

The Alberta
Adverse Childhood Experiences Survey

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Report Prepared by:

Dr. Sheila McDonald, PhD

(Co-Investigator)

Senior Research Associate, Department of Paediatrics, University of Calgary

Child Development Centre

Suite 200, 3820 24th Ave NW

Calgary, Alberta T3B 2X9

Phone: (403) 955-7472 Fax: (403) 955-5979

Email: sheilaw.mcdonald@albertahealthservices.ca

Dr. Suzanne Tough, PhD

(Principal Investigator)

Professor, Departments of Paediatrics and Community Health Sciences, University of Calgary

Child Development Centre

Suite 200, 3820 24th Ave NW

Calgary, Alberta T3B 2X9

Phone: (403) 955-2272 Fax: (403) 955-5979

suzanne.tough@albertahealthservices.ca

Questions about this research can be directed to
Sheila McDonald at the contact information provided above.

Requests for copies of this report can be directed to

ACFCR thanson@research4children.com

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Lay Summary

The issue: Evidence indicates that children who suffer trauma, such as abuse, neglect, living in a home where there is violence, or having a parent who is mentally ill have twice the risk of conditions like obesity, cardiovascular disease, addiction, and depression as adults. Between 1994 and 1998 in collaboration with the Centres for Disease Control and Prevention, Kaiser Permanente, one of the largest health maintenance organizations (HMOs) in the United States, surveyed 17,000 of its clients about childhood trauma. In this study, they documented a shocking statistic: 58% of educated, employed, middle-class Americans had experienced significant child trauma. In this study the lead researchers developed the Adverse Childhood Experiences (ACE) checklist, which has been used in numerous studies to collect sensitive information on types of childhood trauma: physical abuse, sexual abuse, alcoholic or drug addict parent, family member in jail, battered mother, parent with mental illness, loss of a parent, physical neglect, emotional neglect, or verbal/emotional abuse. These studies have consistently found an association between ACEs and adult chronic disease.

The causal pathway: ACE Study Director Vincent Felitti MD says “...time does not heal all wounds, since humans convert traumatic emotional experiences in childhood into organic disease later in life.” Brain research helps us understand this relationship: the toxic stress from trauma in childhood damages the developing brain. Exposure to trauma influences the stress response and coping strategies leading to health and social problems in adulthood.

The current study: To date, there has been no research done in Alberta on ACEs and there is limited Canadian data. In 2013, the Alberta Adverse Childhood Experiences Study, a telephone survey of 1200 Albertan adults, was launched. The ACE checklist was modified to be appropriate for interviewing people about sensitive issues over the telephone. Eight questions were asked about two main areas of childhood trauma: childhood abuse and growing up in a household where there was family dysfunction. Like other studies, results from the Alberta ACE study demonstrated that ACEs were common and there were strong associations between childhood trauma and increased risk for poor health outcomes in adulthood.

Key Results:

- Before the age of 18, 27.2% experienced abuse and 49.1% experienced family dysfunction.
- ACEs rarely occur in isolation. Having one ACE increases the probability of experiencing another one by 84%.
- Children who experienced more ACEs were more likely to be *diagnosed* with mental health conditions or substance dependence in adulthood.
- Children who experienced more ACEs were more likely to *perceive* their physical health, emotional health, and social support as poor.
- The association between ACEs and poor health remained strong even when other risk factors for poor adult health outcomes, such as poverty, were taken into consideration.
- Children who experienced *both* abuse and family dysfunction had the highest risk for negative health outcomes in adulthood.

- Almost 50% of the risk for poor adult health outcomes could be attributed to ACEs.

