Predictors of Employment and Income Assistance Usage in Early Adulthood across Type and Income Quintile

by

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Table of Contents

List of Acronyms 5
List of Tables and Figures 6
Tables 6
Figures 8
Abstract 9
Introduction 11
Literature Review 12
Early Adult EIA Usage 13
Predictors of Early Adult EIA Usage 14
Health and Wellbeing of Social Assistance Users 16
Materials and Methods 17
Data Sources 17
Cohort Selection 18
Variables 23
Outcomes 23
Predictors 24
Methods 25
Overall 26
Income Quintile of Neighborhood at Age 18 28
Results 34
Fit Statistics 35
Conclusion 36
Type of EIA Usage 37
Results 42
Fit Statistics 43
Conclusion 43
Type of EIA Usage by Income Quintile at Age 18 44
Results 48
Fit Statistics 50
Conclusion 51
Sensitivity Testing 52
Additional Analyses 53
Limitations 54
General Discussion and Conclusions 55
Literature Cited 59
Appendix A – Odds Ratio Tables 65
Appendix B – Sensitivity Testing 68
One Child per Family 68
Income Quintile of Neighborhood at Birth 71
Education Predictors 75

Cross Validation....79
Bootstrapping....80
Appendix C - Relative Risk....82

List of Acronyms

ACG	Adjusted Clinical Group
ADG	Adjusted Diagnostic Groups
ADHD	Attention Deficit Hyperactivity Disorder
CAP	Canadian Assistance Program
CHST	Canadian Health and Social Transfer
CL	Confidence Limit
EIA	Employment and Income Assistance
ICD	International Classification of Disease
ICD-9-CM	International Classification of Diseases, Ninth Revision, Clinical Modification
ICD-10-CA/CII	International Statistical Classification of Diseases, Tenth Revision, Canada and the Canadian Classification of Interventions
KG	Kilograms
MCHP	Manitoba Centre for Health Policy
OR	Odds Ratio
PCCF	Postal Code Conversion File
RHA	Regional Health Authority
ROC	Receiver operating characteristic
RR	Relative Risk
SD	Standard Deviation
SES	Socioeconomic Status

List of Tables and Figures

Tables

Table 1 - Loss to Follow-up, by Fiscal Year of Birth 19
Table 2 – Summarized Loss to Follow-up 19
Table 3 - Income Quintile at Age 18 by Fiscal Birth Year 21
Table 4 -Income Quintiles at Birth and at Age 18 21
Table 5 - Missing Key Variables by Income Quintile 22
Table 6 - Frequencies of binary variables and mean and standard deviation of continuous variables 27
Table 7 -- Received EIA between 18 and 25 (odds ratios) 28
Table 8 - Cross tabulations of the continuous predictors 29
Table 9 - Received EIA, by Income Quintile at Age 18 35
Table 10 - Cohort Selection for EIA Type 37
Table 11 - Cross tabulations of the continuous predictors 38
Table 12 - Fit Statistics for different types of EIA 43
Table 13 - Number of Individuals in each subsample 44
Table 14 - Predictors by EIA Type and income quintile at Age 18 46
Table 15 - Fit Statistics for each EIA type by income quintile 51
Table 16 - Odds Ratios of Predictors by income quintiles at Age 18 65
Table 17- Odds Ratios of Predictors for Different EIA Types 65
Table 18 - Odds Ratios of General Assistance EIA by income quintile at age 18 66
Table 19 - Odds Ratios of Single Parent EIA by income quintile at age 18 66
Table 20 - Odds Ratios of Disability EIA by income quintile at Age 18 67
Table 21 - Number of Individuals in Income Quintiles and EIA Type for Full Cohort and One Child per Family 68
Table 22 - Comparison of estimates and standard errors for Full Cohort and One Child per Family Cohort 69
Table 23 – Estimates and Standard Errors for Full Cohort and One Child Per Family Cohort, by Income Quintile 69
Table 24 – Estimate and Standard Errors for Full Cohort and One Child per Family, by EIA Type 70
Table 25 - Income Quintile at birth by fiscal birth year 71
Table 26 - Frequencies of binary variables and mean and standard deviation of continuous variables 71
Table 27 - Received EIA between 18 and 25 (odds ratios) 73
Table 28 – Odds Ratios of Predictors by Income Quintile at Birth 74
Table 29 -Fit Statistics for Income Quintile at Birth 74
Table 30 - Fit Statistics for models with Education predictors 76
Table 31 - Odds Ratios for the overall model 76
Table 32 - Odds Ratio for Income Quintile Models including the High School Graduation predictor 76
Table 33 -Odds Ratio for Income Quintile Models including the Grade 9 Achievement Index predictor 77
Table 34 - Odds Ratio for Specific Injuries 78
Table 35 - C-Statistics and Confidence intervals of full model and cross-validated model 79
Table 36 - Model and Bootstrapped Confidence Intervals, Overall Model and EIA Type Models 80
Table 37 - Model and Bootstrapped Confidence Intervals, Income Quintile Models 81
Table 38 - Relative Risk and Odds Ratio Comparison, Overall Model 82

Table 39 - Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18 83
Table 40 - Relative Risk and Odds Ratio Comparison, by EIA Type 83
Table 41 - Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18 for those using General Assistance EIA 83
Table 42 - Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18 for those using Disability EIA 84
Table 43 -Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18 for those using Single Parent EIA 84

Figures

Figure 1 - Manitoba Centre for Health Policy Research Repository as of 2015 18
Figure 2 - Cohort Selection (Selected cohort in bold) 22
Figure 3 - Number of Months of EIA Usage 27
Figure 4 - Percent of Individuals in Each Income Quintile Receiving EIA between 18 and 25 29
Figure 5 – Percent of individuals who received EIA in early adulthood, by income quintile 30
Figure 6 – Percent of individuals who did not received EIA in early adulthood, by income quintile 31
Figure 7 - Childhood and Adolescent Mental Health conditions of individuals who did and did not received EIA in early adulthood, by income quintile at age 18 32
Figure 8 - Average number of months of EIA usage by Income Quintile at age 18 33
Figure 9 - Percent of EIA recipients who transitioned from being a dependent child to applicant at age 18 34
Figure 10 – Odds Ratios of Receiving EIA, 18 - 25, by Income Quintile at Age 18 35
Figure 11 - Proportion of Individuals with each binary predictor by EIA Type 39
Figure 12 - Childhood and Adolescent Mental Health conditions of individuals who received EIA in early adulthood, by EIA Type 40
Figure 13 - Average number of Months on EIA in young adulthood by EIA Type 41
Figure 14 - Proportion of Individuals using each type of EIA who transitioned at age 18 41
Figure 15 - Received EIA, 18 - 25, by EIA type 42
Figure 16 – Type of EIA received by individuals receiving EIA in early adulthood, by income quintile at age 18 45
Figure 17 - Average Number of Months of EIA usage by EIA type and income quintile at Age 18 47
Figure 18 - Percent of Individuals using each type of EIA who transitioned at age 18, by income quintile at age 18 47
Figure 19 - General Assistance EIA Usage in Early Adulthood by income quintile at Age 18 48
Figure 20 - Single Parent EIA usage in Early Adulthood by income quintile at Age 18 49
Figure 21 - Disability EIA usage in Early Adulthood by income quintile at Age 18 50
Figure 22 - Percent of Individuals in each Income Quintile who received EIA between 18 and 25, by income quintile at Birth 72

Abstract

Social Assistance – also known as welfare – has been a program of last resort for individuals in poverty across Canada for many years. The use of social assistance in early adulthood is of particular interest, as these individuals have a long life of consequences ahead of them. The social assistance program available in Manitoba, Canada – the setting of this study – is Employment and Income Assistance (EIA). This study examines difference in predictors of early adult (ages 18-25) EIA usage across income quintiles of the neighborhoods individuals lived in as they enter young adulthood (age 18) and the type of EIA (General Assistance, Single Parent or Disability) received.

Linked administrative data was used to create a birth cohort of all born in Manitoba, Canada between 1979 and 1987 who lived in the province until their 26th birthday, and resided in an urban neighborhood at age 18 (N = 47 589). Predictors include time-invariant birth and family characteristics and time-varying predictors of family instability, mental and physical health.

Childhood/adolescent mental health conditions affected the odds of EIA usage in early adulthood most for those living in high income neighborhoods; family instability affected the odds of EIA usage in early adulthood most for those living in low income neighborhoods. Predictors varied across type of EIA usage, but, regardless of type and neighborhood affluence, mental health conditions remained a significant predictor of EIA usage in early adulthood. To best address uptake of EIA in early adulthood, programs need to take into account differences in characteristics and developmental trajectories of individuals coming from different socioeconomic neighborhoods.

Keywords: Administrative Data, Employment and Income Assistance, Mental Health, Transition to Adulthood

Introduction

Social assistance, or welfare, has been available to Canadians for many decades as a last resort for those unable to support themselves or their families financially. Living in poverty extreme enough to qualify for social assistance has many consequences for the applicant but also for their families. Although social assistance rates have decreased significantly since policy changes made in the 1990's, the changes focused heavily on inclusion criteria, which decrease the number of people deemed to be in poverty extreme enough to require assistance (Kneebone & White, 2014). To improve the quality of life of Canadians at high risk for poverty, it is important to better understand the lives of people before they start using social assistance. Better identifying predictors can improve preventative programming. The social assistance program available in Manitoba, Canada (the setting of this study) is the Employment and Income Assistance (EIA) program. Within this program there are four types - general assistance, single parents, disability, and special cases. Individuals receiving EIA from these different programs have different needs and likely different predictors. Another characteristic that may influence predictors is the income level of the neighborhood an individual lives in at age 18 – when they are likely still living with their parents and are about to enter the work force or continue on to post-secondary education. Although fewer individuals coming from high income families and neighborhoods go on to use EIA, the driving factors to EIA usage are likely different from those living in low income neighborhoods. EIA usage in early adulthood is of particular interest, as poverty at this time has lifelong consequences.

This study uses linked administrative data to examine differences in predictors of EIA usage in Manitoba, Canada. The three questions addressed are whether individuals who use EIA in young adulthood have different predictors based on 1) The income quintile of the

neighborhood they lived in at age 18 (the beginning of the period where they can receive their own EIA) 2) The type of EIA the individual received and 3) The type of EIA they received and the income quintile of the neighborhood lived in at age 18. Understanding differences in predictors of EIA type and income quintiles will allow for more effective policy to address poverty across different groups of individuals.

Literature Review

The causes and consequences of Employment and Income Assistance (EIA) usage - also known as Social Assistance, Income Assistance or Welfare – have been studied in many contexts. Many countries have assistance available for poverty relief; the structure and level of support available differs greatly between and within countries. The majority of the studies reviewed were conducted in Canada, where the basic structure of welfare is very similar across the country but specific administrative rules, eligibility criteria, benefit levels and provisions regarding special assistance differ between provinces/territories (Tweedle, Battle & Torjman, 2013).

The funding structure of social-assistance programs in Canada has changed several times since its inception. Between 1957 and 1996, provincial/territorial and federal governments shared the cost of social assistance programs through the Canadian Assistance Program (CAP) (Government of Canada, 2014). CAP required provinces to base eligibility solely on a test of financial need and required recipients to have an action plan such as education, training, job preparation or job placement (Karsh, 2003). Changes to this system began in 1990, when the federal government put a cap on cost-sharing with the three richest provinces (Karsh, 2003). In 1996, CAP was replaced by the Canadian Health and Social Transfer (CHST), which gave

provinces much greater responsibility (and control) of social assistance programs, including the elimination of the aforementioned financial needs test (Karsh, 2003). In 2004, the CHST was split into the Canadian Health Transfer (CHT) and the Canadian Social Transfer (CST); the federal part of social assistance being funded through the CST (Department of Finance Canada, 2014).Social-assistance rates in Canada were at an all-time high in 1994 at over 12% and reduced steadily until 2008 to a rate under 6% (Kneebone & White, 2014, p.6). In Manitoba specifically, rates went from just over 9% in 1994 to around 5.5% in 2008 (Kneebone & White, 2014, p.9).

Early Adult EIA Usage

The use of EIA in young adults is a strong indicator of unemployment. Although those under 25 generally have unemployment rates twice that of those over 25, in 2012, this number has increased to 2.4 times that of those over 25 in Canada (Bernard, 2013; Statistics Canada, 2013). Employment issues in young adulthood are often linked to the more transitory nature of the job market faced by young adults today (National Institute for Health Care Management, 2006). Many young adults are unemployed because they are furthering their education. To understand true unemployment in young adults in Canada, a proportion of individuals who are neither in education or employed was calculated. Fifteen percent of 20-24 year old and eight percent of 15-19 year old Canadians fell into this group (Statistics Canada, 2013). While many people are choosing to pursue education after high school, those who don't are facing fewer options for unskilled labor. Those under 25 are significantly more likely to be laid off than those over 25; it is less expensive to lay off a newly hired employee than one who has been there for a while (Bernard, 2013). Young adults today are at a much greater risk of being poor than they were three decades ago. This in part due to the recent recession as well as the lack of good entry-

level jobs; young adults with families are particularly at risk for poverty, with a third of these families considered poor (Citizens for Public Justice, 2014).

The number of EIA beneficiaries in Manitoba decreased significantly between 1999/2000 to 2007/2008 but returned to 99/00 levels by 2012/2013. Of the 34,418 EIA cases in Manitoba in 2011, 17.7% were adults between 18 and 24 years old (Government of Manitoba, 2013). Of the young adults receiving EIA in Manitoba in 2011, 39% were receiving EIA due to disability, 25% for general assistance and 36% as single parents (Government of Manitoba, 2013).

Predictors of Early Adult EIA Usage

Predictors of unemployment and EIA usage in (early) adulthood can be broadly classified into two groups – predictors at birth and predictors during childhood and adolescence. Poor childhood health has been shown to affect many SES outcomes during adulthood, including family income, household wealth, individual earnings and labor supply (Smith, 2009). Case, Fertig & Paxson (2005) found that those with poor childhood health had lower levels of education, poorer adult health and lower social status; all these factors impacted economic status in adulthood. Oreopoulos, Stabile, Walld & Roos (2008) use several different methods to infer the relationship between poor infant health and receiving EIA in early adulthood. Their study found that health at birth measured by the 5-minute APGAR score, birth weight and gestational age were all significant predictors of EIA usage in early adulthood. Low birth weight was also identified as a strong predictor of early adult welfare usage by Currie, Stabile, Manivong & Roos (2010); those born between 1,000 and 1,500 grams were 3.8 percentage points more likely to end up on welfare immediately after becoming eligible (baseline of 5.5 percent). Birth weight differences have particularly sizable effects on adult outcomes of children from poorer families (Black, Devereux & Salvanes, 2007). Sex is a strong predictor of welfare usage. In Manitoba,

Canada, 58.3% of welfare recipients in 2011 were women; this was largely due to the high number of single mothers using EIA (Government of Manitoba, 2013). The social environment of a child significantly impacts adult outcomes. Being born to a single mother influences educational achievement and entrance into the labour force (Aquilino, 1996). Poverty in childhood is a strong measure of child cognitive ability, achievement and eventual earnings; a $3,000 increase in annual parental income before a child's fifth birthday is associated with almost 20% higher earnings and more hours worked in adult life (Duncan & Brooks-Gunn, 1997; Duncan, Ziol-Gues & Kalil, 2010). The social environment and health at birth have been shown to influence outcomes in early adulthood, both in the ability to gain and keep employment as well as in the uptake of social assistance.

Events in childhood and adolescence play a strong role in predicting the eventual uptake of social assistance. Residential mobility during primary and secondary school years increases the likelihood of dropping out of high school and having low income in adulthood (Tønnessen, Telle, & Syse, 2013). Children experiencing multiple family structure transitions and multiple family types had lower educational attainment and had an increased likelihood of dropping out of school and entering the labor force at an early age. Many of these individuals were unable to maintain an independent lifestyle for long (Aquilino, 1996). Those who did not graduate high school, have poor reading scores, and are antisocial in childhood and adolescence are more likely to be unemployed in early adulthood (Caspi, Wright, Moffitt, Silva, 1998). In addition to the negative effects of a changing social environment in childhood and adolescence, poor health during this time has a strong influence on early adult outcomes. Currie et al (2010) showed that a variety of major health conditions in early childhood and adolescence – particularly externalizing mental conditions (ADHD and Conduct Disorder) and major injuries - significantly increased the

odds of using Social Assistance in early adulthood. Together, the social circumstance and health at birth and adolescences play a very strong role in predicting the uptake of social assistance in early adulthood.

Health and Wellbeing of Social Assistance Users

Social assistance users have greater health needs and poorer prospects of future employment. Researchers using Cycle 2 (1996/97) of the National Population Health Survey to examine the health of Canadian welfare recipients found that welfare recipients had poorer mental and physical health and lack social support (Vozoris & Tarasuck, 2004). Social assistance recipients were more likely to report heart disease, which can be managed or prevented with specific lifestyle modifications; these modifications are difficult to achieve on the low, fixed income provided by government programs (Vozoris & Tarasuck, 2004). Unemployment as a young adult can have long-lasting impacts on a person's career options and is linked to lower wages well into adulthood (TD Economics, 2013). Many of those leaving welfare and finding employment found low paying jobs with few benefits and often cycle between social assistance and marginal employment (City of Toronto, 2002). It isn't just the individuals receiving social assistance who have negative outcomes; children of individuals unemployed for long periods of time (six months or more) have lower academic performance and communities with higher shares of long-term unemployed workers generally have higher rates of crime and violence (Nichols, Mitchell & Linder, 2013). The usage of social assistance in early adulthood has implications for the user and their children long after early adulthood, both socially and physically.

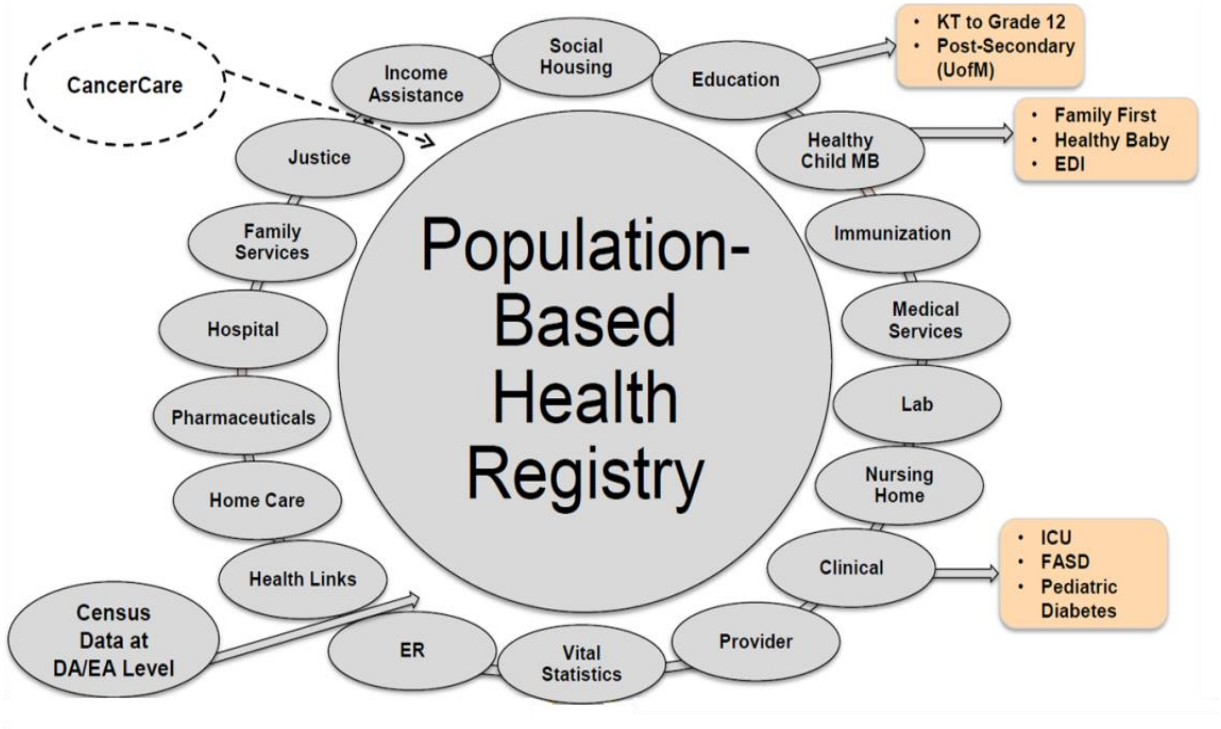
Materials and Methods

Data Sources

Administrative data, with the accompanying 'ecosystem' to facilitate their organization and analysis, can transform birth cohort studies. The Manitoba Population Health Research Data Repository includes rich individual-level data on family structure, residential mobility, healthcare use, education and EIA usage; this information is linked across files and over time using encrypted personal health identification numbers. This Repository contains province-wide, routinely collected data over time, across space (with residential location documented every six months using six digit postal codes), for each family and for each resident individual. Health variables are measured continuously from physician claims and hospital abstracts (as long as an individual remains in Manitoba). Census information on neighborhood household income has been incorporated.

This registry identifies every individual resident in the province, with births, arrival and departure dates, and deaths has been created from the provincial health registry and is coordinated with Vital Statistics files. Given approximately 16,000 births annually, follow-up is comparable to that in the largest cohort studies based on primary data (Power et al., 2013). Validity checks have been described elsewhere (Ladouceur et al., 2010; Roos and Nicol, 1999; Roos et al., 2005). This study draws on files from The Population-Based Research Registry, Vital Statistics, Manitoba Health (Medical Services, Hospital), Manitoba Education, Manitoba Jobs and the Economy (Income Assistance), and the Census (Figure 1).

Figure 1 - Manitoba Centre for Health Policy Research Repository as of 2015.



