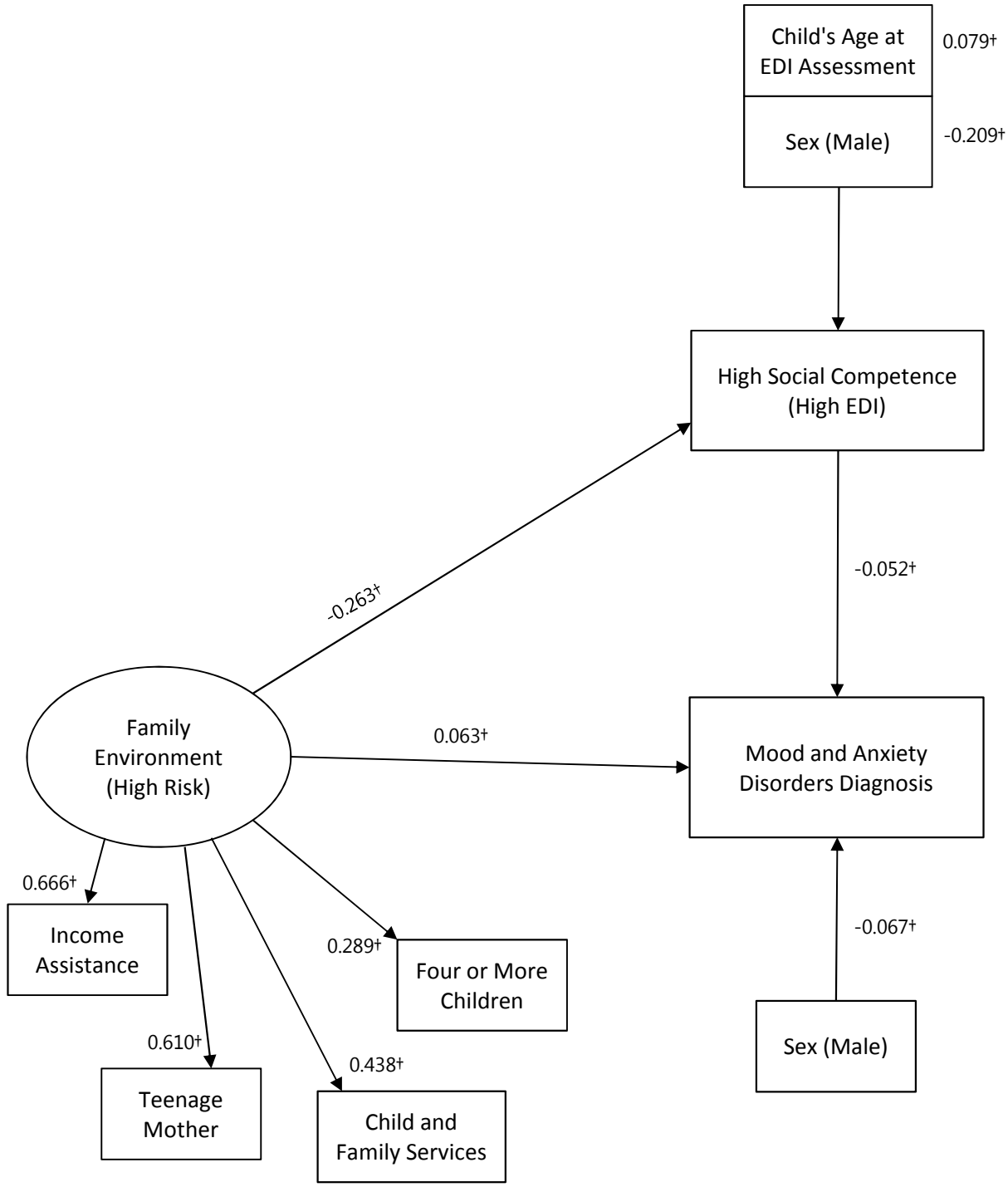
As illustrated in Appendix Figure 10.11 and Appendix Figure 10.12, emotional maturity and social competence partially mediate or explain the relationship between family environment and mood and anxiety disorders. Appendix Table 10.4 indicates that family environment is associated with mood and anxiety disorders directly and indirectly through emotional maturity and social competence.

Appendix Figure 10.11: Examining Emotional Maturity (EDI) as Mediator Between Family Environment and Diagnosis of Mood and Anxiety Disorders



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9727, NNFI=0.9491, RMSEA=0.0293, SRMSR=0.0154
All regression coefficients are standardized

Appendix Figure 10.12: Examining Social Competence (EDI) as Mediator Between Family Environment and Diagnosis of Mood and Anxiety Disorders



Statistical Significance: "*"=p<0.05, "**"=p<0.01, "†"=p<0.001
Model Fit: CFI=0.9712, NNFI=0.9462, RMSEA=0.0302, SRMSR=0.0157
All regression coefficients are standardized

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