Implications of the findings: We need to focus on prevention of ACEs and recovery from ACEs to decrease the risk for poor outcomes. **Specifically:**

1. Prevent the exposure to ACEs in families with young children. Prevention strategies include effective programs and interventions to stop child exposure to toxic stress such as home visitation programs¹, and delivery of evidence-based parenting interventions such as Healthy Start initiatives². A commitment to social change is also needed to foster safe environments that support nurturing and stable relationships for children and families.
2. Support children and their families who are exposed to adverse childhood events. Building strong supportive relationships and environments promotes the foundations of healthy development necessary to produce positive health outcomes for vulnerable children. We can mitigate the consequences of ACEs in families with parent support interventions aimed at improving the parent child relationship and building resilience among at-risk children. Many of these interventions address parenting skills training and social support. Other interventions for children exposed to trauma to prevent or treat traumatic stress symptoms include cognitive behaviour therapy, trauma-focused cognitive behavioural therapy, and child-parent psychotherapy.
3. Among adults who were exposed to ACEs, we can address lifestyle risk factors such as smoking, poor nutrition, and poor coping strategies to prevent the development of chronic disease and mental health problems. In addition we can address the experience of trauma using effective psychological interventions such as psychotherapy and cognitive behavioural therapy. Among adults who were exposed to ACEs, we can also tailor approaches to chronic disease management and mental health/addiction treatments that may involve psychological interventions to address child trauma.
4. Help health care providers understand the connections between ACEs and health and social issues to identify people exposed to ACEs and intervene to prevent the conversion of trauma in childhood into poor health outcomes later in life.

¹ Examples of trauma and abuse prevention programs include Nurse-Family Partnership, Nurturing Parenting, and Positive Discipline Program

² Examples include Hawaii Health Start, Sure Start, Healthy Beginnings

Executive Summary

The 2013 Alberta Survey is an annual telephone survey of Albertan adults designed to answer research questions and provide baseline information on a number of Alberta relevant topics and issues. In 2013, questions about adverse childhood experiences were administered as part of the annual survey. In total, 1207 completed interviews were conducted (20.9% response rate) with 612 females and 595 males. Eight questions about adverse childhood experiences (ACEs) were derived from the original ACE questionnaire administered through Kaiser Permanente. Questions were modified to reflect the Alberta, Canada environment, the emerging literature on child development, and to be acceptable for a telephone survey. Question modifications included deleting a question about having a parent incarcerated, and adding a question on living with a household member with a chronic medical condition. Questions were pilot tested. Three questions covered abuse, and the remaining five focused on aspects of household risk that can increase dysfunction. Before the age of 18, almost a third of participants (27.2%) experienced at least one type of abuse, and nearly half experienced at least one form of household dysfunction (49.1%). Just under half reported zero ACEs (44.2%), 35.7% reported 1-2 ACEs, and 20.0% reported 3 or more ACEs. ACEs were highly interrelated and were associated with female gender, low household income, single marital status, Canadian born, and younger age. There was a graded relationship between number of ACEs and poor psychosocial and physical health ratings, as well as diagnosed mental and physical health conditions, including substance dependence in adulthood. A more comprehensive approach to conceptualizing ACEs that combined specific domains and number of ACEs showed that the profile that conferred the greatest risk for poor adult health outcomes included ACEs in both the abuse and household dysfunction domain. Population attributable fractions for one or more ACE suggest a large population impact on adult health outcomes if ACEs are addressed, with implications for preventive and early intervention approaches. The new pilot household dysfunction ACE (living with a household member with a chronic physical illness or disability) in the Alberta survey provided additional information not captured by other surveys that measure ACEs.

Highlighted Results

Participant characteristics

The 2013 Alberta Survey is an annual telephone survey of Albertan adults designed to answer research questions and provide baseline information on a number of Alberta relevant topics and issues. In 2013, the survey included questions about adverse childhood experiences was administered as part of the annual survey. The response rate was 20.9%. In total, 1207 completed interviews were conducted with 612 females and 595 males. Approximately two-thirds lived in urban regions. Participants were most commonly 45-64 years of age (44.5%), with 16.0% being in childbearing years (18-34 years). The majority were married or living common-law (65.8%), had completed post-secondary education (78.2%), and were Caucasian (86.2%). Over half were employed either full-time or part-time (55.7%). Almost three-quarters of households had no children in the household (70.8%) and most reported either one or two adults in the household (78.0%). Approximately 80% were born in Canada, and just over half were born in Alberta (56.7%). Religious affiliation was commonly identified as either Protestant or Catholic (49.5%).