Note: Reprinted from the Manitoba Centre for Health Policy. (n.d). Retrieved from http://umanitoba.ca/faculties/health_sciences/medicine/units/community_health_sciences/departmental_units/mchp/protocol/media/Repository_circles.pdf

Cohort Selection

Individuals born in Manitoba between April 1, 1979 and November 30, 1987 (fiscal years 79 – 86 and part of fiscal year 87) were followed. Fiscal years are defined by the period of April 1st of a specific year to March 31st of the following year. The last part of fiscal year 87 was removed because the last date of coverage currently available is November 30, 2013; everyone selected has at least 26 years of coverage. Of the 180,398 people born in the specified time period who lived in Manitoba between birth and their 26th birthday, 149,307 were born in Manitoba. Of these, 94,521 stayed in Manitoba for the full 26 years. Table 1 displays reasons people left Manitoba before their 26th birthday, by fiscal year of birth.

Table 1 - Loss to Follow-up, by Fiscal Year of Birth

	1979	1980	1981	1982	1983	1984	1985	1986	1987[a]
'0' Registration is active at cancel date (age at cancel date < 26)	961	931	757	492	184	130	99	91	69
'2' Deceased	322	346	339	290	354	352	355	341	208
'3' Changed to another registration number (Before 1984)	48	46	48	56	13	0	0	0	0
'4' Military or RCMP services	9	9	7	6	7	7	7	6	*
'5' Duplicate Registration	307	317	211	178	145	154	160	167	105
'6' Registered in Error	6	9	8	*	*	*	7	8	*
'7' Cannot Locate - Mail Returned	2290	1809	1365	1152	1136	1162	1097	1197	674
'8' Inmate	57	55	50	75	76	50	70	60	44
'9' No longer ward of province	181	166	150	143	119	104	87	135	29
'A' Cancelled - Left Province, destination unknown	324	310	359	328	305	297	273	269	176
'C' Left Province - Newfoundland and Labrador	18	11	25	15	13	21	26	16	16
'D' Left Province - New Brunswick	9	7	10	13	14	12	16	13	*
'E' Left Province - PEI	21	35	38	41	40	48	28	41	27
'F' Left Province - Nova Scotia	38	57	53	68	88	75	94	60	45
'G' Left Province - Quebec	57	59	71	102	90	86	105	117	67
'H' Left Province - Ontario	569	674	686	789	811	852	886	784	493
'I' Left Province - Saskatchewan	529	493	609	600	695	607	657	584	370
'J' Left Province - Alberta	1078	1140	1252	1266	1354	1326	1249	1239	788
'K' Left Province - British Columbia	666	695	785	773	821	749	804	776	457
'L' Left Province - NWT	9	12	9	10	11	15	12	17	*
'M' Left Province - Yukon Territory	36	31	46	38	40	33	33	49	15
'N' Left Province - USA	66	54	91	65	71	84	61	60	38
'P' Left Province - Other	65	56	72	65	71	71	58	57	45
'Q' Left Province - Nunavut	*	*	*	*	0	*	*	*	*

[a] Partial fiscal year

[b] * Data supressed, frequencies less than 6

Table 2 summarizes these data into: those remained in Manitoba until their 26th birthday (active), those who moved or were lost, those who died before age 1, and those who died between their first and 26th birthday. Previous research using similar data shows that the results are not biased by individuals leaving the province or dying (Oreopoulos, et al., 2008). Although very few individuals died between ages 1 and 25, if the assumption is that deaths are due to poor health and these individuals would have had poor later life outcomes, then the estimates seen in this study are underestimating the true effect (Oreopoulos, et al., 2008).

Table 2 – Summarized Loss to Follow-up

	1979	1980	1981	1982	1983	1984	1985	1986	1987[a]	Total
Active	10,193	10,384	10,480	10,480	10,896	11,047	11,411	11,613	8017	94,521
Death, before age 1	176	187	168	148	183	144	175	159	102	1442
Death, ages 1 - 25	146	159	171	142	171	208	180	182	106	1465
Moved/Lost	7347	6979	6705	6282	6105	5888	5832	5749	3474	54,361

[a] Partial fiscal year

Of the individuals born in Manitoba between April 1, 1979 and November 30, 1987, 62 percent remained in Manitoba until at least their 26th birthday.

The study population includes those who lived in an urban neighborhood (Winnipeg or Brandon) in Manitoba at age 18. Urban status is defined by the postal code and municipal code of the individual's residence at the time of their birth. These codes are then converted to Regional Health Authorities (RHA); if an individual lives in RHA 'GA' (Brandon) or 'K' (Winnipeg), they are defined to be living in urban neighborhood. Individuals residing in all other RHAs are defined as living in a rural neighborhood. Of the 94,521 individuals in the cohort, 50,161 lived in an urban RHA at age 18.

Individuals using EIA were classified into income quintiles based on where they lived at age 18. Income quintiles developed by MCHP were created for both urban (Winnipeg and Brandon) and rural (other Manitoba areas) populations (MCHP, 2002). Income quintiles were created for each year using the following steps: 1) generate the population file for a selected year, 2) remove the postal codes that cannot be ranked, 3) attach the average household income value from the Census files to the population file using the Postal Code Conversion File (PCCF), 4) rank the population by Urban/Rural geographical location and by average household income, and 5) form the 20% population income quintile groups based on the average household income values (MCHP, 2002). Quintiles were ranked from 1 (lowest income) to 5 (highest income). Table 3 displays the distribution of individuals across income quintiles at age 18 by fiscal birth year – a total of 50,021 individuals have assigned income quintiles for their residence at age 18.

Table 3 shows more 18 year olds residing in affluent neighborhoods than in poor neighborhoods. To better understand this, a sub cohort of individuals who also lived in urban Manitoba at birth (n = 42 344) was created and the income quintile at birth and age 18 examined.

Table 3 - Income Quintile at Age 18 by Fiscal Birth Year

Income Quintile	1979	1980	1981	1982	1983	1984	1985	1986	1987[a]	Total
1	781	766	764	776	875	873	847	933	573	7188
2	860	897	955	943	952	1018	1099	1054	779	8557
3	1092	1040	1088	1057	1114	1124	1194	1232	838	9779
4	1262	1263	1385	1375	1398	1501	1437	1487	1052	12158
5	1327	1410	1281	1365	1353	1473	1530	1532	1068	12339
Not Found	15	14	11	*	*	13	21	25	29	140

[a] partial fiscal year; *suppressed due to small numbers to protect privacy

At birth people were evenly distributed across income quintiles; at age 18 more people are living in higher income neighborhoods (Table 4). Although people move between all income quintiles, more people are moving to wealthier neighborhoods after birth than moving to poorer neighborhoods. This is consistent with the life-cycle theory of income, consumption and savings. Most babies are born when parents are young, and young people are disproportionately lower-income -- students or workers with little seniority and experience. By the time their kids are 18, students have graduated and workers have moved up through the ranks. Income is higher so they buy housing in more affluent neighborhoods (Browning & Crossley, 2001).

Table 4 -Income Quintiles at Birth and at Age 18

		Income Quintile at Age 18					
		1	2	3	4	5	Total
Income Quintile at Birth	1	2663	1974	1487	1394	849	8367
	2	1450	2300	1863	1726	1179	8518
	3	625	1542	2168	2160	1652	8147
	4	404	961	2020	3395	3073	9853
	5	199	337	807	1967	4149	7459
	Total	5341	7114	8345	10642	10902	42344

Individuals with key missing data were also excluded - mother's age at first birth (n = 259), mother's marital status at birth (n = 1032) and birth weight (n = 2,048). The few individuals receiving EIA as a 'special case' were also excluded from the analyses (n = 7).

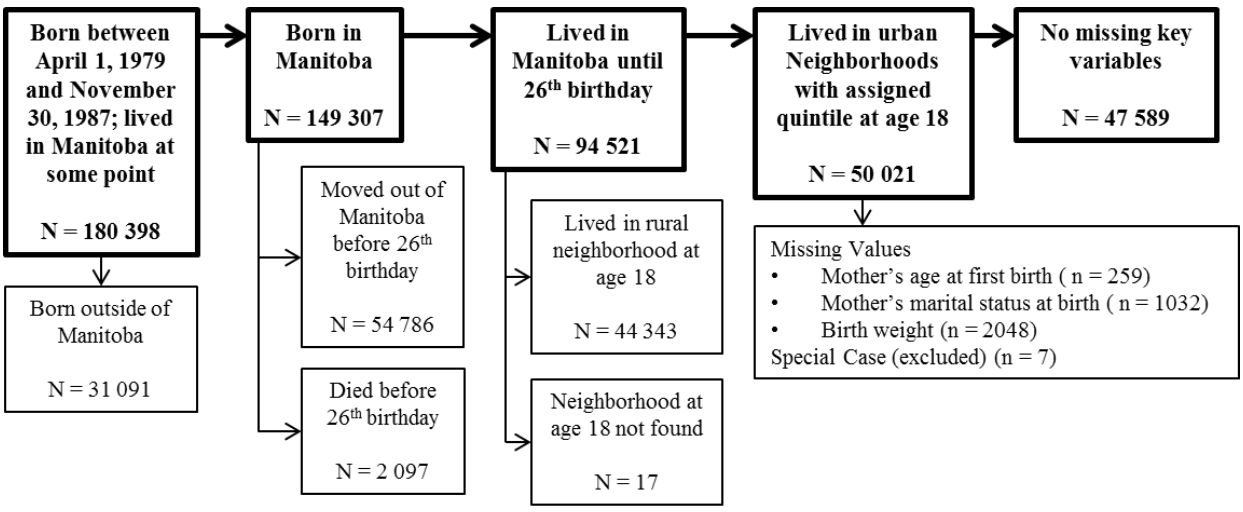
Accounting for overlapping exclusions, the final cohort consists of 47,589 individuals. Table 5 shows that between 3.9 and 6.8 percent of individuals in each income quintile have missing key variables; more individuals in low income neighborhoods are missing key variables.

Table 5 - Missing Key Variables by Income Quintile

Income Quintile at Age 18	All Urban at Age 18	Missing Key Variables (%)	Final Cohort
1	7188	491 (6.8)	6697
2	8557	482 (5.6)	8075
3	9779	469 (4.8)	9310
4	12158	474 (3.9)	11684
5	12339	516 (4.2)	11823
Total	50 021	2433	47589

The cohort selection trajectory for the selected cohort is summarized in Figure 2.

Figure 2 - Cohort Selection (Selected cohort in bold)



Variables

Outcomes

An individual was classified as receiving Employment and Income Assistance (EIA) in early adulthood if they had at least two consecutive months of EIA usage between their 18th and 26th birthday.

Employment and Income Assistance (EIA) in Manitoba is categorized into four groups: those who require it due to disability, those who require it due to single parenthood, those who require general assistance and special cases. Special cases were excluded as there were very few of these. Although each of the groups has the common eligibility criterion of having total costs of monthly needs exceed total financial resources and being between 18 and 65, each subgroup has specific eligibility criteria and available services. Needs assessments are based on 1) the number of people in the family, their ages and relationships to each other, 2) the EIA basic allowance rate for the family size and 3) the cost of some of the ongoing health needs. In addition to income support, EIA recipients also qualify for cost coverage for specific health needs and other benefits such as home repairs, moving costs and costs associated with living in northern Manitoba (Government of Manitoba, 2013(a)).

Eligibility and the amount of income support vary by the type of EIA an individual receives. To be eligible for general EIA, a person must not have a disability or be a single parent and have financial need (Government of Manitoba, 2013(a)). To receive the additional supports provided for persons with disabilities, an individual must have a "mental or physical disability that is likely to last more than 90 days and this disability keeps [them] from earning enough money to pay for [their or their] family's basic needs (Government of Manitoba, 2013(b))." Those receiving EIA for persons with disabilities receive more income support than those

receiving EIA for general assistance, due to the increased cost of living with disability in a community. Additionally, for this group, EIA does not count income from ongoing cash contributions of up to $500 per month from family or friends and Registered Disability Savings Plan withdrawals as income in the financial resources of individuals with disabilities. Lastly, to be eligible to receive EIA for single parents, individuals must have custody of a dependent child or be in their seventh, eighth or ninth month of pregnancy and must be unmarried, separated, divorced, widowed or have a spouse who is in prison (Government of Manitoba, 2013(c)). Individuals in this group receive the least amount of income support of the three groups.

During the 8 years of interest, individuals can receive EIA for several reasons – in this study the reason used most frequently defined the EIA reason for that individual.

Predictors

Birth characteristics of interest are mother's age at first birth, mother's marital status at the time of the child's birth, sex and birth weight (kg). Although many articles examining the later-life effects of birth weight in categories (defined by very low, low, normal and high birth weight), this is not done here due to the low numbers of individuals within each income quintile receiving each type of social assistance who fall into each birth weight category; a continuous predictor is used here. As the odds ratios do not differ greatly when examining a one year difference in mother's age at first birth, the models examines the effect of a five year difference (mother's age at first birth/5). Various events may be experienced at different stages of development: this paper examines one family instability variable - residential mobility, two mental health variables – major mental health conditions and minor mental health conditions, and one physical health variable - major injuries. All health conditions are defined using the well-validated Johns Hopkins University Adjusted Clinical Group (ACG) software simplifying

14,000 ICD codes into 32 Aggregated Diagnostic Groups (or ADGs) (The Johns Hopkins University, 2003; Weiner et al., 1996; Reid et al., 2002). Major mental health conditions are defined by at least one year of ADG 25 (Psychosocial: Recurrent or Persistent, Unstable) and minor mental health conditions are defined by at least one year of ADG 23 (Psychosocial: Time Limited, Minor) or ADG 24 (Psychosocial: Recurrent or Persistent, Stable). Major injuries were defined by at least one year of ADG 22 (Injuries/ Adverse Effects: Major).

The proportion of individuals with different types of mental health conditions who went on to receive EIA is of particular interest. As our mental health predictors were quite broad – minor or major mental illness between birth and age 18 – further investigation was done to examine which mental health diagnoses individuals in this cohort received. All medical records used ICD-9-CM codes during the period of interest, however, hospital discharge codes switched from ICD-9-CM to ICD-10-CA/CCI in 2004/05. A function was created at MCHP to easily facilitate the conversion of ICD-9-CM to ICD-10-CA/CCI files (MCHP, 2006). In the ICD-9-CM system, mental, behavioral and neurodevelopmental disorders are classified under codes 290-319 (CDC, 2012). Only diagnoses with at least 6 individuals in each subgroup were examined to avoid privacy issues.

Methods

Logistic regression was used to examine the effects of the predictors on the dichotomous outcome: Y = an individual received Employment and Income Assistance between 18th and 26th birthday. Let $Pr(Y = 1|\boldsymbol{x}) = \pi(\boldsymbol{x})$, then

$$ln\left(\frac{\pi(\boldsymbol{x})}{1 - \pi(\boldsymbol{x})}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8$$

Where x_1= mother's age at first birth/5, x_2= mother unmarried at birth, x_3=birth weight (kg), x_4= male, x_5= Moved, 0 – 17, x_6 =Major Mental Health Conditions, 0 – 17, x_7= Minor Mental Health Conditions, 0 – 17 and x_8= Major Injuries, 0 – 17.

Initially, the odds ratios of individuals with a specific predictor to receive EIA were compared to those without that predictor. To compare predictors across income quintiles, five additional models (one for each income quintile) were created. The cohort was split into three groups to examine the influence of predictor on different types of EIA. The last set of analyses focused on how predictors differed across income quintiles for each type of EIA. Five logistic regression models were created for each type of EIA. Twenty-four models were examined for the cohort of individuals who lived in urban Manitoba on their 18th birthday (overall model, one for each income quintile, one for each EIA type and one for each income quintile of each type of EIA).

Model fit was assessed using measures of accuracy and discrimination. A Brier score of 0 indicates perfect accuracy whereas a score of 0.5 indicates complete inaccuracy (Green, 2004). A useful risk prediction model has a Brier score under 0.25 (Gerds, Cai & Schumacher, 2008). The c-statistic (ranging from 0.5 to 1) measured discrimination. Reasonable models have a c-statistic of at least 0.7 while strong models have a c exceeding 0.8 (Hosmer & Lemeshow, 2000).

Overall

Slightly less than thirteen percent of the cohort received EIA at some point between their 18th and 26th birthday. The frequencies and means of the predictors for the whole population are presented in Table 6.

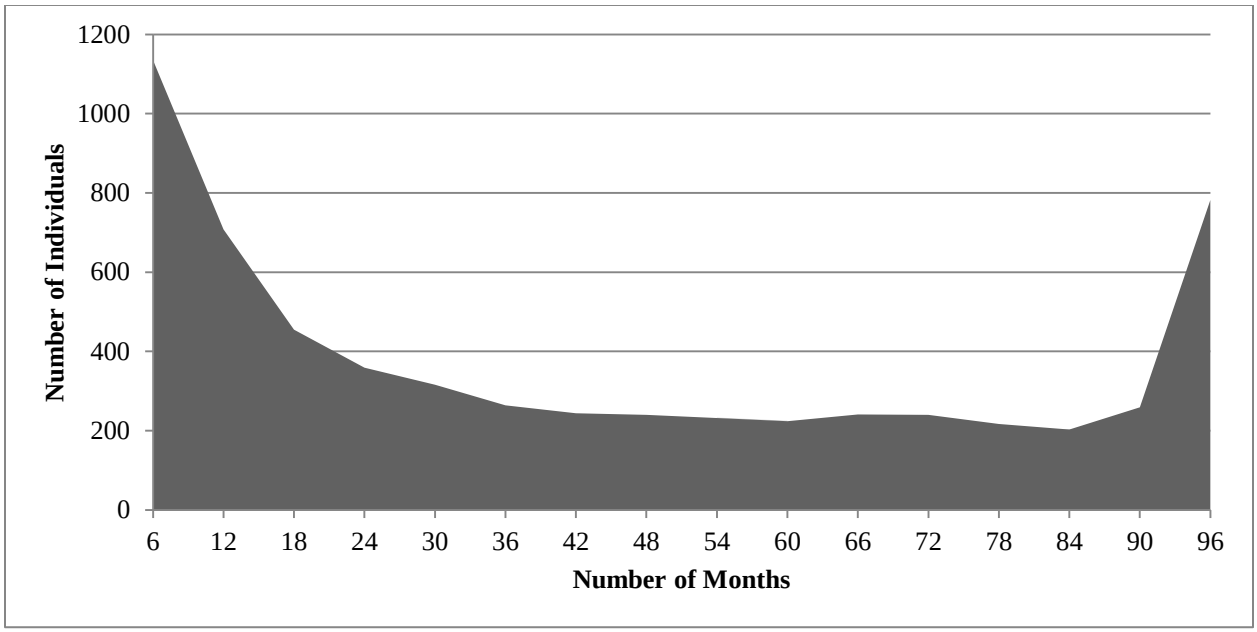
Table 6 - Frequencies of binary variables and mean and standard deviation of continuous variables

Variable	n	%
Received EIA, 18 - 25	6,119	12.86
Average Mother's Age at First Birth (SD)	26.41(5.01)	
Average Birth Weight (grams) (SD)	3410.77 (547.63)	
Mother Unmarried at time of Birth	8,115	17.05
Male	23,855	50.13
Moved, 0 - 17	14,010	29.44
Major Mental Health Conditions, 0 - 17	1,773	3.73
Minor Mental Health Conditions, 0 - 17	19,523	41.05
Major Injuries, 0 - 18	38,216	80.30

[a] N = 47 589

To be classified as receiving EIA in early adulthood, individuals must have received at least two consecutive months of EIA between their 18th and 26th birthdays. This provides a general idea of who is using EIA. Figure 6 displays the distribution of the number of months of EIA usage for all individuals who received EIA in early adulthood. Figure 3 shows: a decrease in use up to 36 months, a somewhat steady number of people from 36 months to 90 months and a sharp increase at 96 months (full 8 years).

Figure 3 - Number of Months of EIA Usage



To determine the general predictors of EIA usage in early adulthood, a logistic regression model was used. Table 8 displays the odds ratios and corresponding confidence intervals associated with each predictor. All predictors are significant at $p < 0.0001$. As mother's age at first birth increases and birth weight increases, the odds of receiving EIA in early adulthood decrease. Being male is a 'protective factor' in that young women are more likely to receive EIA. Those born to unmarried mothers, had major or minor mental health conditions or major injuries in childhood or early adolescence had increased odds of receiving EIA in early adulthood. The greatest odds were associated with having major mental health conditions in childhood and adolescence.

Table 7 -- Received EIA between 18 and 25 (odds ratios)

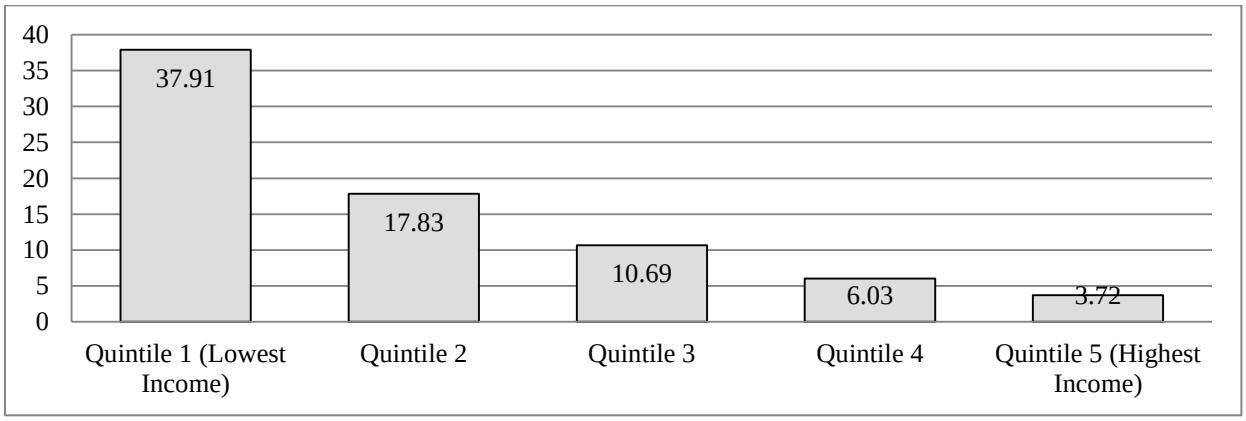
Independent Variables	OR	95% CL
Mother's Age at First Birth/5	0.714	(0.69,0.74)
Mother Unmarried at time of Birth	3.098	(2.90,3.31)
Birth Weight (kg)	0.855	(0.81,0.90)
Male	0.498	(0.47,0.53)
Moved, 0 - 17	3.189	(2.99,3.40)
Major Mental Health Conditions, 0 - 17	4.021	(3.58,4.51)
Minor Mental Health Conditions, 0 - 17	2.217	(2.08,2.36)
Major Injuries, 0 - 17	1.543	(1.41,1.69)

*Note: all ORs are significant at $p < 0.0001$

Income Quintile of Neighborhood at Age 18

The first question addressed is whether individuals living in different income quintiles on their 18^{th} birthday have different predictor of EIA usage. Figure 4 displays the percent of individuals receiving EIA varies significantly across income quintiles, with the greatest percent seen residing in the lowest income quintile (38%) and the smallest percent in the highest income quintile (4%).