ACEs

Eight questions were asked on adverse childhood experiences (ACEs), derived from the original ACE survey by Kaiser Permanente. Questions were modified to reflect the local context, the recent literature on child development, and a telephone survey methodology. Three questions covered abuse, and the remaining five focused on aspects of the household that increase the risk for dysfunction. Questions on physical, sexual, and emotional abuse were asked, as were items on growing up in a household where there was mental illness, substance dependence, domestic violence, chronic physical illness, and parental separation.

Ninety-seven percent (n=1169) answered all eight ACE questions.

Before the age of 18, almost a third of participants (27.2%) experienced at least one type of abuse, and nearly half experienced at least one form of household dysfunction (49.1%). Prevalences of individual ACEs ranged from a low of 11% for physical abuse to a high of 20% for either household substance abuse or mental illness in household. Just under half reported zero ACEs (44.2%), 35.7% reported 1-2 ACEs, and 20.0% reported 3 or more ACEs.

Among those with just one ACE, the top 3 ACEs were chronic physical illness in household (28.4%), parental separation or divorce (18.4%), and mental illness in household (14.8%). Among adults reporting more than one ACE, combinations most likely involved household dysfunction, such as growing up in a household with substance dependence and/or mental illness.

ACEs were highly interrelated. The median probability of exposure to any additional ACE given having experienced the first was 84.0%. For any 2 and 3 additional ACEs, the median probability was 64.2% and 44.1%, respectively.

ACEs and sociodemographic subgroups

Female adults, those who reported low household incomes, and those who were not married or living in a common-law relationship were more likely to have experienced *any abuse* before the age of 18.

Younger adults and those who were born in Canada were more likely to have experienced *any household dysfunction* before the age of 18.

Female adults, those reporting low household incomes, and those born in Canada were more likely to have experienced *a higher number* of ACEs.

ACES and adult health outcomes

In multivariable analyses, we examined the association between ACEs and the following adult health outcomes: 1) perceived physical health; 2) perceived emotional health; 3) perceived social support; 4) perceived optimism; 5) any diagnosed chronic physical health condition; 6) any diagnosed mental health condition or substance dependence. ACEs were operationalized in three ways: 1) any abuse; 2) any household dysfunction; 3) a cumulative ACE variable, categories for which included 0, 1-2, ≥ 3 ACEs.

ACEs were associated with all adult health outcomes, and associations remained robust when sociodemographic characteristics were taken into account. The strongest ACE effect, in terms of magnitude of the ACE odds ratio estimate in regression analysis, was seen when ACEs were operationalized as a three category variable, and for mental health outcomes. Compared to adults who experienced 0 ACEs, adults with 1-2 ACEs and ≥ 3 ACEs had a three and six-fold risk, respectively, of being diagnosed with a mental health condition or substance dependence, suggesting a dose response effect of number of ACEs with this adult health outcome.

Population attributable risk (PAR)

The estimated proportion of each adult health outcome that is attributable to having experienced at least one ACE was estimated from adjusted multivariable regression analysis. PARs for poor adult health outcomes ranged from 39.9% to 59.9%, orders of magnitude rarely seen in epidemiology and public health. This means that by addressing ACEs early in life, we can prevent a significant proportion of poor health outcomes later in life, ranging from poor perceived health ratings and diagnosed conditions.

Methodological issues

A number of different operationalizations of ACEs are seen in the literature; however, standard approaches are often crude and attribute equal weighting and influence to ACEs, which may oversimplify ACEs as a risk factor for adult health outcomes. We examined a more comprehensive conceptualization of ACEs that combined both a specific domain approach and a cumulative approach. A four category variable that operationalized four risk combinations was derived: low risk abuse & low risk household dysfunction; low risk abuse & high risk household dysfunction; high risk abuse & low risk household dysfunction; high risk abuse & high risk household dysfunction. Adjusting for sociodemographic characteristics, multivariable results showed that the profile of high risk in both

domains conferred the greatest risk for poor adult health outcomes. In terms of single domains, the profile of high risk (greater number of ACEs) in the abuse domain was a more consistent risk profile across adult health outcomes than the profile of high risk in the household dysfunction domain.