Figure 4 - Percent of Individuals in Each Income Quintile Receiving EIA between 18 and 25



The descriptive statistics of the predictors in each income quintile also differ (see Table 7 and Figures 3 and 4). In general, those who did not receive EIA in early adulthood were born to mothers who were older when they had their first child than those who did receive EIA. Those who lived in higher income neighborhoods at age 18 were born to mothers who were older at the birth of their first child. Individuals receiving EIA in early adulthood were on average lighter at birth than those who did not receive EIA in early adulthood. Among those receiving EIA in early adulthood, average birth weight does not seem to differ much across income quintiles. Those who did not receive income assistance, individuals living in higher income neighborhoods were somewhat heavier at birth than those living in low income neighborhoods at age 18.

Table 8 - Cross tabulations of the continuous predictors

Predictor	Received EIA between 18 and 25	Income Quintile at Age 18				
		1	2	3	4	5
Mean Mother's Age at First Birth	Yes	22.653	23.361	24.242	24.899	26.349
	No	25.559	26.034	26.432	26.991	27.867
Mean Birth Weight (kg)	Yes	3.335	3.333	3.333	3.296	3.448
	No	3.380	3.389	3.416	3.435	3.343

The difference in binary predictors across income quintiles can be seen in Figure 5 (those who received EIA in early adulthood) and Figure 6 (those who did not receive EIA in early adulthood). In both groups, a greater proportion of individuals living in low income

neighborhoods were born to unmarried mothers than those living in higher income neighborhoods; the proportions were much higher for individuals going on to receive EIA. Approximately 50% of those who did not receive EIA in early adulthood were male; only 35 – 42 percent of those who did receive EIA in early adulthood were male, with a greater proportion of males in higher income neighborhoods. For those receiving EIA as young adults, between 30 and 75 percent moved before age 18, with a greater proportion of individuals living in low income neighborhoods at age 18 having moved prior to age 18. Only 15 to 50 percent of individuals who did not receive EIA in young adulthood moved before age 18; a greater proportion of those living in lower income neighborhoods moved in childhood and adolescence. Among those receiving EIA in early adulthood, individuals who lived in higher income neighborhoods had more (minor and major) mental health conditions in childhood and adolescence; the opposite was true for the group that received EIA in early adulthood. More individuals who received EIA in early adulthood had major injuries in childhood and adolescence; the pattern across income quintiles remained similar.

Figure 5 – Percent of individuals who received EIA in early adulthood, by income quintile

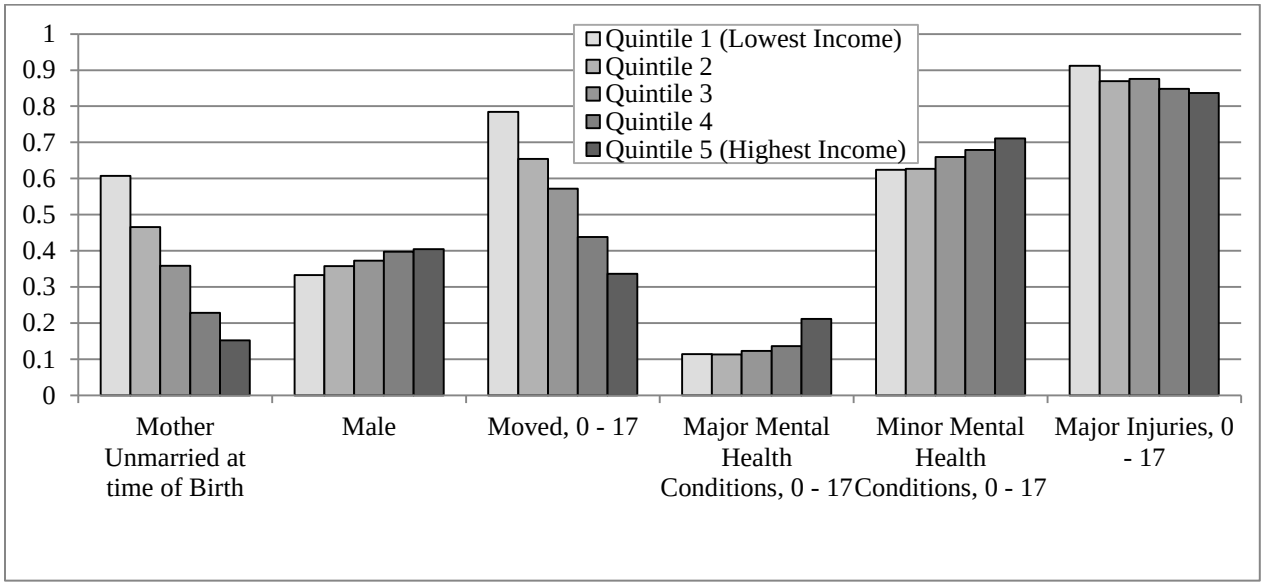
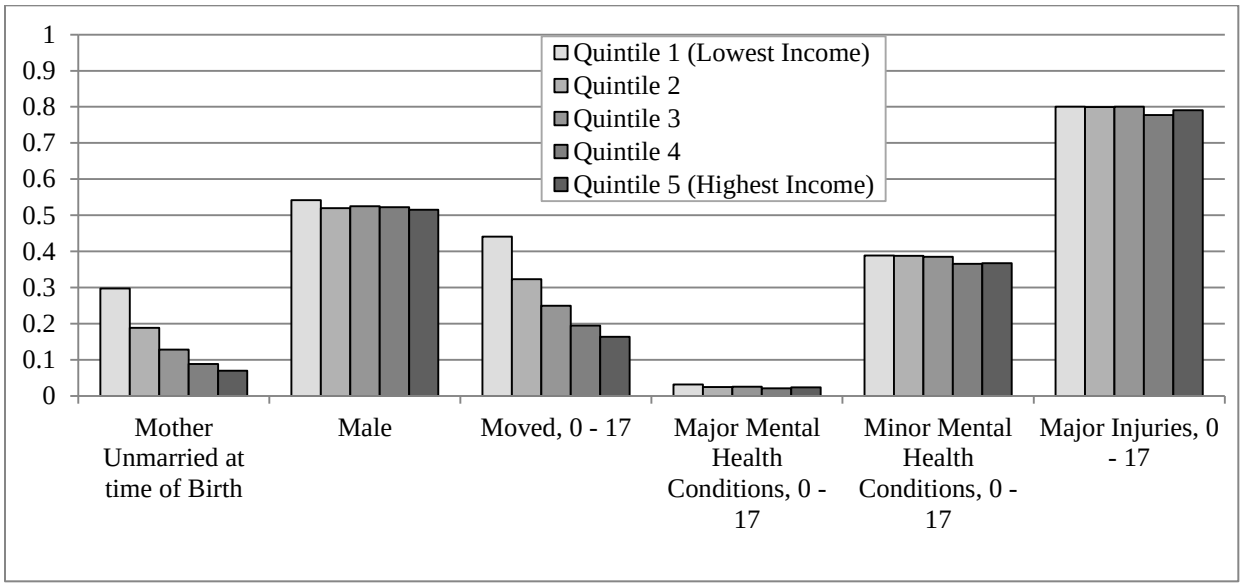


Figure 6 – Percent of individuals who did not received EIA in early adulthood, by income quintile



The many more childhood and adolescent mental illnesses in the group that received EIA in early adulthood called for further investigation. Figure 7 displays the percent of individuals receiving EIA in early adulthood who had specific mental health diagnoses by income quintile. The percent of individuals not receiving EIA in early adulthood is overlaid onto the table – this shows that for all conditions 1) those receiving EIA have higher percentages and 2) the pattern from poor to affluent neighborhood differs between the two groups. For those using EIA in early adulthood, the highest proportion of mental health diagnoses was found in those living in high income neighborhoods (except nondependent abuse of drugs and hyperkinetic syndrome of childhood).

Figure 7 - Childhood and Adolescent Mental Health conditions of individuals who did and did not received EIA in early adulthood, by income quintile at age 18

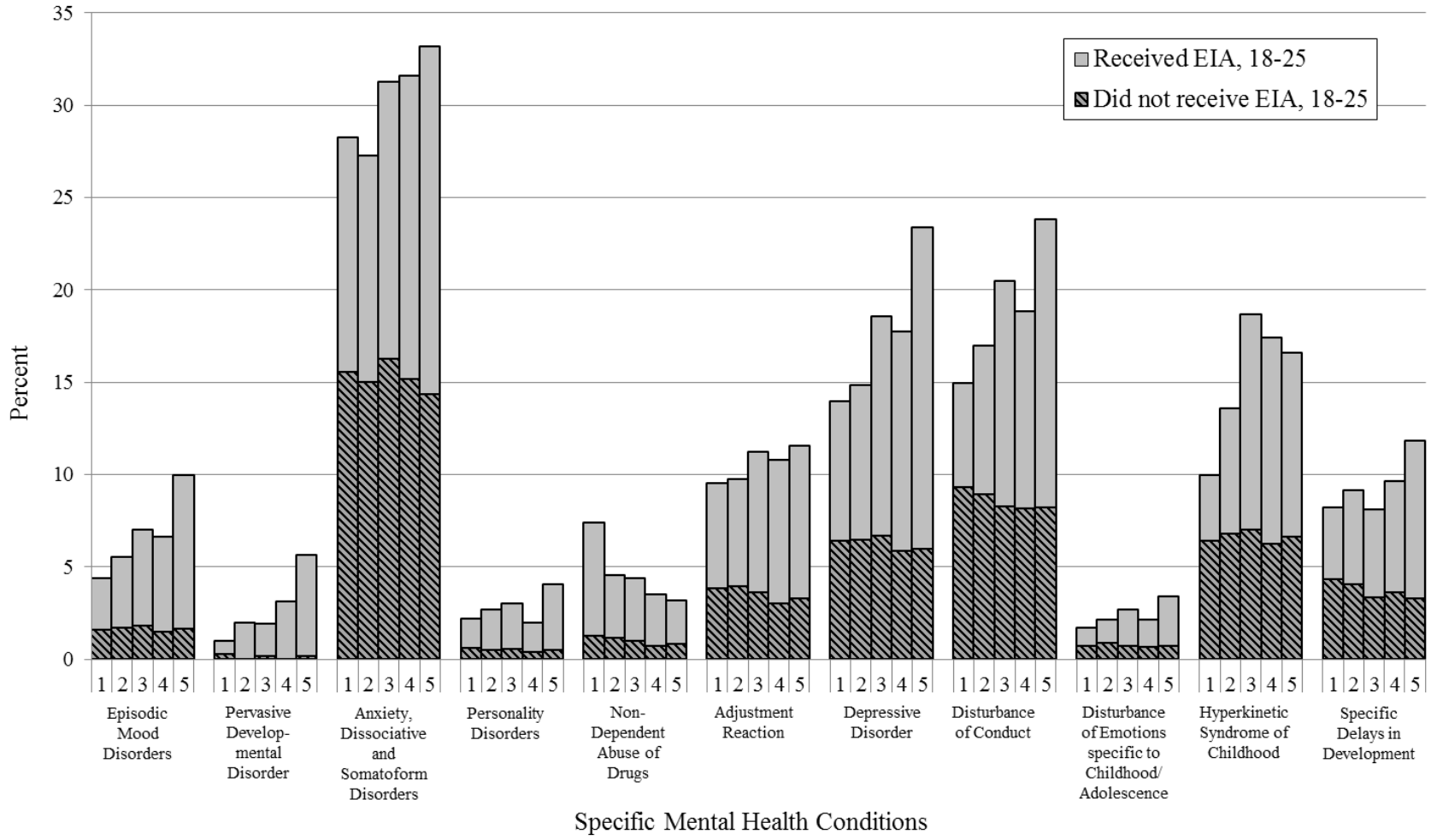
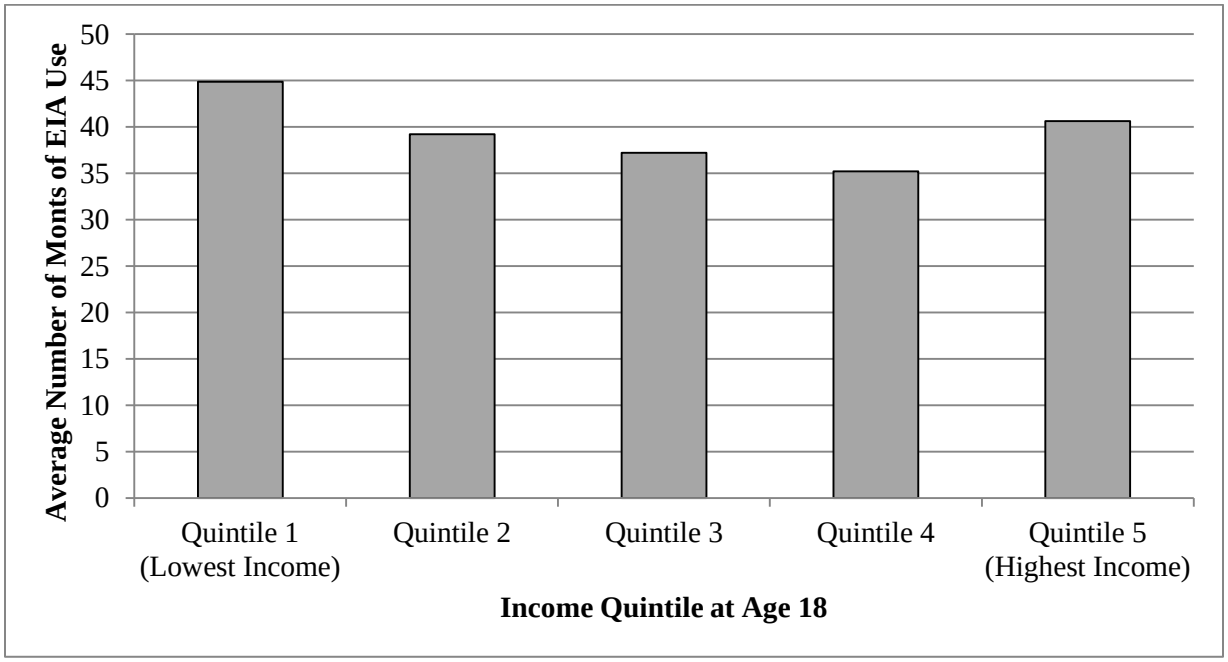


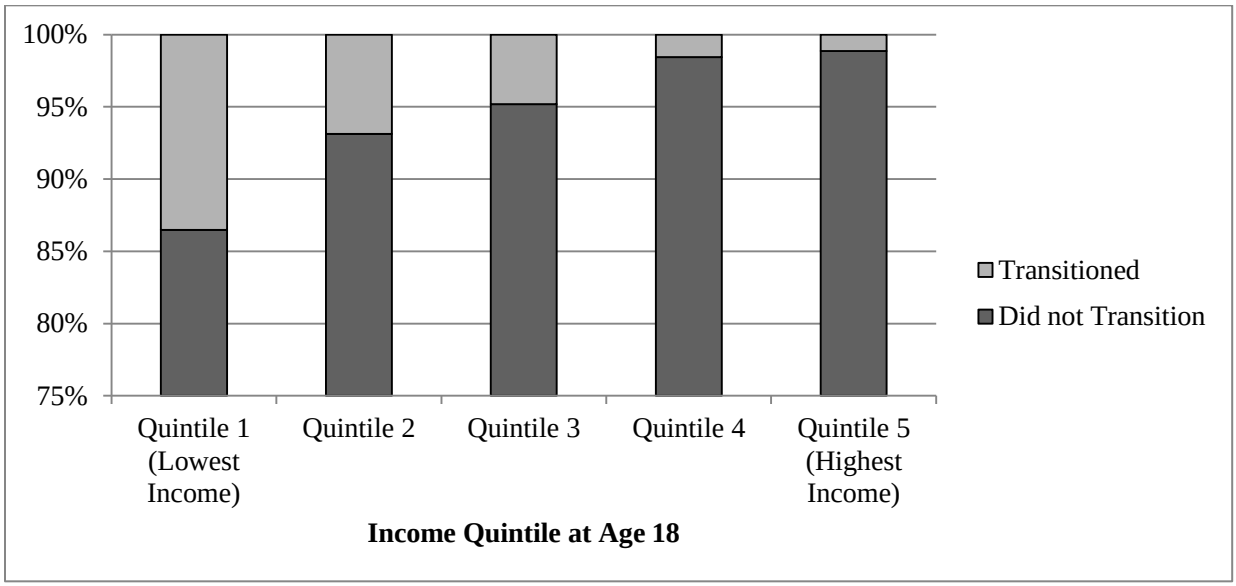
Figure 8 displays the average number of months of EIA that individuals in each income quintile received. Although the range is quite small (35 – 45 months), the highest number of months is used by the group of individuals who lived in the lowest income neighborhoods at age 18.

Figure 8 - Average number of months of EIA usage by Income Quintile at age 18



Before age 18, individuals receive EIA as a dependent child; after age 18 individuals must apply for their own EIA. Individuals can transition from receiving EIA as a dependent child to receiving EIA as an applicant at their 18th birthday. Figure 8 shows the proportion of individuals in each income quintile receiving EIA in early adulthood that transitioned from being a dependent child to applicant at age 18. A greater percent of individuals living in low income neighborhoods at age 18 transitioned from receiving EIA as a dependent child just before their 18th birthday to receiving EIA as an applicant after their 18th birthday.

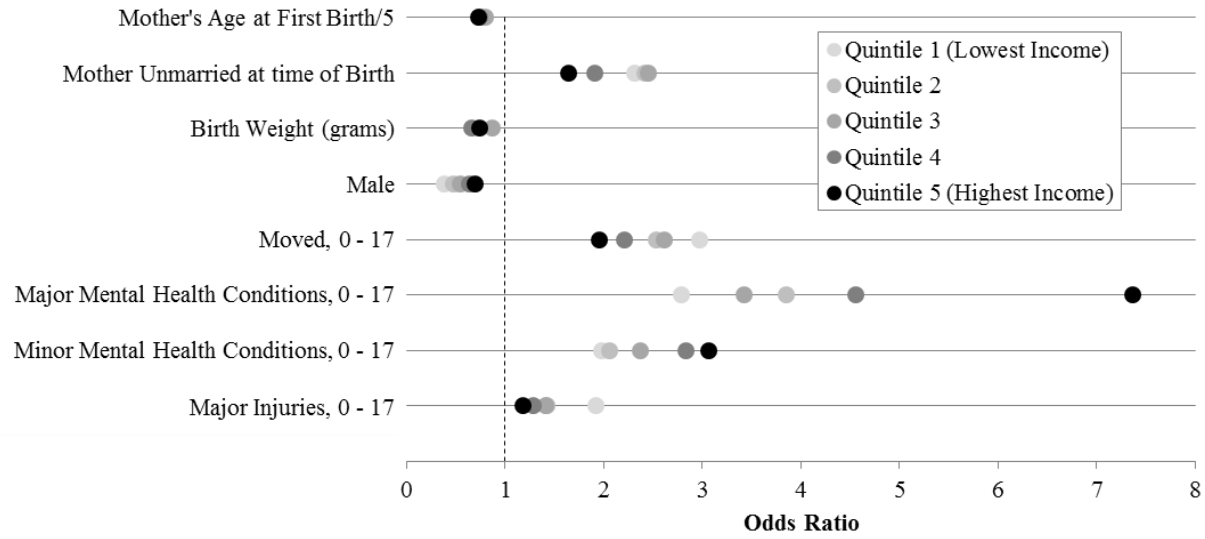
Figure 9 - Percent of EIA recipients who transitioned from being a dependent child to applicant at age 18



Results

Separate logistic regression models explored these relationships for each income quintile. The following models are displayed as odds ratio dot plots – odds ratios and confidence intervals for these models can be found in Appendix A. Figure 10 displays the (significant at $p < 0.05$) odds ratios of each predictor for each income quintile. Mental health conditions (major and minor) in childhood and adolescence increased the odds of receiving EIA in early childhood much more for those living in a high income neighborhood at age 18. Moving in childhood and adolescence and being born to an unmarried mother were more significant in predicting EIA usage in early adulthood for those living in low income neighborhoods.

Figure 10 – Odds Ratios of Receiving EIA, 18 - 25, by Income Quintile at Age 18



*Note: All Odds Ratios presented are significant at $p < 0.05$

Fit Statistics

Table 9 displays the Brier Score (Accuracy) and C-Statistic (Discrimination Ability) of each of the five models discussed in this section and the overall model. Each of the models has reasonable discrimination (>0.75) and accuracy (<0.20). The model with the best discrimination ability is the one for which all individuals in this cohort were included; the model with the best accuracy examined the predictors of EIA usage in early adulthood by individuals living in the highest income quintile at age 18.

Table 9 - Received EIA, by Income Quintile at Age 18

Quintile at Age 18	Brier Score	C-Statistic	Proportion Receiving EIA, 18 - 25
All	0.089	0.822	0.1286
1	0.177	0.794	0.3791
2	0.122	0.783	0.1783
3	0.084	0.781	0.1069
4	0.052	0.77	0.0603
5	0.033	0.766	0.0372

Conclusion

Predictors of EIA usage in Manitoba differ depending on the income quintile an individual lived in at age 18. All time-varying predictors were significant in each income quintile, however, the odds ratios differed between income quintiles. For the mental health predictors, the odds of using EIA in early adulthood were greatest for those who lived in high income neighborhoods. This finding is mirrored in the proportion of individuals with specific mental health ICD codes seen in Figure 7. A greater percent of those residing in high income neighborhoods at age 18 had mental health conditions in childhood and adolescence; these diagnoses increased the odds of using EIA for these individuals much more than those living in low income neighborhoods at age 18. The linear relationship between income quintile and size of odds ratios is less evident in residential mobility and major injures. From both of these predictors, the odds of receiving EIA in early adulthood are greatest for those living in the lowest income neighborhood at age 18. The relationship between income quintile and transitioning from being a dependent receiving EIA to an applicant receiving EIA at age 18 is also linear. As one would expect, fewer individuals living in high income neighborhoods transition; less than three percent of the already small number of individuals receiving EIA in the highest two income quintiles transitioned. Those living in the highest and the lowest income quintile received EIA for the longest period of time (on average); the reason for this is unclear, further research is required.

Those diagnosed with (minor or major) mental health conditions in childhood and adolescence appear to be at a significantly greater risk of being impoverished in early adulthood and requiring the last resort services offered through EIA. Although true for all individuals, the relationship is stronger for those living in high income neighborhoods. Children coming from disadvantaged families have long been found to have higher rates of physical and mental

disability (as seen in the population who did not go on to receive EIA in early adulthood) (Houtrow et al., 2014). The finding that a) individuals in high income neighborhoods at age 18 have higher proportions of many mental health conditions and b) these children are at greater odds of needing Employment and Income Assistance bring with it a series of additional questions. Previous research has found an increase in "disability related to conditions that were classified as neurodevelopmental or mental health in nature, especially for children living in sociodemographically advantaged families (Houtrow et al., 2014, p.537)." However, this study found that those living in low income families have higher rates of disability.

Type of EIA Usage

The second question addressed here is whether predictors differ across types of EIA used in early adulthood (General Assistance, Single Parent and Disability). As 37% of individuals received general assistance, 40% received assistance as single parents and 23% received assistance due to disability, the cohort of individuals who did not receive EIA were randomly assigned into three groups based on the same proportions as those receiving EIA. Table 10 shows the number of individuals in each EIA type and the number of individuals from the comparison group of those not receiving EIA.

Table 10 - Cohort Selection for EIA Type

EIA Type	Received EIA, 18 - 25	Did not receive EIA, 18 - 25
General Assistance	2,162 (35.4%)	14,528
Single Parent	2578 (42.1%)	17806
Disability	1,379 (22.5%)	9,136

The average birth weight and mother's age at first birth for EIA recipient type is displayed in Table 11. Individuals who did not receive EIA in early adulthood were born to mothers who were older when they had their first child than those who did use EIA; those using

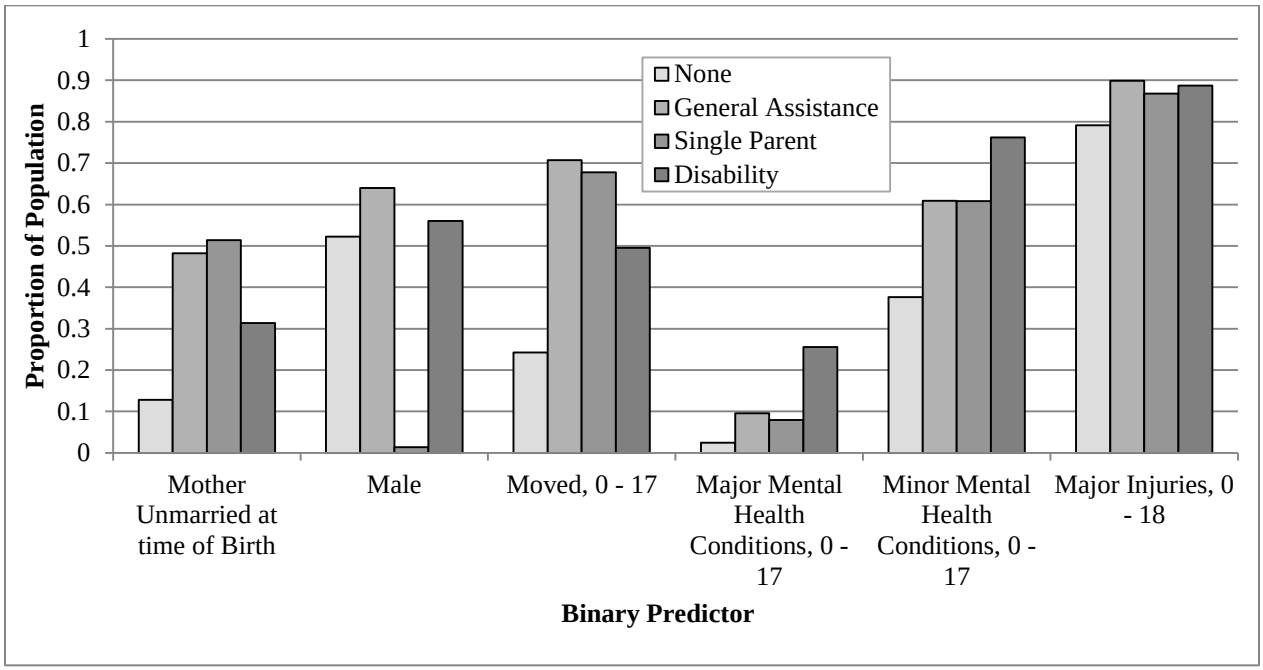
EIA for general assistance and as single parents were born on average to mothers who were youngest at birth. Individuals receiving EIA in early adulthood as single parents and due to disability were on average lighter at birth than those who did not receive EIA in early adulthood.

Table 11 - Cross tabulations of the continuous predictors

Predictor	Did not use EIA, 18 - 25	EIA Type		
		General Assistance	Single Parent	Disability
Average Mother's Age at First Birth	26.82	23.15	22.91	25.62
Average Birth Weight (kg)	3.422	3.436	3.329	3.245

Figure 11 shows the difference in binary predictors across EIA types. Greater rates are seen among those using EIA for all predictors other than being male – here only those receiving EIA due to single parenthood had lower rates of males than those who did not receive EIA. Using EIA due to single parenthood was associated with being born to an unmarried mother. Individuals using EIA for general assistance had the highest rates of being male, moving and having major injuries in childhood and adolescence. The highest rates of major and minor mental health conditions in childhood and adolescence were seen in those receiving EIA due to disability.

Figure 11 - Proportion of Individuals with each binary predictor by EIA Type



The specific types of mental health conditions found in individuals using each type of EIA is further investigated (Figure 12). Other than anxiety and nondependent drug use, those using EIA due to disability had the highest proportions of each specific mental health condition in childhood and adolescence. Individuals receiving EIA as single parents had significant lower rates in half of the conditions examined; these individuals had the highest proportions of anxiety, dissociative and somatoform disorders.

Figure 12 - Childhood and Adolescent Mental Health conditions of individuals who received EIA in early adulthood, by EIA Type

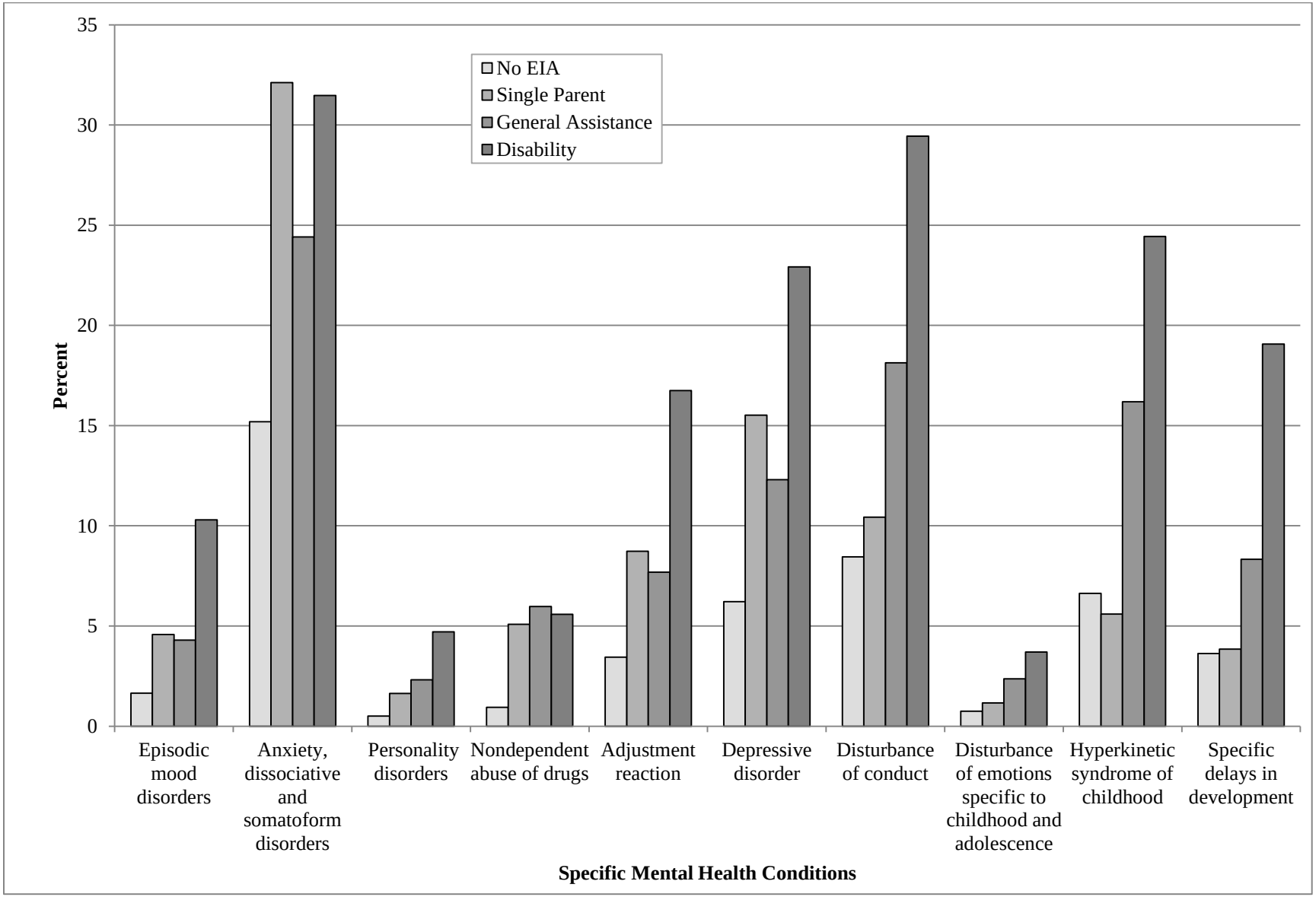


Figure 13 displays the average number of months of EIA usage of individuals for each EIA type. The range is quite large – on average those using EIA for general assistance received EIA for 15 months and those using EIA due to disability received EIA for 62 months.

Figure 13 - Average number of Months on EIA in young adulthood by EIA Type

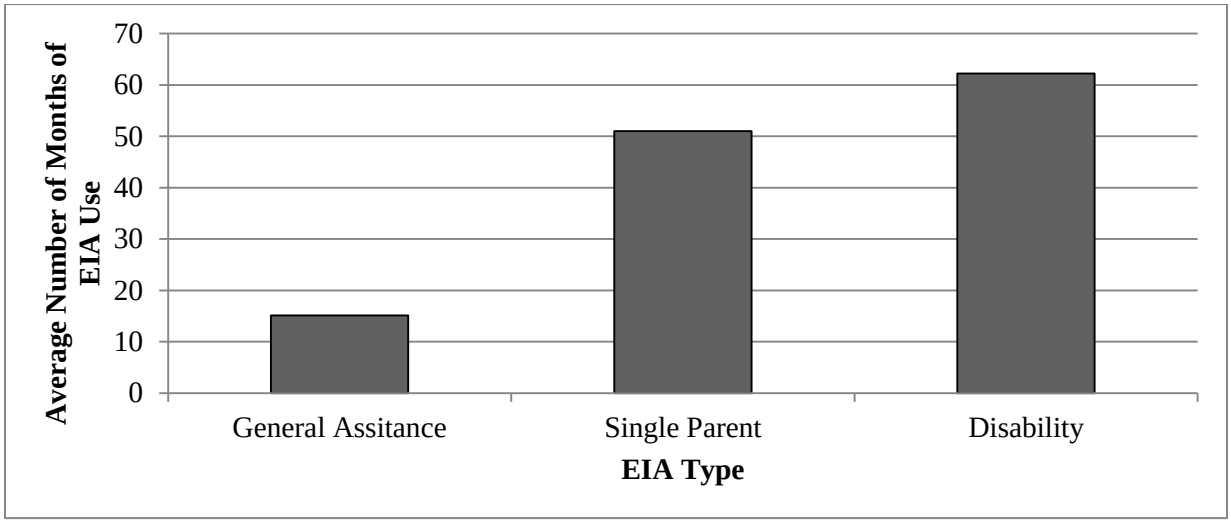
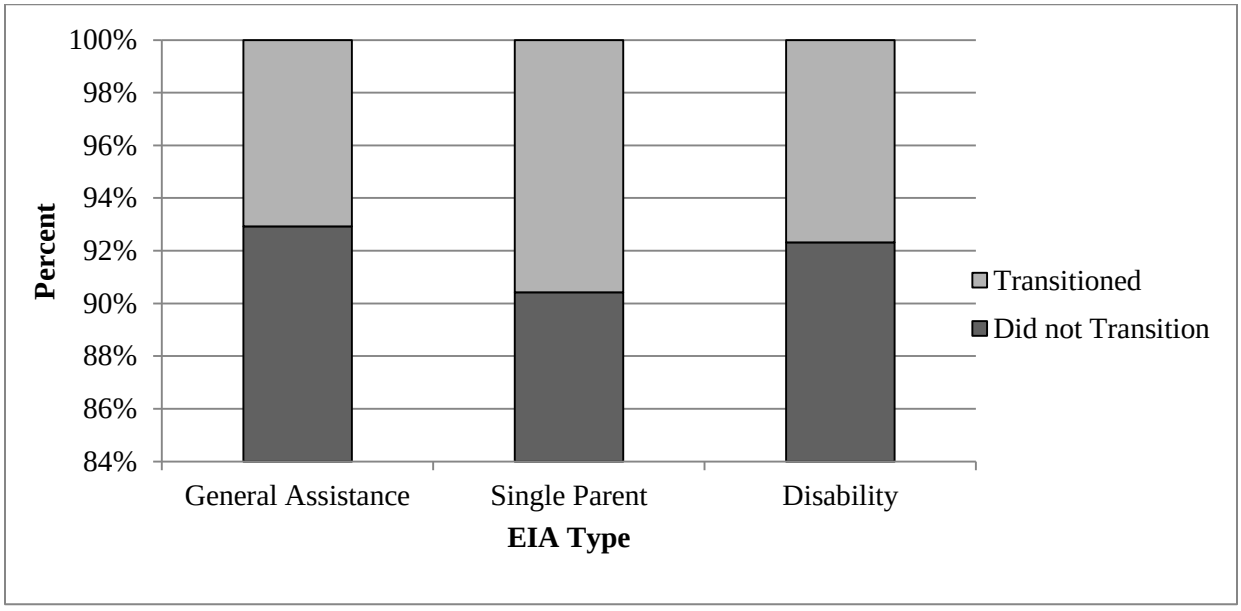


Figure 14 shows the proportion of individuals receiving each type of EIA in early adulthood transitioning from being a dependent child to applicant at age 18; the proportion is very similar across EIA types.

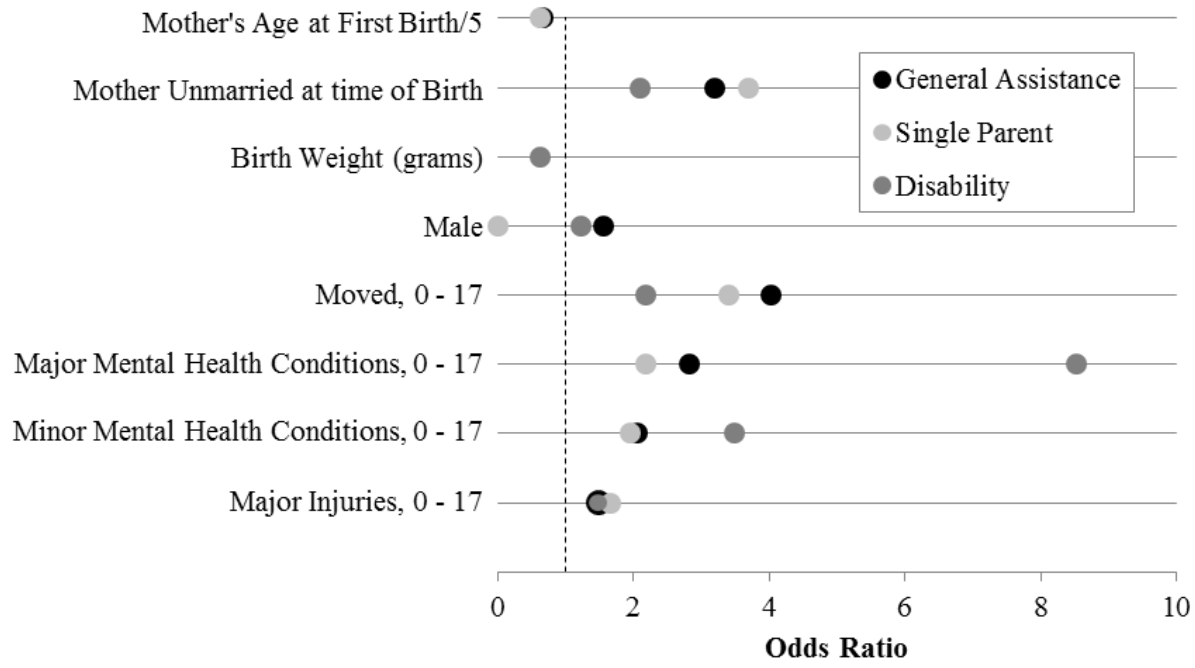
Figure 14 - Proportion of Individuals using each type of EIA who transitioned at age 18



Results

Individuals receive EIA for different reason – three logistic regression models examined whether predictors differed across EIA types (Figure 15). The models are displayed as odds ratio dot plots – odds ratios and confidence intervals for these models can be found in Appendix A. Being born to an unmarried mother increased the odds for each type of EIA; these odds were much greater for those who received general assistance and were single parents. An increase in birth weight decreased the odds of using EIA due to disability but did not influence the odds for the other types of EIA usage. Being male increased the odds of receiving EIA for general assistance and disability, but decreased the odds of using EIA as a single parent (given that most single parents are female). Mental illness in childhood and adolescence increased the odds of using EIA due to disability much more than for other EIA usage. Major Injuries increased the odds of EIA usage; the odds did not differ across EIA type.

Figure 15 - Received EIA, 18 - 25, by EIA type



*Note: All Odds Ratios presented are significant at $p < 0.05$

Fit Statistics

Table 12 displays the Brier Score (Accuracy) and C-Statistic (Discrimination Ability) of each of the six models discussed in this section. Each of the models has excellent discrimination (>0.8) and accuracy (<0.10). The model with the best discrimination ability and accuracy is that examining EIA usage due to single parenthood.

Table 12 - Fit Statistics for different types of EIA

EIA Type	**Brier Score** Accuracy	**C-Statistic** Discrimination	**Proportion Receiving EIA, 18 - 25**
All	0.089	0.822	0.1286
General Assistance	0.0877	0.835	0.1285
Single Parent	0.0708	0.913	0.1287
Disability	0.089	0.8	0.1285

Conclusion

The predictors of the EIA usage remained similar across the three different types of EIA, however the size and direction of the odds ratios differed markedly. Not surprisingly, individuals who had major or minor mental health conditions in childhood and adolescence had higher odds of receiving EIA due to disability than any other type of EIA; mental illness in adolescence is a strong indicator of mental illness in adulthood (which is covered through EIA for the Disabled) (Mental Health Foundation, 2005). The model of overall EIA usage (Table 11) shows males to be at significantly lower odds of receiving EIA. When we break this up by type, these odds are clearly driven by those receiving EIA as single parents – both of the other types of EIA see higher odds of usage for males. The Canadian Institute of Child Health (2000) found that low birth weight contributed to long-term health problems, including cerebral palsy and learning difficulties – this explains the significant decrease in EIA usage for disability for those with higher birth weight. Individuals require EIA for different reasons. To address these reasons more accurately, the predictors of each type of EIA need to be understood as aggregate data can

be misleading. To better understand predictors across EIA types, the predictors of individuals receiving EIA in each income quintile need to be examined.