Validity testing of the new household dysfunction ACE related to living in a home with someone with a chronic physical illness or disability suggests that it is associated with poor adult health across a range of outcomes. When combined with other ACEs, it provides additional explanation about ACEs and increased risk for diagnosed conditions. Comparing nested models with and without the additional ACE showed that upon inclusion, it significantly improved the model for diagnosed conditions and perceived physical health but not perceived emotional health, social support, and optimism.

Summary

In Alberta, approximately 1/3 reported 1-2 ACEs and 1/5 reported 3 or more ACEs. The experience of household dysfunction was more common than the experience of abuse. Demographic subgroups that were more likely to report ACEs included females, adults with low household incomes, those who were younger, and those who were born in Canada. ACEs were highly interrelated.

Controlling for sociodemographic characteristics, ACEs were associated with poor psychosocial and physical health ratings, as well as diagnosed mental and physical health conditions, including substance dependence in adulthood. A comprehensive approach to ACEs that combines both specific domains and number of ACEs addresses the disadvantage of previous approaches, which may oversimplify the risk associated with ACEs. Results suggest that both number of ACEs and the specific domain interact to confer risk for poor adult health outcomes. The large population attributable risk fractions associated with at least one ACE have implications for preventive and early intervention approaches that would have large population impact. The new pilot household dysfunction ACE (growing up in a household with someone with a chronic physical illness or disability) provided additional information for some but not all outcomes.

Overview

The 2013 Alberta Survey³ is an annual telephone survey of households across Alberta conducted by the Population Research Laboratory (PRL) at the University of Alberta. The survey varies yearly as different sponsors submit questions of interest. In 2013, seven sponsors submitted questions to be included in the 2013 Alberta Survey. Additional components of the survey included a standardized introduction and demographic questions that were replicated from the 2012 Alberta Survey. The Alberta Centre for Child, Family and Community Research sponsored items designed to gather information on a history of adverse childhood experiences. The survey questions were based on the original Adverse Childhood Experiences Study (ACE) Study (1995 – 1997), an American epidemiological study of over 17,000 individuals administered through Kaiser Permanente. The 2013 Alberta Survey ACE questions were slightly modified for brevity (e.g., yes/no responses) and wording to align with a telephone data collection methodology and to minimize response burden (Appendix 1). Categories of abuse and household dysfunction were covered. In addition, an ACE that asked about growing up in a household in which someone experienced a chronic physical illness or disability was added to pilot test in this survey in order to examine its potential relevance for the Alberta context and to capture additional adversity in childhood. An ACE on neglect was not asked as this was considered to be captured by other ACEs such as emotional abuse and household substance abuse/mental illness, respectively. Validation of this was provided by secondary data analysis of the All Our Babies study⁴, in which questions on both abuse and neglect were asked. Affirmative responses to these experiences in the All Our Babies study were highly correlated. An ACE on incarceration was not asked as this ACE was deemed to have low prevalence in Alberta, as confirmed by provincial adult incarceration rates (1.7%)⁵. Questions on adult perceived psychosocial and physical health status and diagnosed health conditions, including mental health and substance dependence were also asked. Findings from the 2013 Alberta Survey will add to the scientific literature by generating knowledge about early childhood experiences from a random sample of Albertan adults. The results from the study will serve as a baseline measure of adult adverse childhood experiences at a provincial level and will provide information with respect to the feasibility of collecting ACE data using a telephone interview methodology. Examination of methodological issues will provide a better understanding of conceptualizing ACEs and the validity of including an additional household chronic physical illness ACE.

Objectives

1. To generate provincial benchmarks for the type and frequency of adverse childhood experiences.

³ Population Research Laboratory, Department of Sociology, University of Alberta. 2013 Alberta Survey Methodology Report. Prepared for ACCFCR, 2013. www.prl.ualberta.ca.

² The All Our Babies study is a community-based prospective cohort study in Calgary Alberta that began in 2008 (n=3200)

³ Based on admissions to adult correctional services 2010/2011 for Alberta. Rates were calculated per 100,000 adult population using revised July 1 population estimates from Statistics Canada.