Type of EIA Usage by Income Quintile at Age 18

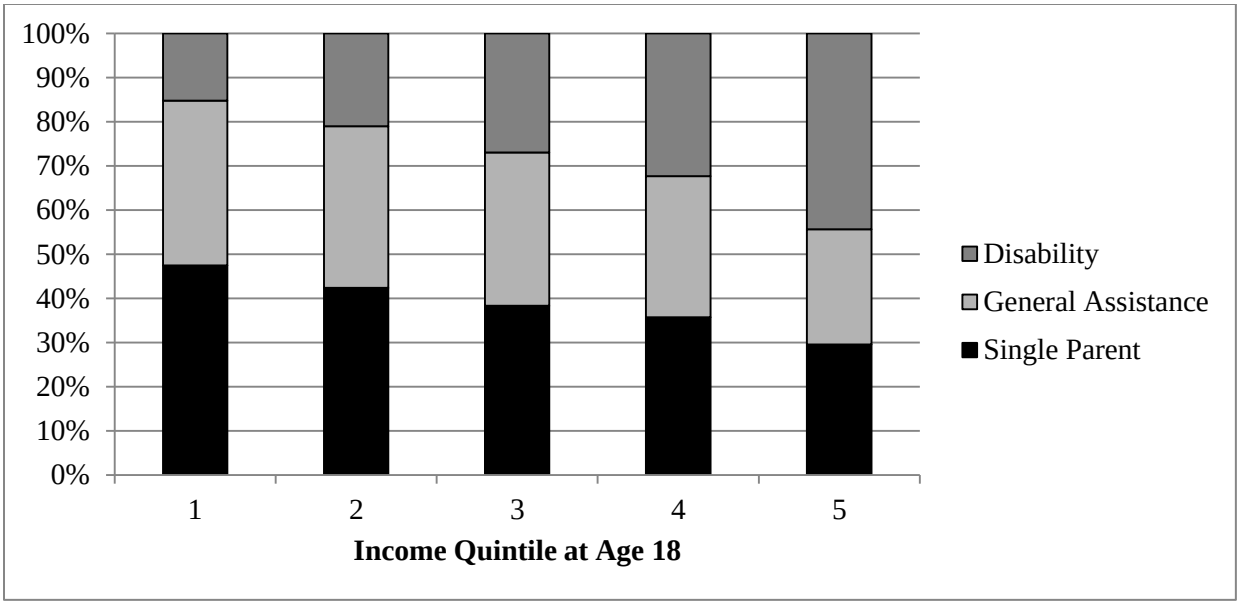
Finally, the question of whether the predictors of different types of EIA differ across income quintiles is addressed. The cohort used for this analysis is that created for the analysis on Type of EIA Usage. Table 13 shows the number of individuals in each income quintile at age 18 for each of the three groups.

Table 13 - Number of Individuals in each subsample

EIA Type	Income Quintile (at age 1	Received EIA, 18 - 25	Did not receive EIA, 18 - 25
General Assistance	1	948	1454
	2	528	2247
	3	346	2850
	4	225	3862
	5	115	4115
Single Parent	1	1205	1785
	2	610	2929
	3	381	3602
	4	252	4690
	5	130	4800
Disability	1	386	919
	2	302	1459
	3	268	1863
	4	228	2427
	5	195	2468

Figure 16 displays the distribution of EIA type for those receiving EIA in early adulthood, by income quintile at age 18. In the lowest income quintile (Q1), almost half of the people receiving EIA were single parents. In the highest income quintile (Q5), almost half of the people receiving EIA were disabled.

Figure 16 – Type of EIA received by individuals receiving EIA in early adulthood, by income quintile at age 18



The average values of the continuous predictors and the percentages of binary predictors for EIA type by income quintile (at age 18) are displayed in Table 14. Mother's age at first birth increases by as income increases for each EIA type. Those who use EIA due to disability were on average born to mothers older at the time of their first birth. Those using EIA in early adulthood had the lowest birth weight (in all income quintiles). As neighborhood income increased, the percent of individuals born to unmarried mothers decreased; those using EIA due to disability had the lowest percentages of individuals born to unmarried mothers. Less than 3 percent of all individuals in each income quintile using EIA due to single parenthood were male. As income increased, then number of individuals who moved decreased. Among those using EIA for general assistance and due to disability, those living in the highest income quintile at age 18 had the greatest percentages of major mental health conditions; those using EIA due to single parenthood and living in the highest income quintile at age 18 had the greatest rates of minor mental health conditions in childhood and adolescence.

Table 14 - Predictors by EIA Type and income quintile at Age 18

Independent Variables	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
			General Assistance		
Average Age at Mother's First Birth	22.52	23.20	23.56	23.83	25.53
Average Birth Weight (grams)	3408.65	3402.45	3392.28	3350.21	3506.28
Percent with Mother Unmarried at time of Birth	59.92	49.05	41.33	23.11	17.39
Percent Male	65.61	63.07	64.16	65.33	51.30
Percent who Moved, 0 - 17	80.59	70.08	67.63	51.56	39.13
Percent who had Major Mental Health Conditions, 0 - 17	10.97	8.14	7.80	8.89	11.30
Percent who had Minor Mental Health Conditions, 0 - 17	58.54	58.71	63.29	68.89	66.96
Percent who had Major Injuries, 0 - 17	91.14	89.77	91.04	87.11	81.74
			Single Parent		
Average Age at Mother's First Birth	22.25	22.73	23.57	24.14	25.47
Average Birth Weight (grams)	3341.98	3303.88	3304.93	3339.40	3367.02
Percent with Mother Unmarried at time of Birth	64.32	50.66	37.80	26.98	21.54
Percent Male	1.49	1.31	1.05	1.98	0.00
Percent who Moved, 0 - 17	78.26	65.57	59.32	48.02	43.85
Percent who had Major Mental Health Conditions, 0 - 17	7.63	7.05	9.19	7.54	11.54
Percent who had Minor Mental Health Conditions, 0 - 17	59.50	59.02	61.94	66.67	66.92
Percent who had Major Injuries, 0 - 17	90.46	82.62	85.83	82.94	83.08
			Disability		
Average Age at Mother's First Birth	24.24	24.90	26.12	26.79	27.42
Average Birth Weight (grams)	3261.43	3247.78	3270.40	3193.27	3231.21
Percent with Mother Unmarried at time of Birth	51.55	34.11	26.12	17.98	9.74
Percent Male	53.37	57.62	54.10	56.14	61.03
Percent who Moved, 0 - 17	73.58	56.95	40.67	31.58	23.59
Percent who had Major Mental Health Conditions, 0 - 17	24.35	25.50	22.39	25.00	33.33
Percent who had Minor Mental Health Conditions, 0 - 17	81.09	76.82	75.00	68.42	76.41
Percent who had Major Injuries, 0 - 17	93.52	90.73	85.45	84.65	85.13

The number of individuals in each income quintile within each EIA type with specific mental health conditions is very low and many of the numbers would have to be suppressed; the differences of specific mental health conditions diagnosis in each income quintile for each EIA are not displayed.

Figure 17 shows the average number of months of EIA usage by EIA type and income quintile at age 18. As income increases, the average number of months of EIA usage decreases for those using EIA for general assistance and single parenthood. The average months of EIA usage remains very similar across income quintiles for those using EIA due to disability.

Figure 17 - Average Number of Months of EIA usage by EIA type and income quintile at Age 18

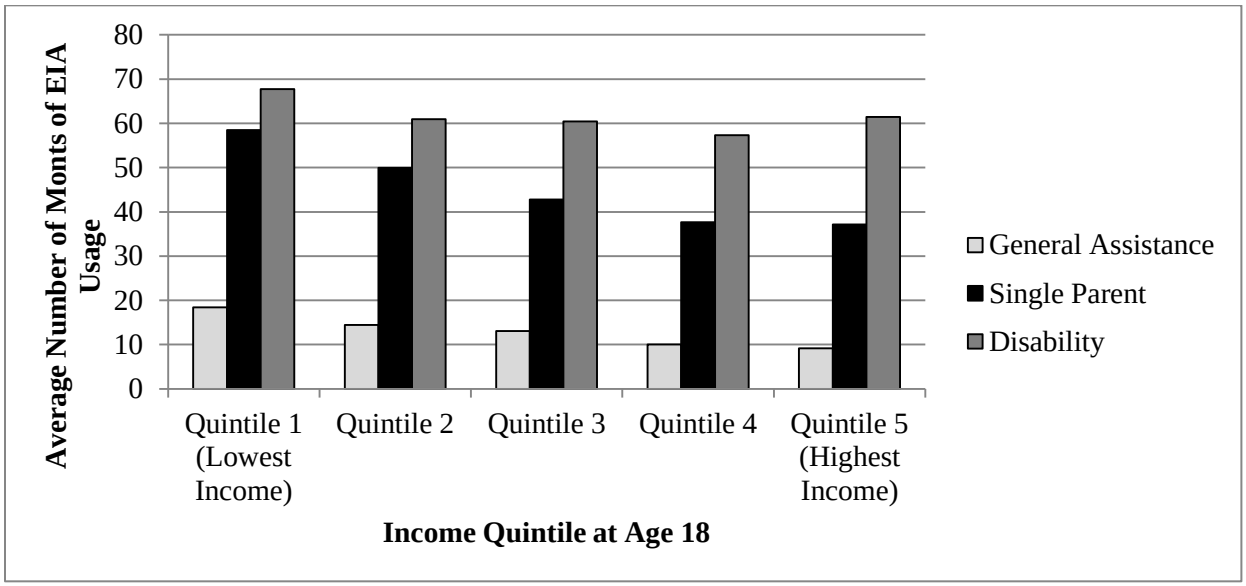
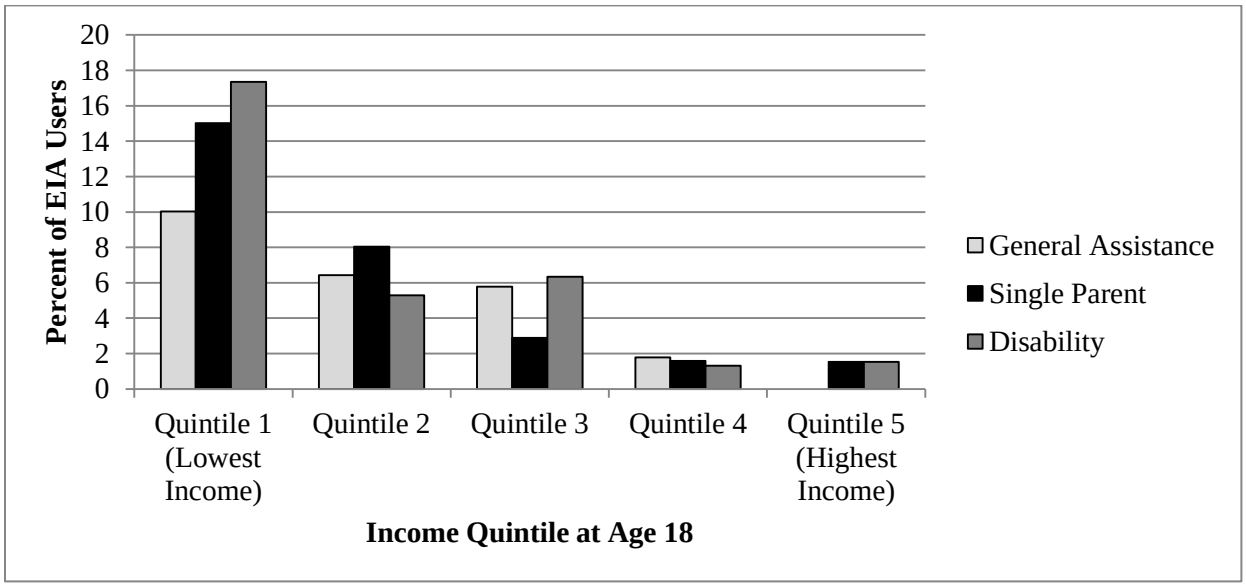


Figure 18 shows the proportion of individuals receiving each type of EIA in early adulthood that transitioned from being a dependent child to applicant at age 18 by income quintile at age 18. For each type of EIA, as income increased, the percent of individuals who transitioned decreased.

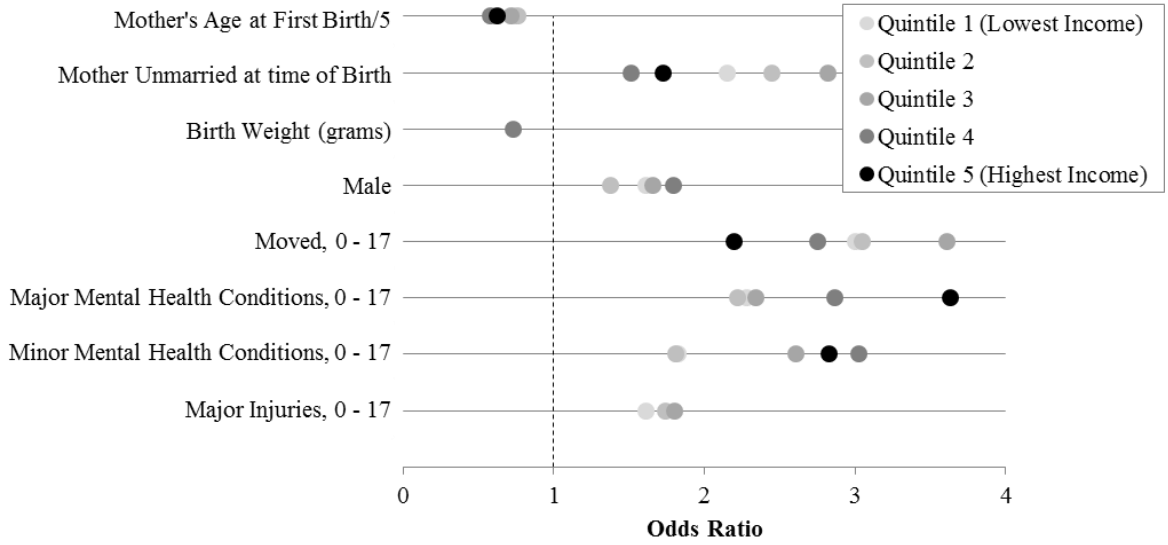
Figure 18 - Percent of Individuals using each type of EIA who transitioned at age 18, by income quintile at age 18



Results

The predictors of the different types of EIA usage differ across income quintiles (Figures 19 – 21).The following models are displayed as odds ratio dot plots – odds ratios and confidence intervals for these models can be found in Appendix A. Figure 19 examines the predictors of general assistance across income quintiles. As mothers age at first birth increases, the odds of general assistance EIA usage decreases in all income quintiles. Increased birth weight reduced the odds of using EIA in early adulthood for those living in the highest income neighborhoods. Being male increased the odds of using EIA in early adulthood for all individuals other than those living in the most affluent neighborhoods at age 18. Birth weight All other predictors increased the odds of general assistance usage across all income quintiles; however the odds ratios differ between income quintiles. Being born in to an unmarried mother and moving in childhood and adolescence increased the odds of general assistance EIA usage the most for those who lived in low income neighborhoods at age 18. Having major and minor mental health conditions in childhood and adolescence increased the odds of using general assistance EIA for those living in higher income neighborhoods at age 18.

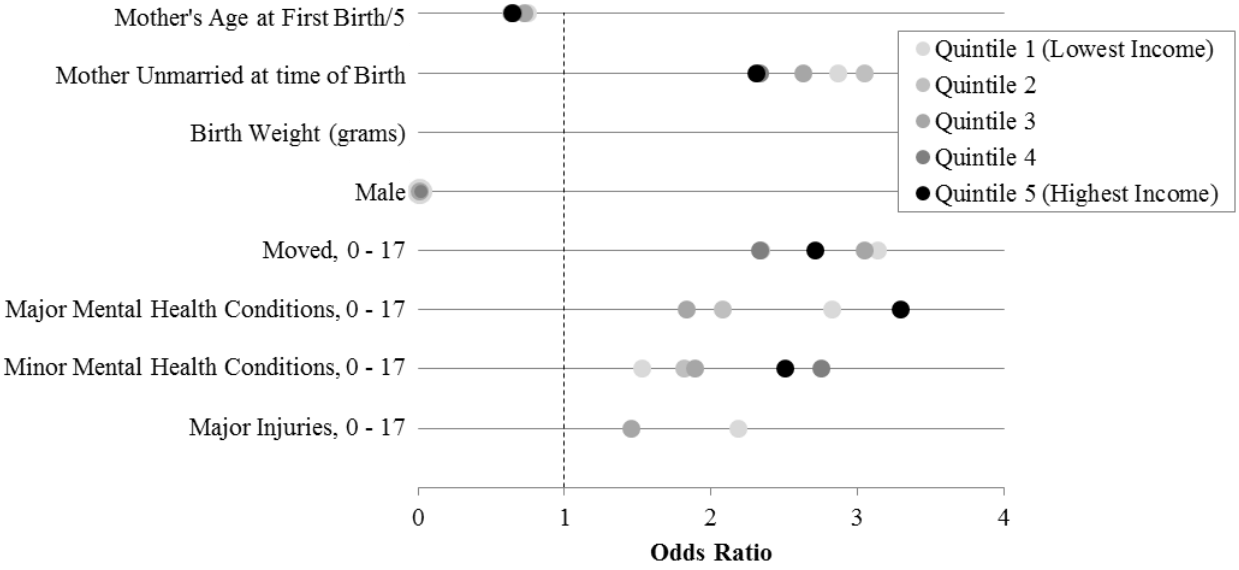
Figure 19 - General Assistance EIA Usage in Early Adulthood by income quintile at Age 18



*Note: All Odds Ratios presented are significant at $p < 0.05$

The second type of EIA is that due to single parenthood (Figure 20). As mother's age at first birth increased, the odds of EIA usage decreased for in all income quintiles. Being born to a mother who was unmarried or moving in childhood or adolescence increased the odds for all individuals; these odds are greater for those living in low income neighborhoods at age 18. In all income quintiles, being male decreased the odds very significantly. Major and minor health conditions in childhood and adolescence were all significant predictors of EIA usage due to single parenthood – the odds of each of these predictors was greatest for those who lived in high income neighborhoods at age 18. Major Injuries in childhood and adolescence was a significant predictor, but only for those who lived in income quintile 1 and 3.

Figure 20 - Single Parent EIA usage in Early Adulthood by income quintile at Age 18

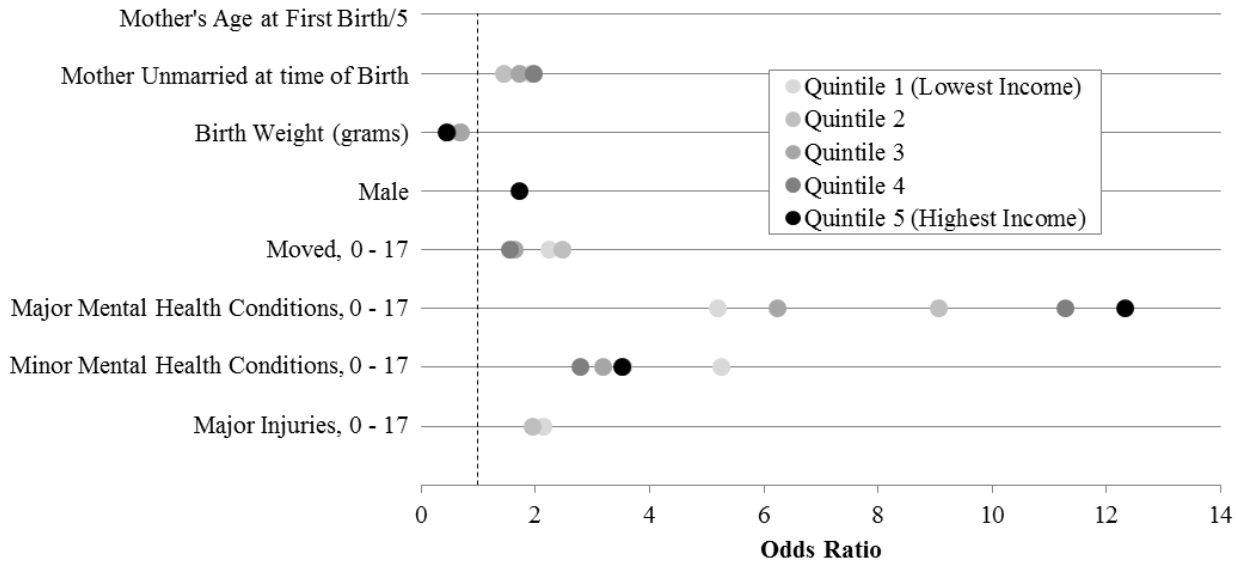


*Note: All Odds Ratios presented are significant at $p < 0.05$

The final type of EIA usage examined is that due to disability (Figure 21). Mother's age at first birth was not a significant predictor for any individuals. Mother's marital status at birth and major injuries were significant only for those living in lower income neighborhoods. The greatest odds of EIA usage due to disability are associated with mental health conditions – this is

particularly true for major mental health conditions; these odds were greatest for those living in high income neighborhoods at age 18.

Figure 21 - Disability EIA usage in Early Adulthood by income quintile at Age 18



*Note: All Odds Ratios presented are significant at $p < 0.05$

Fit Statistics

Table 15 displays the Brier Score (Accuracy) and C-Statistic (Discrimination Ability) of each of the five models for each EIA type discussed in this section. Each of the models has reasonable discrimination (>0.70) and accuracy (<0.20). The model with the best discrimination ability and accuracy is that for individuals receiving EIA due to being a single parent.

Table 15 - Fit Statistics for each EIA type by income quintile

Group	Income Quintile at Age 18	Brier Score Accuracy	C-Statistic Discrimination	Proportion Receiving EIA, 18 - 25
All		0.089	0.822	0.1286
General Assistance	1	0.186	0.777	39.47
	2	0.129	0.784	19.03
	3	0.081	0.816	10.83
	4	0.047	0.799	5.51
	5	0.025	0.751	2.72
Single Parent	1	0.126	0.896	40.3
	2	0.096	0.889	17.24
	3	0.066	0.892	9.57
	4	0.041	0.876	5.1
	5	0.023	0.882	2.64
Disability	1	0.149	0.817	29.58
	2	0.129	0.8	17.15
	3	0.095	0.756	12.58
	4	0.066	0.768	8.59
	5	0.055	0.796	7.32

Conclusion

Not only do the predictors differ across income quintiles for each EIA type, but the predictors that are significant have very different odds ratios. Individuals living in all income quintiles had increased odds of receiving EIA for general assistance and single parenthood as mother's age at first birth decreased and if they were born to unmarried mothers. This was not true for those receiving EIA for disability. Residential mobility had very different effects on individuals living in different income quintiles for the different types of EIA. In all cases, major mental illness increased the odds of receiving EIA more for those living in high income neighborhoods; the size of these odds were very different. Individuals living in the highest income neighborhoods with major mental health conditions had 3.6 times the odds of receiving general assistance EIA, 2.7 times the odds of receiving single parent EIA and 12.3 times the odds of receiving disability EIA. Having a major injury in childhood and adolescence increased the odds of receiving any type of EIA, but only for those in the lowest income neighborhoods. From

these analyses we see that individuals living in different neighborhoods have very different predictors of EIA usage; these differences are manifested in unique ways across the three types of EIA.

Sensitivity Testing

Sensitivity testing addressed possible issues of assumptions being violated and to determine the robustness of the models. A key assumption of logistic regression is that the each observation needs to be independent. As the data includes all individuals born in a specific time periods, more than one child can be included for each family. Siblings have many commonalities in environments and genetics; we wanted to determine whether these commonalities influenced the results of these data. To do this, we reduced our sample to include only one child per family, and ran several models (overall model, EIA type) (Appendix B). These results showed the odds ratios to remain very similar to those in our initial analysis, indicating that there was not a violation of the assumption of independence.

Secondly, individuals who lived in an urban setting on their 18^{th} birthday were selected to be included in the cohort. A second analysis was conducted on those living in an urban neighborhood at birth to determine whether there were significant differences in the findings (Appendix B). Models were created for the overall cohort as well as for the five income quintiles. Although the linear relationship between odds ratios and income quintiles is not quite as evident in the cohort with those living in an urban setting at age 18, the predictors remain very similar.

Previous research has shown a person's level of education to be a good indicator of EIA usage in later life. Education predictors (failure to graduate high school, the Grade 9

Achievement Index) were not included in the model for several reasons, including missing data which reduced the cohort significantly. Two sets of models were run that included education predictors. Both education predictors proved to be significant and increased the fit statistics for all models. Additional discussion on the limitations and outcomes of these models can be found in Appendix B.

Eighty percent of the cohort had major injuries at some point between birth and their 18th birthday. Given the aggregated nature of this predictor, specific injuries affected were examined to determine how they affected the outcome. Although several types of injuries were significant in predicting the outcome, the highest odds ratios were associated with poisonings and open wounds (Appendix B).

Cross validation and bootstrapping procedures were done for the overall model, the five income quintile models and the three EIA type models. The C-statistics of the cross validated models and bootstrapped standard errors were very similar to those of the initial results; the models are very robust. Additional information on these tests can be found in Appendix B.

Additional Analyses

Some argue that relative risks are more appropriate than odds ratios when events are common (incidence of 10% or more) (McNutt, Wu, Xue & Hafner, 2003); this is important when looking at models examining EIA usage in early adulthood for those living in the lowest two income quintiles at age 18. Relative risk can be modelled using either a log-binomial model or a modified Poisson model. Given convergence issues with the log-binomial model, relative risks were calculated using the modified Poisson approach using robust error variance as suggested by Zou (2004). In general, the odds ratios are greater than the risk ratios (as is expected); as the

outcome becomes more ‘rare’ (as in the higher income quintile models), the odds ratios and risk ratios become more similar. In most models, the variables that are significant do not differ between the logistic regression models and the modified Poisson models. (Appendix C).

Limitations

The limitations associated with this study are related to lack of data on possible confounding factors. Two factors have possible impacts on this study that we did not observe were whether individuals were involved with Child and Family Services (CFS) and whether individuals were living in social housing. Children and adolescents involved with CFS generally have greater levels of instability and toxic stress, both factors that play roles in the economic position of young adults (Siegel, Dobbins, Earls, Garner, McGuinn, Pascoe & Wood, 2012). Secondly, social housing is distributed across all income quintile neighborhoods in Winnipeg. This means that individual living in low income families within high income neighborhoods could be going on to receive EIA. Although there is no way to test whether the individuals living in high income neighborhoods are in fact from high income families, the characteristics of the families (mother’s age at first birth, mother’s marital status at birth) living in high income neighborhoods follow similar trends for those receiving EIA in young adulthood and those not receiving EIA in young adulthood. The Research Repository at MCHP has data available for both Social Housing and Child and Family Services, however, these data are a more recent acquisition. Future research on this matter, when these data become available for the required cohorts, would be of great interest.

Given that the individuals were born between 1979 and 1987, it is likely that there have been changes in diagnosis procedures and treatment of specific conditions since then. It is possible that the effects of health at birth may not be as strong today. This is a limitation of all

cohort studies that follow individuals for a long period of time. Additionally, we are relying on diagnosed conditions for the health predictors. This is a potential limitation as there are undiagnosed cases of mental illness, as well as misdiagnosed cases. This limitation exists for all studies using administrative data.

General Discussion and Conclusions

One of the most significant study findings is the increased odds of EIA usage for those living in high income neighborhoods at age 18 that had mental health conditions in childhood and adolescence. This was very evident in the first set of findings. The majority of those living in high income neighborhoods at age 18 went on to use EIA for disability in early adulthood; this would fit with findings showing lower levels of single parenthood and increased employment and educational opportunities in wealthy neighborhoods. Given that almost fifty percent of EIA cases in the wealthiest neighborhood were for disability purposes, and disability covers mental health conditions, this may be a contributing factor. The last question addressed the differences in predictors across EIA type and income quintile. Having childhood and adolescent mental health conditions increase the odds of using EIA more for those living in high income neighborhoods; this is particularly true for those going on to use EIA for disability. Although services are more easily accessed for those living in wealthy neighborhoods, individuals with mental health conditions in these neighborhoods are falling into extreme poverty upon entering adulthood. Further research is required to understand the root of these issues.

Studies on developmental trajectories of affluent children and parental investment theory may lend some insight into the mechanisms at work here. Children in affluent families are exposed to a more competitive environment, which can lead to increased levels of stress (Luthar, 2003). For individuals unable to cope with this stress, mental health conditions may arise (The

National Advisory Mental Health Council Workgroup on Child and Adolescent Mental Health Intervention Development and Deployment, 2001). A second explanation for the distress of affluent children is their increased levels of literal and emotional isolation from adults (Luthar & Latendresse, 2005).With parents investing more heavily in children seen as having a greater chance of success (both in monetary terms and in the amount of time and attention given to children), those who display emotional or behavioral issues in childhood and adolescences may have lower levels of investments, thus being at higher risk of requiring social services in adulthood (Shenk, 2011). The mechanisms by which individuals in high income neighborhoods with mental health conditions have greater risk of requiring EIA services is not clear and require further investigation. The differences in predictors across income quintiles suggest that in order to best address uptake of EIA in early adulthood, programs need to take into account the differences in characteristics and developmental trajectories of individuals in different neighborhoods.

Regardless of EIA type and income quintile, mental health conditions in childhood and adolescence are a significant predictor of early adult EIA usage. The Canadian Mental Health Association (2012) estimated that only one in four children and adolescents receive the mental health treatment that they need. Increased access and available of mental health services for children and adolescents could reduce the impact of mental illness on these individual's future, including the need to use social assistance in early adulthood. When examining mental illness, it is important to consider their differential effects on males and females. Although the prevalence of mental health conditions is similar for men and women, specific conditions are more prevalent for the different sexes. Women utilize mental health services more than men do (Salmon, Poole, Morrow, Greaves, Ingram & Pederson, 2006). Increased utilization of services can reduce the

impact of mental illness; given this difference, mental illness could be a stronger predictor of social assistance usage for males than females.

The Manitoba data suggest a template for risk prediction using administrative data. The use of routinely collected data has only recently been accepted as a means to generate risk prediction tools. They have been found to "generate more accurate, discriminating and useful predictions on health issues and strategies than have been available in the past (Maunel, Rosella, Hennessy, Sanmartin & Wilson, 2012)." Having linked data expands the number of predictors and outcomes beyond health data. Outcomes (like income assistance) are very important for social and economic reasons. Population prediction can improve the effectiveness and efficiency of prevention strategies by identifying optimal target groups and determining the required scale of a strategy to meet desired goals (Rosella, Manual, Burchill & Stukal, 2011). The continued development of risk prediction tools outside of health, such as social housing and involvement with the justice system, can lead to significant insight into the mechanisms involved in the uptake of these costly programs. Implementing programs which reduce the risk of using EIA not only reduces costs associated with health and social programs, but will also improve the quality of life for Canadians.

The predictive models in this study are not able to reduce uptake of EIA in Manitoba. However, they provide insight and allow us to think more clearly about the reasons why people end up in extreme poverty. They also bring with them a new set of questions and problems that if answered in the future, could contribute to reducing poverty in this setting. To further understand the risk factors of severe poverty in Manitoba, research to determine not only the time-varying predictors of EIA usage in early adulthood, but also the sensitive or critical periods of

development in which these predictors have the greatest impact should be explored. Methods in life course epidemiology have been developed to address this specific question. Of particular interest, again, is whether mental health conditions in childhood and adolescence have different critical periods of impact for individuals living in different income quintiles or accessing different types of EIA. The only limitation to doing this type of research currently is the need for a larger dataset. These models may change in a few years when additional predictors (such as educational indicators, child and family services, educational outcomes, social housing, and involvement with the justice system) can be incorporated and when the datasets are large enough to use life course methods.

Literature Cited

Aquilino, W. S. (1996). The life course of children born to unmarried mothers: Childhood living arrangements and young adult outcomes. Journal of Marriage and Family, 58(2): 293-310.

Bernard, A. (2013). Unemployment dynamics among Canada's youth. Statistics Canada (Catalogue no. 11-626-X). *Economic Insights*, *24*. Retrieved on Nov. 21, 2013 from http://www.statcan.gc.ca/pub/11-626-x/11-626-x2013024-eng.pdf

Black, S. E., Devereux, P. J. & Salvanes, K. (2007). From the cradle to the labor market? The effect of birth weight on adult outcomes. The Quarterly Journal of Economics, MIT Press, 122(1): 409-439.

Browning, M. & Crossley, T. F. (2001). The life-cycle model of consumption and savings. The Institute for Fiscal Studies (WP01/15). Retrieved on January 6, 2015 from http://www.ifs.org.uk/wps/wp0115.pdf

Canadian Mental Health Association. (2012). Mental illnesses in youth and children. Retrieved on March 18, 2015 from http://www.cmha.bc.ca/get-informed/mental-health-information/child-youth-md

Case, A., Fertig, A. & Paxson, C. (2005). The lasting impact of childhood health and circumstance. *J Health Econ*, 24(2):365-89.

Caspi, A., Wright, B. R. E., Moffitt, T. E., Silva, P. A. (1998). Early failure in the labor market: Childhood and adolescent predictors of unemployment in the transition to adulthood. *American Sociological Review, 63*(3), 424-451.

Centers for Disease Control and Prevention (CDC). (2012). Internaltional Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). Retrieved on November 13, 2014 from http://www.cdc.gov/nchs/icd/icd9cm.htm.

Citizens for Public Justice. (2014). The burden of poverty: A snapshot of poverty across Canada. Ottawa, ON: Citizens for Public Justice.

City of Toronto. (2002). Survey of people leaving Ontario Works: Key findings and implications. Retrieved on December 21, 2014 from http://www.toronto.ca/legdocs/2002/agendas/council/cc020618/cms6rpt/cl019.pdf

Currie, J., Stabile, M., Manivong. P., & Roos, L. L. (2010). Child health and young adult outcomes. *Journal of Human Resources, 45*(3), 517-48.

Department of Finance Canada. (2014). History of Health and Social Transfer. Retrieved on March 4, 2015 from http://www.fin.gc.ca/fedprov/his-eng.asp

Duncan, G. J., & Brooks-Gunn, J. (1997). Consequences of growing up poor. New York: Russell Sage Foundation.

Duncan, G. J., Ziol-Guest, K. M., & Kalil, A. (2010). Early-childhood poverty and adult attainment, behavior, and health. Child Development, 81(1), 306–325.

Gerds, T.A., Cai, T. & Schumacher, M. (2008). The performance of risk prediction models. *Biometrical Journal*, 50(4), 457-479.

Government of Canada. (2014). History of Health and Social Transfers. Retrieved on March 19, 2015 from http://www.fin.gc.ca/fedprov/his-eng.asp

Government of Manitoba. (2013). EIA Rate Review Fall 2013: A review of the total income available to Employment and Income Assistance Participants in Manitoba. Retrieved on January 20, 2015 from http://www.gov.mb.ca/jec/eia/pubs/eia_rate_rev.pdf

Government of Manitoba. (2013 (a)). *Employment and Income Assistance for the General Assistance Category.* Retrieved on November 6, 2014 from http://www.gov.mb.ca/jec/eia/pubs/eia_general.pdf

Government of Manitoba. (2013 (b)). *Employment and Income Assistance for Persons with Disabilities.* Retrieved on November 6, 2014 from http://www.gov.mb.ca/jec/eia/pubs/eia_disability.pdf

Government of Manitoba. (2013 (c)). *Employment and Income Assistance for Single Parents.* Retrieved on November 6, 2014 from http://www.gov.mb.ca/jec/eia/pubs/eia_single_parents.pdf

Green, K. C. (2004). *Assessing probabilistic forecasts about particular situations*. Business and Economic Forecasting Unit: Melbourne, Australia.

Hosmer, D. W., & Lemeshow, S. (2000). *Applied logistic regression (2nd Edition).* New York, NY: John Wiley & Sons

Houtrow, A. J., Larson, K., Olson, L. M., Newacheck, P. W. & Halfon, N. (2014). Changing trends of childhood disability, 2001 – 2011. *Pediatrics*, 134(3): 530-538.

Kenny, D.A., Kashy, D.A. & Cook, W. L. (2006). Dyadic Data Analysis. New York, NY: The Guilford Press.

Karsh, F. (2003). A comparison of Canadian and American welfare reforms and their effects on poverty after 1990. Retrieved on December 2, 2014 from http://economics.uwo.ca/undergraduate/wuer_docs/2003/4_Karsh.pdf

Kneebone, R & White, K. (2014). The rise and fall of social-assistance use in Canada, 1969-2012. *SPP Pesearch Papers*, 7(4): 1 – 19. Retrieved on December 24, 2014 form http://policyschool.ucalgary.ca/sites/default/files/research/kneebone-white-social-assistance.pdf

Ladouceur, M., Leslie, W. D., Dastani, Z., Goltzman, D., & Richards, J. B. (2010). An efficient paradigm for genetic epidemiology cohort creation. *PLoS.One,* 5(11), e14045.

Luthar, S. S. (2003). A culture of affluence: Psychological costs of material wealth. *Child Development*, 74(6): 1581-1593.

Luthar, S. S. & Latendresse, S. J. (2005). Children of the affluent. *Curr Dir Psychol Sci*, 14(1): 49-53

Manitoba Centre for Health Policy (MCHP). (2002). Concept: Income quintile ranking procedure. Retrieved on November 13, 2014 from http://mchp-appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1164

Manitoba Centre for Health Policy (MCHP). (2006). Concept: ICD-10 to ICD-9-CM Conversion. Retrieved on November 14, 2014 from http://appserv.cpe.umanitoba.ca/viewConcept.php?conceptID=1157#a_sas

Manitoba Centre for Health Policy (MCHP). (2014). Term: Grade 9 Achievement Index. Retrieved on January 8, 2014 from http://appserv.cpe.umanitoba.ca/viewDefinition.php?definitionID=104655

Manuel, D. G., Rosella, L. C., Hennessy, D., Sanmartin, C. & Wilson, K. (2012). Predictive risk algorithms in a population setting: an overview. *J Epidemiol Community Health*, 66: 859-865.

McNutt, L.A., Wu, C., Xue, X. & Hafner, J.P. (2003). Estimating the Relative Risk in Cohort Studies and Clinical Trials of Common Outcomes. *Am J Epidemiol*, 157(10):940-3.

Mental Health Foundation. (2005). Childhood and adolescent mental health: understandint the lifetime impacts. London, UK. Retrieved on December 22, 2014 from http://www.mentalhealth.org.uk/content/assets/PDF/publications/lifetime_impacts.pdf

National Institute for Health Care Management (NIHCM). (2006). Young People's Health Care: A National Imperative. Issue Paper. Washington DC.

Nichols, A., Mitchell, J. & Linder, S. (2013). Consequences of long term unemployment. The Urban Institute. Retrieved on December 23, 2014 from http://www.urban.org/uploadedpdf/412887-consequences-of-long-term-unemployment.pdf

Oreopoulos, P., Stabile, M., Walld, R., & Roos, L. L. (2008). Short, medium, and long term consequences of poor infant health: An analysis using siblings and twins. Journal of Human Resources, 43(1), 88-138.

Power, C., Kuh, D., & Morton, S. (2013). From developmental origins of adult disease to life course research on adult disease and aging: Insights from birth cohort studies. *Annual Review of Public Health, 34*, 7–28.

Reid RJ, Roos NP, MacWilliam L, Frohlich N, Black C. Assessing population health care need using a claims-based ACG morbidity measure: A validation analysis in the province of Manitoba. *Health Serv Res* 2002;37:1345-1364.

Roos, L. L., &. Nicol, J. P. (1999). A research registry: Uses, development, and accuracy. *Journal of Clinical Epidemiology*, 52(1), 39-47.

Roos, L. L., Gupta, S., Soodeen, R., & Jebamani. (2005). Data Quality in an Information-Rich Environment: Canada as an Example. *Canadian Journal on Aging/ La Revue canadienne du vieillissement, 24*, 153-170.

Rosella, L. C., Manuel, D. G., Burchill, C. & Stukel, T. A. (2011). A population-based risk algorithm for the development of diabetes: development and validation of the Diabetes Population Risk Tool (DPoRT). *J Epidemiol Community Health*, 65:613-620.

Salmon, A., Poole, N., Morrow, M., Greaves, L., Ingram, R.& Pederson, A. (2006). Improving Conditions: Integrating Sex and Gender into Federal Mental Health and Addictions Policy. Vancouver, B.C.: British Columbia Centre of Excellence for Women's Health.

Siegel, B. S., Dobbins, M. I., Earls, M. F., Garner, A. S., McGuinn, L., Pascoe, J. & Wood, D. L. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129(1): e232-e246

Shenk, M. K. (2011). Our children: Parental decisions – how much to invest in your offspring. In Frey, U. J. et al (eds) *Essential Building Blocks of Human Nature*. Berlin, Germany: Springer-Verlag.

Sainani, K.L. (2013). Bootstrapping and Cross Validation [Power Point]. Retrieved on Sept. 30, 2014 from web.stanford.edu/~kcobb/hrp261/lecture7.ppt

Smith, J. P. (2009). The impact of childhood health on adult labor market outcomes. Rev Econ Stat. 91(3): 478-489.

Statistics Canada. (2013). What has changed for young people in Canada (Catalogue no. 75-006 X). Retrieved on December 3, 2013 from http://www.statcan.gc.ca/pub/75-006-x/2013001/article/11847-eng.pdf

TD Economics. (2013). Special Report: Assessing the long term costs of youth unemployment. Retrieved on Nov. 21, 2013 from http://www.td.com/document/PDF/economics/special/ms0113_YouthUnemp.pdf

The Canadian Institute of Child Health. (2000). Low Birth Weight. In *The health of Canada's children: A CICH profile.* Ottawa, ON. Retrieved on December 22, 2014 from http://www.cich.ca/PDFFiles/ProfileFactSheets/English/LBWEng.pdf

The Johns Hopkins University. The Johns Hopkins ACG case-mix system (Version 9.0 Release Notes) [Computer software]. Baltimore, MD: The Johns Hopkins University Bloomberg School of Public Health & Development Centre. 2003.

The National Advisory Mental Health Council Workgroup on Child and Adolescent Mental Health Intervention Development and Deployment. (2001). *Blueprint for Change: Research on Child and Adolescent Mental Health*. Washington, D.C.

Tønnessen, M., Telle, K. & Syse, A. (2013). Childhood residential mobility and adult outcomes. Statistics Norway Research Department Discussion Paper No. 750. Retrieved on Dec. 5, 2014 from http://www.ssb.no/en/forskning/discussion-papers/_attachment/135790?_ts=140c922be00

Tweedle, A., Battle, K. & Torjman, S. (2013). Welfare in Canada 2012. Ottawa ON: Caledon Institute of Social Policy. Retrieved on December 2, 2014 from http://www.caledoninst.org/publications/pdf/1031eng.pdf

Vozoris, N. T. & Tarasuck, V.S. (2004). The health of Canadians on welfare. *CJPH,* 95(2): 115-120.

Weiner JP, Dobson A, Maxwell SL, Coleman K, Starfield B, Anderson GF. Risk-adjusted Medicare capitation rates using ambulatory and inpatient diagnoses. *Health Care Financ Rev* 1996;17:77-99.