2. To examine differences in adverse childhood experiences between various sub-populations of interest according to sociodemographic variables, such as gender, household income, ethnicity, and community type.
3. To determine the impact of adverse childhood experiences on the current health of Albertan adults controlling for confounding variables, and to determine the population attributable risk fractions for ACEs.
4. To examine methodological issues such as a more comprehensive conceptualization of ACEs that takes into account both individual domains and ACE score, and validity testing of the pilot household dysfunction ACE.

Methods

Design

The 2013 Alberta Survey used a two-stage sampling design to select participants, with households selected in the first stage followed by respondent within households in the second stage. A Random-Digit Dialing of eight-digit telephone banks across the province generated a random sample of households from rural and urban areas and ensured that the sampling frame included households with and without telephone directory listings. Respondents were eligible to participate if they were: 1) ≥ 18 years; and 2) contacted by direct dialing. Thus, the target population comprised all adults in Alberta 18 years of age or older who were living in a dwelling unit that could be contacted through a land line for direct dialing. The Alberta Survey aimed for a sample size of 1200 participants, with equal representation by gender, and at least 400 respondents in each of Calgary, Edmonton, and the remainder of Alberta. The final sample size was $n=1207$. The final sample size is a weighted sample and is meant to represent the population of Alberta. Weights were calculated for the Alberta Survey 2013 sample data using population estimates for 2012; using these weights, the sample represents 3,026,495 Albertan adults. The estimated sampling error is plus or minus 2.08 percentage points, at the 95% confidence level and assuming a 50/50 binomial percentage distribution.

Data collection

All questions were pre-tested by the PRL on 20 households to check wording, response categories, question order, interviewer instructions, and interview length. Pre-testing resulted in minor wording changes to the 2013 Alberta Survey questions on adverse childhood experiences. All final modifications to the main 2013 Alberta Survey were made by the PRL.

Following the pre-testing, data were collected between June 18, 2013 and July 23, 2013 by trained PRL interviewers using computer-assisted telephone interviews (CATI). CATI features of automatic question routing and built-in logical and out-of-range checks limited data entry errors and eliminated potential field editing. To maximize the response rate, households were called on various days and at different times during the day. No phone messages were left. Residential telephone numbers were deemed 'no contact' after 10 call-back attempts. An average of 3 call-back attempts was made to complete an interview. A random sample of 10% of the respondents was followed-up by PRL supervisors to verify

accuracy of data collection. Interviews were conducted in English and each lasted a maximum of 30 minutes. The final response rate (number of participants/number eligible to participate) of the 2013 Alberta Survey was 20.9%, which is similar to that reported for previous years. Upon contact, interviewers identified themselves, verified the telephone number, explained the purpose of the survey, and administered the eligibility questions. Prior to asking the main survey questions, the interviewer informed the participant of the voluntary nature of their participation and about the confidentiality of their responses. Participants were informed that data collection was in conformity with the Alberta Freedom of Information and Protection of Privacy Act. Survey questions and data collection protocols were approved by the Research Ethics Board 2 at the University of Alberta.

Data management and analysis

Interviewers entered in responses directly into the computer at the PRL. With coding frames developed by the PRL or by the contributing sponsor, verbatim responses were coded into numeric responses, followed by merging of open-ended codes. Data were imported into IBM SPSS for Windows (version 20.0) for further data cleaning and labeling. A rigorous data cleaning process was followed including wild code, discrepant value, and consistency checks.

Descriptive data were generated to describe sample characteristics, ACEs, and adult health outcomes as frequencies and percentages. Continuous variables were described using means (SD) or medians (IQR). Bivariate associations between selected categorical variables were examined using Chi Square test or Fisher's Exact test when expected cell counts were fewer than five. An alpha level of less than 0.05 was considered statistically significant.

To further assess the relationship between ACEs and adult health outcomes, bivariate and multivariable analyses were performed. Multivariable analysis controlled for sociodemographic variables to examine the extent to which other risk factors for the adult health outcomes confound the ACE crude effect. Multivariable results are presented as odds ratios (ORs) and 95% confidence intervals (CIs). The analysis was conducted using SPSS (Version 20.0).