Appendix A – Odds Ratio Tables

Table 16 - Odds Ratios of Predictors by income quintiles at Age 18

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	OR	95% CL	OR	95% CL	OR	95% CL	OR	95% CL	OR	95% CL
Mother's Age at First Birth / 5	0.772	(0.73,0.82)***	0.75	(0.7,0.8)***	0.803	(0.74,0.87)***	0.742	(0.68,0.81)***	0.727	(0.65,0.82)***
Mother Unmarried at Birth	2.321	(2.06,2.62)***	2.422	(2.11,2.78)***	2.457	(2.09,2.89)***	1.911	(1.55,2.36)***	1.645	(1.23,2.21)***
Birth Weight (kg)	0.967	(0.87,1.07)	0.92	(0.82,1.03)	0.875	(0.77,1)*	0.667	(0.58,0.77)***	0.742	(0.62,0.89)**
Male	0.386	(0.34,0.43)***	0.477	(0.42,0.54)***	0.547	(0.47,0.63)***	0.635	(0.54,0.75)***	0.696	(0.57,0.85)***
Moved, 0 - 17	2.969	(2.61,3.37)***	2.532	(2.21,2.9)***	2.614	(2.25,3.04)***	2.206	(1.86,2.62)***	1.953	(1.56,2.45)***
Major Mental Health Conditions, 0 - 17	2.794	(2.19,3.56)***	3.848	(2.98,4.97)***	3.423	(2.64,4.45)***	4.558	(3.47,5.99)***	7.37	(5.58,9.74)***
Minor Mental Health Conditions, 0 - 17	1.976	(1.76,2.22)***	2.06	(1.81,2.34)***	2.368	(2.04,2.75)***	2.839	(2.39,3.37)***	3.068	(2.46,3.82)***
Major Injury, 0 - 17	1.921	(1.61,2.29)***	1.429	(1.2,1.71)***	1.418	(1.15,1.75)**	1.285	(1.03,1.6)*	1.18	(0.9,1.54)

*** p < 0.001; ** p < 0.01; * p < 0.05

Table 17- Odds Ratios of Predictors for Different EIA Types

	General Assistance		Single Parent		Disability	
Independent Variables	OR	95% CL	OR	95% CL	OR	95% CL
Mother's Age at First Birth /5	0.672	(0.63,0.71)***	0.622	(0.59,0.66)***	0.979	(0.92,1.05)
Mother Unmarried at Birth	3.198	(2.86,3.58)***	3.697	(3.29,4.15)***	2.094	(1.8,2.44)***
Birth Weight (kg)	0.932	(0.85,1.02)	0.979	(0.89,1.08)	0.629	(0.57,0.7)***
Male	1.568	(1.41,1.75)***	0.011	(0.01,0.02)***	1.231	(1.08,1.4)**
Moved, 0 - 17	4.023	(3.6,4.5)***	3.409	(3.06,3.8)***	2.193	(1.91,2.52)***
Major Mental Health Conditions, 0 - 17	2.828	(2.29,3.5)***	2.18	(1.73,2.75)***	8.527	(7,10.38)***
Minor Mental Health Conditions, 0 - 17	2.065	(1.86,2.3)***	1.952	(1.76,2.17)***	3.487	(3.03,4.01)***
Major Injury, 0 - 17	1.489	(1.27,1.75)***	1.657	(1.44,1.91)***	1.478	(1.22,1.79)***

***p<0.01; ** p < 0.01; * p < 0.05

Table 18 - Odds Ratios of General Assistance EIA by income quintile at age 18

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL
Mother's Age at First Birth /5	0.74	(0.67,0.81)***	0.766	(0.68,0.86)***	0.719	(0.63,0.83)***	0.583	(0.49,0.69)***	0.623	(0.49,0.79)***
Mother Unmarried at Birth	2.151	(1.77,2.61)***	2.448	(1.96,3.06)***	2.823	(2.14,3.72)***	1.513	(1.04,2.19)*	1.727	(1,2.98)*
Birth Weight (kg)	1.01	(0.86,1.19)	1.067	(0.88,1.29)	0.972	(0.78,1.21)	0.731	(0.57,0.94)*	1.279	(0.89,1.84)
Male	1.612	(1.33,1.96)***	1.379	(1.11,1.71)**	1.656	(1.28,2.15)***	1.792	(1.33,2.41)***	0.932	(0.63,1.37)
Moved, 0 - 17	3.004	(2.43,3.71)***	3.051	(2.44,3.82)***	3.612	(2.77,4.71)***	2.749	(2.03,3.72)***	2.195	(1.45,3.33)***
Major Mental Health Conditions, 0 - 17	2.279	(1.56,3.32)***	2.219	(1.4,3.51)***	2.339	(1.38,3.95)**	2.866	(1.65,4.98)***	3.635	(1.91,6.94)***
Minor Mental Health Conditions, 0 - 17	1.824	(1.51,2.21)***	1.808	(1.46,2.23)***	2.605	(2.02,3.36)***	3.022	(2.23,4.1)***	2.826	(1.88,4.25)***
Major Injury, 0 - 17	1.611	(1.21,2.14)**	1.739	(1.26,2.4)***	1.799	(1.2,2.69)**	1.369	(0.9,2.07)	1.038	(0.63,1.71)

*** p < 0.001; ** p < 0.01; * p < 0.05

Table 19 - Odds Ratios of Single Parent EIA by income quintile at age 18

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL
Mother's Age at First Birth /5	0.748	(0.68,0.83)***	0.638	(0.57,0.72)***	0.722	(0.63,0.83)***	0.651	(0.55,0.77)***	0.644	(0.51,0.81)***
Mother Unmarried at Birth	2.873	(2.33,3.55)***	3.053	(2.42,3.85)***	2.632	(1.99,3.49)***	2.332	(1.64,3.31)***	2.312	(1.42,3.76)***
Birth Weight (kg)	1.024	(0.85,1.23)	1.004	(0.82,1.23)	0.945	(0.75,1.2)	0.941	(0.72,1.23)	0.995	(0.7,1.42)
Male	0.011	(0.01,0.02)***	0.011	(0.01,0.02)***	0.009	(0,0.02)***	0.019	(0.01,0.05)***	0.001	(<0.001,>999.999)
Moved, 0 - 17	3.144	(2.54,3.9)***	2.34	(1.87,2.92)***	3.05	(2.36,3.94)***	2.338	(1.74,3.14)***	2.711	(1.81,4.06)***
Major Mental Health Conditions, 0 - 17	2.825	(1.65,4.84)***	2.077	(1.27,3.4)**	1.836	(1.12,3.02)*	1.765	(0.98,3.17)	3.293	(1.73,6.25)***
Minor Mental Health Conditions, 0 - 17	1.529	(1.25,1.88)***	1.821	(1.47,2.26)***	1.89	(1.47,2.43)***	2.755	(2.06,3.68)***	2.51	(1.69,3.72)***
Major Injury, 0 - 17	2.188	(1.65,2.9)***	1.037	(0.79,1.36)	1.459	(1.05,2.04)*	1.161	(0.81,1.66)	1.317	(0.81,2.14)

*** p < 0.001; ** p < 0.01; * p < 0.05

Table 20 - Odds Ratios of Disability EIA by income quintile at Age 18

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL	Odds Ratio	95% CL
Mother's Age at First Birth /5	0.96	(0.84,1.1)	0.944	(0.82,1.09)	1.054	(0.92,1.21)	1.054	(0.9,1.23)	0.88	(0.73,1.06)
Mother Unmarried at Birth	1.905	(1.41,2.58)***	1.453	(1.05,2.01)*	1.714	(1.22,2.42)**	1.983	(1.31,3.01)**	1.173	(0.66,2.08)
Birth Weight (kg)	0.686	(0.54,0.87)**	0.673	(0.54,0.85)***	0.697	(0.55,0.88)**	0.469	(0.36,0.6)***	0.453	(0.34,0.6)***
Male	0.817	(0.61,1.09)	1.296	(0.97,1.73)	1.161	(0.88,1.54)	1.228	(0.91,1.66)	1.721	(1.23,2.41)**
Moved, 0 - 17	2.252	(1.65,3.07)***	2.473	(1.82,3.36)***	1.636	(1.21,2.22)**	1.56	(1.11,2.2)*	1.221	(0.81,1.83)
Major Mental Health Conditions, 0 - 17	5.2	(3.23,8.37)***	9.073	(5.68,14.49)***	6.242	(4.07,9.58)***	11.273	(7.16,17.75)***	12.33	(8.06,18.85)***
Minor Mental Health Conditions, 0 - 17	5.266	(3.87,7.16)***	3.543	(2.6,4.82)***	3.178	(2.33,4.33)***	2.787	(2.03,3.83)***	3.513	(2.43,5.07)***
Major Injury, 0 - 17	2.131	(1.31,3.46)**	1.96	(1.25,3.08)**	1.065	(0.72,1.57)	1.183	(0.79,1.77)	1.182	(0.76,1.84)

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Appendix B – Sensitivity Testing

One Child per Family

An assumption of logistic regression is independence among individuals. Given that our sample has some sibling, this assumption could be violated. A subsample of individual was selected which contained only one child per family (n = 39 255). Table 21 shows the number of individuals in each income quintile and EIA type for this subsample.

Table 21 - Number of Individuals in Income Quintiles and EIA Type for Full Cohort and One Child per Family

Model	Full Cohort	One Child Per Family
Overall	47589	39255
Income Quintile 1	6697	5650
Income Quintile 2	8075	6743
Income Quintile 3	9310	7693
Income Quintile 4	11684	9563
Income Quintile 5	11823	9606
General Assistance	16690	15730
Single Parent	20384	18482
Disability	10515	10275

If the estimates and standard errors of these models are very similar to those in the full sample, then there are no issues of independence. Table 22-24 show the standard errors (SE) and the associated p-value of each predictor of the overall model, the income quintile models and the EIA type models, respectively. Kenny, Kashy and Cook (2006) state that nonindependence does not bias the effect estimates, but rather the variance. These biased variances "likely affect the standard errors of test statistics (e.g., *t* and *F*), making tests of statistical significance, and their associated p values, biased (Kenny, Kashy & Cook, 2006, p.44)". Of the nine models that were tested for nonindependence, only one model had a single predictor that differed in significance between the 'one child per family' model than the 'full cohort' model (Quintile 3). This one case does not give enough evidence to suggest that the assumption of independence is violated.

Table 22 - Comparison of estimates and standard errors for Full Cohort and One Child per Family Cohort

	Full Cohort [a]	One Child per Family[b]
Independent Variables	SE	SE
Mother's Age at First Birth / 5	0.017***	0.018***
Mother Unmarried at Birth	0.034***	0.037***
Birth Weight (kg)	0.028***	0.031***
Male	0.032***	0.035***
Moved, 0 - 17	0.033***	0.036***
Major Mental Health Conditions, 0 - 17	0.059***	0.064***
Minor Mental Health Conditions, 0 - 17	0.032***	0.035***
Major Injury, 0 - 17	0.046***	0.050***

*** p < 0.001; ** p < 0.01; * p < 0.05

[a] N = 47 589; [b] N = 39 255

Table 23 – Estimates and Standard Errors for Full Cohort and One Child Per Family Cohort, by Income Quintile

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	Full Cohort	One Child Per Family	Full Cohort	One Child Per Family	Full Cohort	One Child Per Family	Full Cohort	One Child Per Family	Full Cohort	One Child Per Family
Mother's Age at First Birth / 5	0.03***	0.03***	0.03***	0.04***	0.04***	0.04***	0.05***	0.05***	0.06***	0.06***
Mother Unmarried at Birth	0.06***	0.07***	0.07***	0.07***	0.08***	0.09***	0.11***	0.11***	0.15***	0.16***
Birth Weight (kg)	0.05	0.06	0.06	0.06	0.07*	0.07	0.07***	0.08***	0.09**	0.1**
Male	0.06***	0.07***	0.07***	0.07***	0.07***	0.08***	0.08***	0.09***	0.1***	0.11***
Moved, 0 - 17	0.06***	0.07***	0.07***	0.07***	0.08***	0.08***	0.09***	0.1***	0.12***	0.12***
Major Mental Health Conditions, 0 - 17	0.12***	0.13***	0.13***	0.14***	0.13***	0.14***	0.14***	0.15***	0.14***	0.15***
Minor Mental Health Conditions, 0 - 17	0.06***	0.06***	0.07***	0.07***	0.08***	0.08***	0.09***	0.1***	0.11***	0.12***
Major Injury, 0 - 17	0.09***	0.1***	0.09***	0.1***	0.11**	0.12***	0.11*	0.12*	0.14	0.15

*** p < 0.0001; ** p < 0.01; * p < 0.05

[1]Full Cohort = 47 589; One Child per Family Cohort = 39 255

Table 24 – Estimate and Standard Errors for Full Cohort and One Child per Family, by EIA Type

	General Assistance		Single Parent		Disability	
Independent Variables	Full Cohort	One Child Per Family	Full Cohort	One Child Per Family	Full Cohort	One Child Per Family
Mother's Age at First Birth /5	0.03***	0.03***	0.03***	0.03***	0.03	0.04
Mother Unmarried at Birth	0.06***	0.06***	0.06***	0.06***	0.08***	0.08***
Birth Weight (kg)	0.05	0.05	0.05	0.05	0.05***	0.06***
Male	0.05***	0.06***	0.17***	0.18***	0.07**	0.07**
Moved, 0 - 17	0.06***	0.06***	0.06***	0.06***	0.07***	0.07***
Major Mental Health Conditions, 0 - 17	0.11***	0.11***	0.12***	0.12***	0.1***	0.1***
Minor Mental Health Conditions, 0 - 17	0.05***	0.06***	0.05***	0.06***	0.07***	0.07***
Major Injury, 0 - 17	0.08***	0.08***	0.07***	0.07***	0.1***	0.1***

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

[1] Full Cohort = 47 589; One Child per Family Cohort = 39 255

Income Quintile of Neighborhood at Birth

Of the 94,521 individuals in our cohort, 50,738 lived in an urban RHA at birth, 43,690 lived in a rural RHA at birth and the RHA of 93 individuals could not be determined. The 50,738 individuals who lived in an urban setting at birth were further divided into five income quintiles based on the postal code and municipal code at birth. Table 25 displays the distribution of individuals across income quintiles at birth by fiscal birth year – a total of 50,566 individuals have assigned income quintiles for their residence at birth.

Table 25 - Income Quintile at birth by fiscal birth year

Income Quintile	1979	1980	1981	1982	1983	1984	1985	1986	1987[a]	Total
1	1053	1066	1121	1139	1234	1289	1322	1371	953	10548
2	1057	1105	1099	1146	1201	1224	1268	1334	919	10353
3	1038	1041	1067	1098	1129	1158	1197	1211	863	9802
4	1183	1285	1273	1273	1299	1327	1376	1380	972	11368
5	931	925	877	856	938	1005	1071	1107	785	8495
Not Found	39	27	7	13	11	10	18	29	18	172

[a] partial fiscal year

Individuals with key missing data were also excluded - mother's age at first birth (n = 240), mother's marital status at birth (n = 962) and birth weight (n = 1,940). The few individuals receiving EIA as a 'special case' were also excluded from the analyses (n = 7). Accounting for overlapping exclusions, the final cohort consists of 48,284 individuals. The frequencies and means of the predictors are presented in Table 26.

Table 26 - Frequencies of binary variables and mean and standard deviation of continuous variables

Independent Variables	n
Received EIA, 18 - 25	5698
Average Mother's Age at First Birth (SD)	26.42(4.93)
Average Birth Weight (grams) (SD)	3411.46(546.54)
Mother Unmarried at time of Birth	8024
Male	24404
Moved, 0 - 17	13581
Major Mental Health Conditions, 0 – 17	1693
Minor Mental Health Conditions, 0 – 17	19537
Major Injuries, 0 - 17	38744

[1] N = 48 284

Figure 22 displays the percent of individuals living in each income quintile birth who received EIA between 18 and 25. Not surprisingly, a much greater percentage of individuals from lower income neighborhoods used EIA during early adulthood than those from higher income neighborhoods.

Figure 22 - Percent of Individuals in each Income Quintile who received EIA between 18 and 25, by income quintile at Birth

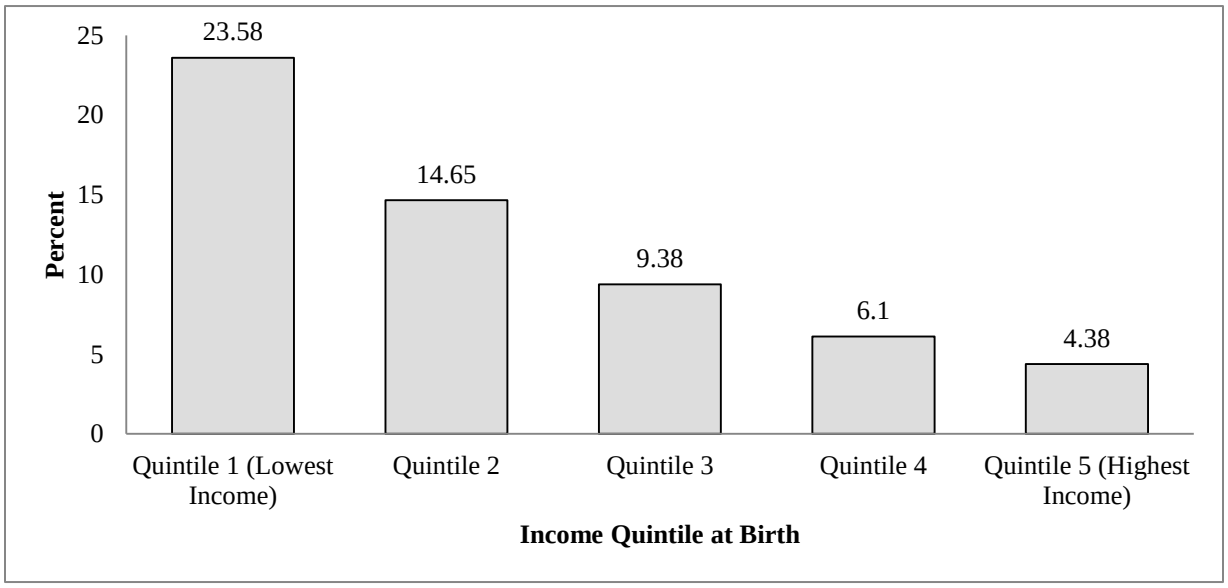


Table 27 displays the odds ratios and corresponding confidence intervals associated with each predictor. All predictors are significant at $p < 0.0001$. As mother's age at first birth increases and birth weight increases, the odds of receiving EIA in early adulthood decrease. Being male is a protective factor. Those born to unmarried mothers or had major or minor mental health conditions or major injuries in childhood or early adolescence had increased odds of receiving EIA in early adulthood. The greatest odds were associated with having a major mental health condition between birth and age 17.

Table 27 - Received EIA between 18 and 25 (odds ratios)

Independent Variables	OR	CI
Mother's Age at First Birth/5	0.732	(0.71,0.76)
Mother Unmarried at time of Birth	3.02	(2.82,3.23)
Birth Weight (kg)	0.819	(0.77,0.87)
Male	0.5	(0.47,0.53)
Moved, 0 - 18	3.155	(2.95,3.37)
Major Mental Health Conditions, 0 - 17	3.925	(3.49,4.42)
Minor Mental Health Conditions, 0 - 17	2.283	(2.14,2.43)
Major Injuries, 0 - 17	1.583	(1.45,1.73)

*Note: all predictors are significant at $p < 0.0001$

Separate logistic regression models explored these relationships for each income quintile (Table 28). Mental Health conditions (major and minor) in childhood and adolescence increased the odds of receiving EIA in early childhood much more for those living in a high income neighborhood at age 18. Major injuries in childhood and adolescence and being born to an unmarried mother increased the odds of EIA usage in early adulthood more for those living in low income neighborhoods at birth.

Table 28 – Odds Ratios of Predictors by Income Quintile at Birth

	Quintile 1 (Lowest Income)		Quintile 2		Quintile 3		Quintile 4		Quintile 5 (Highest Income)	
Independent Variables	Odds Ratio	95% Wald Confidence Limits	Odds Ratio	95% Wald Confidence Limits	Odds Ratio	95% Wald Confidence Limits	Odds Ratio	95% Wald Confidence Limits	Odds Ratio	95% Wald Confidence Limits
Mother's Age at First Birth / 5	0.789	(0.75,0.83)***	0.786	(0.74,0.84)***	0.744	(0.68,0.81)***	0.71	(0.64,0.78)***	0.803	(0.71,0.91)***
Mother Unmarried at Birth	2.721	(2.44,3.04)***	2.822	(2.47,3.23)***	2.236	(1.88,2.67)***	2.372	(1.9,2.96)***	1.476	(1.06,2.06)*
Birth Weight (kg)	0.891	(0.81,0.98)*	0.866	(0.77,0.97)*	0.75	(0.66,0.86)***	0.829	(0.71,0.97)*	0.678	(0.56,0.82)***
Male	0.421	(0.38,0.47)***	0.437	(0.38,0.5)***	0.589	(0.51,0.69)***	0.615	(0.52,0.73)***	0.828	(0.66,1.04)
Moved, 0 - 17	3.204	(2.85,3.6)***	2.642	(2.32,3.01)***	2.597	(2.22,3.04)***	2.586	(2.17,3.09)***	2.914	(2.28,3.72)***
Major Mental Health Conditions, 0 - 17	3.606	(2.86,4.55)***	3.827	(2.98,4.91)***	3.377	(2.59,4.4)***	4.984	(3.77,6.6)***	5.15	(3.71,7.15)***
Minor Mental Health Conditions, 0 - 17	1.936	(1.74,2.16)***	2.436	(2.14,2.77)***	2.601	(2.22,3.04)***	2.717	(2.28,3.25)***	2.79	(2.2,3.55)***
Major Injury, 0 - 17	1.768	(1.5,2.09)***	1.624	(1.35,1.95)***	1.394	(1.13,1.72)**	1.428	(1.14,1.8)**	1.206	(0.89,1.63)

*** p < 0.001; ** p < 0.01; * p < 0.05

Table 29 displays the Brier Score (Accuracy) and C-Statistic (Discrimination Ability) of each of the six models discussed in this section. Each of the models has reasonable discrimination (>0.75) and accuracy (<0.15). The model with the best discrimination ability is the one for which all individuals in this cohort were included; the model with the best accuracy examined the predictors of EIA usage in early adulthood by individuals living in the highest income quintile at birth. The results of these models are very similar to those found when looking at income quintile of the neighborhood an individual lived in at age 18. This adds to the robustness of the results.

Table 29 -Fit Statistics for Income Quintile at Birth

Income Quintile at Birth	Brier Score	C-Statistic	Proportion Receiving EIA, 18 - 25
All	0.084	0.815	0.118
1	0.139	0.807	0.236
2	0.102	0.798	0.147
3	0.075	0.78	0.094
4	0.052	0.777	0.061
5	0.039	0.766	0.044

Education Predictors

There are several reasons for not including an indicator of high school graduation in the model. First, data issues with the first few years of the cohort reduce the sample size. Second, an individual can graduate on time (within 4 years of entering grade 9) and graduate after turning 18. This means there are people who could be receiving EIA while still in school (predictor occurs after outcome). Given that this is very unlikely, an analysis was done on the reduced sample of individuals who had graduation information (n = 33 516) to determine how the fit of the model was affected. Missing values on high school graduation were distributed evenly across income quintiles (approximately 30 percent in each quintile). The models show failure to graduate high school is a very significant predictor of EIA usage in early adulthood, with higher odds for those living in high income neighborhoods. The inclusion of high school graduation in the model reduces the size of the odds for the time-varying predictors and improves the fit statistics (Tables 30 - 32).

To satisfy the 'predictor before outcome' requirement, a second model was tested which used the educational index for grade 9. This index is "based on average marks in all classes and the number of credits earned during the grade 9 school year (MCHP, 2014)"; it is a continuous scaled logit variable ranging from -3.33 to 2.80 in our cohort. Individuals with higher values for this index have higher marks in grade 9 and those with lower values have lower marks. Unfortunately, the index is only available for those born in 1980 or later (n = 42 730). These models also show the education predictors to be important for the model and improved the fit of the models significantly (Tables 30, 31, 33).

In Tables 30 and 31, Model 1 is the original models presented in the paper, Model 2 includes all the predictors of Model 1, with the addition of the 'Failure to Graduate High School'

predictor and Model 3 includes all the predictors of Model 1 with the addition of the 'Grade 9 Achievement Index' predictor.

Table 30 - Fit Statistics for models with Education predictors

	Model 1		Model 2		Model 3	
Model	n	C-Statistic	n	C-Statistic	n	C-Statistic
Overall	47589	0.822	33516	0.875	42730	0.884
Income Quintile 1	6697	0.794	4649	0.83	6014	0.833
Income Quintile 2	8075	0.783	5765	0.835	7294	0.845
Income Quintile 3	9310	0.781	6519	0.845	8314	0.862
Income Quintile 4	11684	0.77	8235	0.833	10516	0.852
Income Quintile 5	11823	0.766	8348	0.852	10592	0.851
General Assistance	16690	0.835	11867	0.89	15110	0.887
Single Parent	20384	0.913	14246	0.939	18138	0.947
Disability	10515	0.8	7403	0.842	9477	0.864

Table 31 - Odds Ratios for the overall model

Independent Variables	Model 1[a]	Model 2[b]	Model 3[c]
Education Variable		7.131***	0.322***
Mother's Age at First Birth / 5	0.714***	0.798***	0.807***
Mother Unmarried at Birth	3.098***	2.384***	2.317***
Birth Weight (kg)	0.855***	0.899**	0.902***
Male	0.498***	0.345***	0.35***
Moved, 0 - 17	3.189***	2.615***	2.538***
Major Mental Health Conditions, 0 - 17	4.021***	3.029***	3.274***
Minor Mental Health Conditions, 0 - 17	2.217***	1.813***	1.879***
Major Injury, 0 - 17	1.543***	1.32***	1.447***

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

[a] N = 47 589; [b] N = 33 516; [c] N = 42 730

Table 32 - Odds Ratio for Income Quintile Models including the High School Graduation predictor

Independent Variables	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Failure to Graduate High School	4.344***	5.326***	6.549***	7.215***	9.217***
Mother's Age at First Birth / 5	0.848***	0.765***	0.893*	0.828**	0.856*
Mother Unmarried at Birth	2.108***	2.088***	2.046***	1.444**	1.474*
Birth Weight (kg)	0.97	0.945	0.998	0.655***	0.822
Male	0.294***	0.342***	0.37***	0.456***	0.485***
Moved, 0 - 17	2.435***	2.064***	2.372***	2.147***	1.82***
Major Mental Health Conditions, 0 - 17	2.611***	3.168***	2.397***	3.584***	4.723***
Minor Mental Health Conditions, 0 - 17	1.732***	1.664***	1.929***	2.148***	2.475***
Major Injury, 0 - 17	1.62***	1.307*	1.391*	1.044	0.892

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 33 -Odds Ratio for Income Quintile Models including the Grade 9 Achievement Index predictor

Independent Variables	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Grade 9 Achievement Index	0.447***	0.367***	0.305***	0.298***	0.353***
Mother's Age at First Birth / 5	0.831***	0.777***	0.908*	0.846**	0.821**
Mother Unmarried at Birth	1.987***	1.901***	2.056***	1.644***	1.4*
Birth Weight (kg)	0.957	0.948	0.921	0.741***	0.83
Male	0.315***	0.357***	0.368***	0.408***	0.463***
Moved, 0 - 17	2.478***	2.207***	2.236***	1.879***	1.658***
Major Mental Health Conditions, 0 - 17	2.468***	3.136***	2.863***	3.819***	5.737***
Minor Mental Health Conditions, 0 - 17	1.796***	1.784***	2.01***	2.214***	2.513***
Major Injury, 0 - 17	1.745***	1.297*	1.403**	1.274	1.229

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Major Injuries

Within the ICD-9-CM, injury and poisoning codes are found between 800 and 999. These codes were broken up into seven categories:

1) Fractures (800 – 829)

2) Dislocations (830 – 839)

3) Sprains and strains (840 – 848)

4) Open wounds (870 – 897)

5) Burns (940 – 949)

6) Poisoning (960 – 989)

7) Other Injuries (849 – 869; 898 – 939; 950 – 959; 990 – 999)

To determine how each of these specific injuries in childhood or adolescence affected early adult EIA usage, 'Major Injures, 0 – 17' was replaced with each of these specific conditions in the model including all individuals and all EIA types. Table 34 displays the odds ratio and p-value of the specific injury, and the c-statistic and brier score of the new model. Both poisonings and open wounds produced higher odds ratios than the aggregated and improved the fit of the model compared with the 'Major Injury, 0 – 17' variable in the models.

Table 34 - Odds Ratio for Specific Injuries

Injury	OR	p-value	C-Statistic	Brier Score	Proportion of Cohort with Injury
Major Injury, 0 - 17	1.543	<0.0001	0.822	0.089	0.803
Fracture, 0 - 17	1.224	<0.0001	0.821	0.089	0.264
Dislocation, 0 - 17	0.868	0.0424	0.821	0.089	0.059
Sprain or Strain, 0 - 17	1.039	0.2117	0.821	0.089	0.481
Open Wound, 0 - 17	1.634	<0.0001	0.824	0.089	0.286
Burn, 0 - 17	1.477	<0.0001	0.822	0.089	0.055
Poisoning, 0 - 17	3.058	<0.0001	0.825	0.088	0.035
Other Injury, 0 - 17	1.281	<0.0001	0.822	0.089	0.573

*N = 47 589

Cross Validation

To determine that our model is not over-fit, we used 10-fold cross validation. The following steps were used to cross validate our sample:

1. Randomly divide your data into 10 pieces, 1 through k.
2. Treat the 1st tenth of the data as the test dataset. Fit the model to the other nine-tenths of the data (which are now the training data).
3. Apply the model to the test data (e.g., for logistic regression, calculate predicted probabilities of the test observations).
4. Repeat this procedure for all 10 tenths of the data.
5. Calculate statistics of model accuracy and fit (e.g., ROC curves) from the test data only. (Sainani, 2013).

The c-statistic was calculated as the measure of fit. Table 35 shows the C-Statistics for the final model (as presented in the paper), as well as the c-statistics obtained after cross-validation. The fit statistics were not significantly different, indicating our models were robust.

Table 35 - C-Statistics and Confidence intervals of full model and cross-validated model

		Full Model		Cross Validated Model	
Model	n	C-Statistic	CI	C-Statistic	CI
Overall	47589	0.822	(0.816,0.828)	0.822	(0.816,0.827)
Income Quintile 1	6697	0.794	(0.784,0.805)	0.793	(0.782,0.803)
Income Quintile 2	8075	0.783	(0.771,0.796)	0.781	(0.768,0.794)
Income Quintile 3	9310	0.781	(0.766,0.796)	0.778	(0.763,0.794)
Income Quintile 4	11684	0.771	(0.721,0.789)	0.768	(0.750,0.787)
Income Quintile 5	11823	0.766	(0.741,0.790)	0.761	(0.737,0.786)
General Assistance	16690	0.835	(0.826,0.844)	0.834	(0.825,0.843)
Single Parent	20384	0.914	(0.908,0.918)	0.913	(0.908,0.918)
Disability	10515	0.8	(0.786,0.813)	0.798	(0.798,0.812)

Bootstrapping

As an additional test to determine the robustness of our results, bootstrapping was done to determine the standard errors associated with our estimates. Unrestricted random sampling with replacement was done at the individual level; each outcome was modelled 500 times with different randomly selected samples. Tables 36 and 37 compare the confidence intervals from the original models with the bootstrapped confidence intervals; results are very similar and the significant predictors remain the same between the two models.

Table 36 - Model and Bootstrapped Confidence Intervals, Overall Model and EIA Type Models

	Overall Model		General Assistance		Single Parent		Disability	
	Model Confidence Interval	Bootstrap Confidence Interval	Model Confidence Interval	Bootstrap Confidence Interval	Model Confidence Interval	Bootstrap Confidence Interval	Model Confidence Interval	Bootstrap Confidence Interval
Independent Variables								
Mother's Age at First Birth / 5	(0.69,0.74)	(0.69,0.74)	(0.63,0.71)	(0.63,0.72)	(0.59,0.66)	(0.58,0.66)	(0.92,1.05)	(0.91,1.05)
Mother Unmarried at Birth	(2.90,3.31)	(2.89,3.32)	(2.86,3.58)	(2.84,3.6)	(3.29,4.15)	(3.26,4.19)	(1.8,2.44)	(1.77,2.48)
Birth Weight (kg)	(0.81,0.90)	(0.81,0.91)	(0.85,1.02)	(0.84,1.03)	(0.89,1.08)	(0.89,1.08)	(0.57,0.7)	(0.56,0.71)
Male	(0.47,0.53)	(0.47,0.53)	(1.41,1.75)	(1.41,1.74)	(0.01,0.02)	(0.01,0.02)	(1.08,1.4)	(1.09,1.39)
Moved, 0 - 17	(2.99,3.40)	(2.99,3.4)	(3.6,4.5)	(3.58,4.52)	(3.06,3.8)	(3.06,3.8)	(1.91,2.52)	(1.9,2.54)
Major Mental Health Conditions, 0 - 17	(3.58,4.51)	(3.55,4.55)	(2.29,3.5)	(2.26,3.53)	(1.73,2.75)	(1.74,2.73)	(7,10.38)	(6.99,10.4)
Minor Mental Health Conditions, 0 - 17	(2.08,2.36)	(2.08,2.36)	(1.86,2.3)	(1.85,2.31)	(1.76,2.17)	(1.74,2.19)	(3.03,4.01)	(3.03,4.01)
Major Injury, 0 - 17	(1.41,1.69)	(1.41,1.69)	(1.27,1.75)	(1.27,1.74)	(1.44,1.91)	(1.44,1.9)	(1.22,1.79)	(1.22,1.79)

Table 37 - Model and Bootstrapped Confidence Intervals, Income Quintile Models

	Income Quintile 1		Income Quintile 2		Income Quintile 3		Income Quintile 4		Income Quintile 5	
	Model Confidence Interval	Bootstrap Confidence Interval	Model Confidence Interval	Bootstrap Confidence Interval	Model Confidence Interval	Bootstrap Confidence Interval	Model Confidence Interval	Bootstrap Confidence Interval	Model Confidence Interval	Bootstrap Confidence Interval
Independent Variables										
Mother's Age at First Birth / 5	(0.73,0.82)	(0.71,0.84)	(0.7,0.8)	(0.7,0.81)	(0.74,0.87)	(0.73,0.88)	(0.68,0.81)	(0.67,0.82)	(0.65,0.82)	(0.64,0.83)
Mother Unmarried at Birth	(2.06,2.62)	(2.11,2.56)	(2.11,2.78)	(2.11,2.78)	(2.09,2.89)	(2.06,2.92)	(1.55,2.36)	(1.54,2.37)	(1.23,2.21)	(1.21,2.23)
Birth Weight (kg)	(0.87,1.07)	(0.86,1.09)	(0.82,1.03)	(0.82,1.03)	(0.77,1)	(0.76,1.01)	(0.58,0.77)	(0.57,0.78)	(0.62,0.89)	(0.61,0.91)
Male	(0.34,0.43)	(0.34,0.44)	(0.42,0.54)	(0.42,0.54)	(0.47,0.63)	(0.47,0.64)	(0.54,0.75)	(0.54,0.75)	(0.57,0.85)	(0.57,0.85)
Moved, 0 - 17	(2.61,3.37)	(2.6,3.38)	(2.21,2.9)	(2.22,2.89)	(2.25,3.04)	(2.23,3.07)	(1.86,2.62)	(1.85,2.62)	(1.56,2.45)	(1.57,2.43)
Major Mental Health Conditions, 0 - 17	(2.19,3.56)	(2.24,3.49)	(2.98,4.97)	(2.94,5.03)	(2.64,4.45)	(2.56,4.58)	(3.47,5.99)	(3.4,6.1)	(5.58,9.74)	(5.63,9.65)
Minor Mental Health Conditions, 0 - 17	(1.76,2.22)	(1.79,2.19)	(1.81,2.34)	(1.8,2.36)	(2.04,2.75)	(2.02,2.78)	(2.39,3.37)	(2.41,3.35)	(2.46,3.82)	(2.46,3.83)
Major Injury, 0 - 17	(1.61,2.29)	(1.54,2.39)	(1.2,1.71)	(1.18,1.74)	(1.15,1.75)	(1.15,1.75)	(1.03,1.6)	(1.03,1.6)	(0.9,1.54)	(0.91,1.53)

Appendix C - Relative Risk

To estimate relative risk and confidence intervals for the EIA models, a modified Poisson with robust error variance approach was used (Zou, 2003). Tables 38 – 43 display the RR compared with the OR found in the logistic regression analysis. These tables show that in general, the odds ratios are greater than the risk ratios (as is expected); as the outcome becomes more 'rare' (as in the higher income quintile models), the odds ratios and risk ratios become more similar. In most models, the variables that are significant do not differ between the logistic regression models and the modified Poisson models.

Table 38 - Relative Risk and Odds Ratio Comparison, Overall Model

Independent Variables	OR	RR
Mother's Age at First Birth	0.714***	0.789***
Mother's Marital Status	3.098***	2.126***
Birth Weight	0.855***	0.901***
Male	0.498***	0.614***
Moved, 0 - 17	3.189***	2.483***
Major Mental Health Conditions, 0 - 17	4.021***	2.061***
Minor Mental Health Conditions, 0 - 17	2.217***	1.818***
Major Injuries, 0 - 17	1.543***	1.388***

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 39 - Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	OR	RR	OR	RR	OR	RR	OR	RR	OR	RR
Mother's Age at First Birth / 5	0.77***	0.87***	0.75***	0.82***	0.80***	0.84***	0.74***	0.78***	0.73***	0.75***
Mother Unmarried at Birth	2.32***	1.15***	2.42***	1.80***	2.46***	1.93***	1.91***	1.67***	1.65***	1.51**
Birth Weight (kg)	0.97	0.99	0.92	0.95	0.88*	0.91	0.67***	0.71***	0.74**	0.77**
Male	0.39***	0.62***	0.48***	0.60***	0.55***	0.63***	0.66***	0.68***	0.70***	0.72***
Moved, 0 - 17	2.97***	1.93***	2.53***	2.01***	2.61***	2.19***	2.21***	1.98***	1.95***	1.8***
Major Mental Health Conditions, 0 - 17	2.79***	1.4***	3.85***	1.99***	3.42***	2.13***	4.56***	3.09***	7.37***	5.25***
Minor Mental Health Conditions, 0 - 17	1.98***	1.41***	2.06***	1.70***	2.37***	2.06***	2.84***	2.59***	3.07***	2.91***
Major Injury, 0 - 17	1.92***	1.47***	1.43***	1.30***	1.42**	1.32**	1.29*	1.25**	1.18	1.16

*** p < 0.001; ** p < 0.01; * p < 0.05

Table 40 - Relative Risk and Odds Ratio Comparison, by EIA Type

	General Assistance		Single Parent		Disability	
Independent Variables	OR	RR	OR	RR	OR	RR
Mother's Age at First Birth /5	0.672***	0.755***	0.622***	0.753***	0.979	0.989
Mother Unmarried at Birth	3.198***	2.164***	3.697***	2.025***	2.094***	1.584***
Birth Weight (kg)	0.932	0.947	0.979	0.988	0.629***	0.745***
Male	1.568***	1.364***	0.011***	0.021***	1.231**	1.167***
Moved, 0 - 17	4.023***	3.103***	3.409***	2.312***	2.193***	1.739***
Major Mental Health Conditions, 0 - 17	2.828***	1.734***	2.18***	1.394***	8.527***	3.228***
Minor Mental Health Conditions, 0 - 17	2.065***	1.686***	1.952***	1.482***	3.487***	2.931***
Major Injury, 0 - 17	1.489***	1.375***	1.657***	1.393***	1.478***	1.34***

*** p < 0.001; ** p < 0.01; * p < 0.05

Table 41 - Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18 for those using General Assistance EIA

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	OR	RR	OR	RR	OR	RR	OR	RR	OR	RR
Mother's Age at First Birth /5	0.74***	0.865***	0.766***	0.825***	0.719***	0.809***	0.583***	0.613***	0.623***	0.643***
Mother Unmarried at Birth	2.151***	1.476***	2.448***	2.001***	2.823***	2.114***	1.513*	1.428*	1.727*	1.723*
Birth Weight (kg)	1.01	0.995	1.067	1.025	0.972	0.925	0.731*	0.762*	1.279	1.249
Male	1.612***	1.267***	1.379**	1.264**	1.656***	1.52***	1.792***	1.697***	0.932	0.993
Moved, 0 - 17	3.004***	2.081***	3.051***	2.391***	3.612***	3.27***	2.749***	2.287***	2.195***	2.127***
Major Mental Health Conditions, 0 - 17	2.279***	1.453***	2.219***	1.569***	2.339**	1.561**	2.866***	2.313***	3.635***	3.136***
Minor Mental Health Conditions, 0 - 17	1.824***	1.338***	1.808***	1.488***	2.605***	1.994***	3.022***	2.868***	2.826***	2.721***
Major Injury, 0 - 17	1.611**	1.396***	1.739***	1.354*	1.799**	1.591**	1.369	1.213	1.038	0.968

*** p < 0.001; ** p < 0.01; * p < 0.05

Table 42 - Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18 for those using Disability EIA

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	OR	RR	OR	RR	OR	RR	OR	RR	OR	RR
Mother's Age at First Birth /5	0.96	0.983	0.944	0.983	1.054	1.095	1.054	1.073	0.88	0.88
Mother Unmarried at Birth	1.905***	1.285**	1.453*	1.405**	1.714**	1.593***	1.983**	1.57**	1.173	0.967
Birth Weight (kg)	0.686**	0.883*	0.673***	0.794**	0.697**	0.77**	0.469***	0.601***	0.453***	0.635***
Male	0.817	1.025	1.296	1.234*	1.161	1.146	1.228	1.156	1.721**	1.429**
Moved, 0 - 17	2.252***	1.632***	2.473***	1.729***	1.636**	1.411**	1.56*	1.524**	1.221	1.159
Major Mental Health Conditions, 0 - 17	5.2***	1.685***	9.073***	2.996***	6.242***	3.478***	11.273***	4.829***	12.33***	6.257***
Minor Mental Health Conditions, 0 - 17	5.266***	3.114***	3.543***	2.847***	3.178***	2.769***	2.787***	2.294***	3.513***	3.208***
Major Injury, 0 - 17	2.131**	1.829***	1.96***	1.621**	1.065	1.032	1.183	1.237	1.182	1.047

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 43 -Relative Risk and Odds Ratio Comparison, by Income Quintile at age 18 for those using Single Parent EIA

	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Independent Variables	OR	RR	OR	RR	OR	RR	OR	RR	OR	RR
Mother's Age at First Birth /5	0.748***	0.885***	0.638***	0.756***	0.722***	0.766***	0.651***	0.726***	0.644***	0.666***
Mother Unmarried at Birth	2.873***	1.451***	3.053***	1.644***	2.632***	1.797***	2.332***	1.721***	2.312***	1.73*
Birth Weight (kg)	1.024	1.017	1.004	0.979	0.945	1.002	0.941	0.922	0.995	0.992
Male	0.011***	0.036***	0.011***	0.02***	0.009***	0.013***	0.019***	0.023***	0.001	0
Moved, 0 - 17	3.144***	1.65***	2.34***	1.688***	3.05***	2.122***	2.338***	2.181***	2.711***	2.291***
Major Mental Health Conditions, 0 - 17	2.825***	1.159**	2.077**	1.408**	1.836*	1.572**	1.765	1.49*	3.293***	2.315**
Minor Mental Health Conditions, 0 - 17	1.529***	1.183***	1.821***	1.425***	1.89***	1.575***	2.755***	2.37***	2.51***	2.545***
Major Injury, 0 - 17	2.188***	1.404***	1.037	1.185	1.459*	1.412*	1.161	1.25	1.317	1.435

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$