An odds ratio provides an estimate of the increased or decreased risk associated with a specific category of a predictor variable compared to the reference category of that variable. For example, if the odds ratio between household dysfunction and risk for depression was 2.5, we would say that adults with a history of household dysfunction were two and a half times more likely to experience depression compared to adults without a history of household dysfunction. The confidence interval tells us about the range of uncertainty around the point estimate (2.5). In the above example, the 95% CI associated with the aforementioned household dysfunction OR of 2.5 is 1.7- 4.5, which states that we are 95% confident that the true OR for a history of household dysfunction is between an increased odds of 1.7 and 4.5.

Population attributable risk (PAR) fractions were calculated using adjusted ORs according to Levin's formula: $PAR = P_e (RR-1) / [1 + P_e (RR-1)]$, where P_e is the prevalence of at least one ACE and $RR=OR$ of each adult health outcome for at least one ACE. The PAR is an estimate of the proportion of the adult health condition that would not have occurred if no people had been exposed to at least one ACE.

Results

The sample

Of the total eligible participants (n=13,093), 4396 refused, 11 interviews were incomplete, 172 interviews involved language problems, and 7307 were unavailable or not contacted (estimated eligible). In total, 1207 completed interviews were conducted (20.9% response rate) with 612 females and 595 males. Approximately two-thirds of the sample lived in urban regions with one-third in rural areas. The mean age of the respondents was 52.4 years (SD=16.3). The majority of respondents were married or living common-law (65.8%), had completed post-secondary education (78.2%), and were Caucasian (86.2%). Over half of the respondents were employed either full-time or part-time (55.7%). Almost three-quarters of households had no children in the household (70.8%) and most reported either one or two adults in the household (78.0%). Approximately 80% were born in Canada, and just over half were born in Alberta (56.7%). Religious affiliation was commonly identified as either Protestant or Catholic (49.5%).

Table 1. Sample characteristics (n=1207*)

Demographic Characteristics	n (%)
Gender	
Male	595 (49.3)
Female	612 (50.7)
Community type	
Rural	404 (33.5)
Urban	803 (66.5)
Marital Status	
Married/Common-Law	791 (65.8)
Single/Divorced/Separated/Widowed	411 (34.2)
Education	
Less than High School	77 (6.5)
High School Complete	184 (15.4)
Post Secondary	936 (78.2)
Ethnicity	
Caucasian	1028 (86.2)
Other	165 (13.8)
Employment status	
Employed full-time (30 or more hours/week)	552 (45.8)
Employed part-time (less than 30 hours/week)	119 (9.9)
Student	40 (3.3)
Other (unemployed, retired, homemaker, maternity leave, on disability, etc.)	494 (41.0)
Total Household income (before taxes and deductions)	
\$39,999 or less	159 (16.1)
\$40,000 or more	825 (83.9)
Total Household income (before taxes and deductions)	
\$Less than \$55,000	243 (24.7)
\$55,000 - \$99,999	253 (25.7)
\$100,000 - \$149,999	228 (23.2)
\$150,000 or more	260 (26.4)
Number of child under 18 in household	
0	854 (70.8)
1	141 (11.7)

2 or more	211 (17.5)
Number of adults in household (including respondent)	
1	266 (22.1)
2	675 (55.9)
3 or more	265 (22.0)
Born in Canada	
Yes	965 (80.1)
No	240 (19.9)
Born in Alberta	
Yes	546 (56.7)
No	417 (43.3)
N/A (not born in Canada or no response)	242 (20.0)
Home Ownership Status	
Own	998 (83.5)
Rent	197 (16.5)
Religion	
Protestant	341 (29.2)
Catholic	238 (20.3)
Other	215 (18.3)
No religion (including agnostic and atheist)	377 (32.2)
Age (Mean (SD))	52.43 (16.34)

*Denominator varies due to missing data for some variables

Adverse childhood experiences (Objective 1)

The ACE module was one of seven modules submitted for the Alberta Survey in 2013. Eight ACE questions were asked. ACE descriptives and adult outcomes are reported for those Albertan adults who provided a valid response for all 8 ACE questions (n=1169). Two main categories of ACEs were covered: abuse (physical, sexual, emotional) and household dysfunction (domestic violence, household substance abuse, mental illness, chronic physical illness, and parental separation). In the tables below, different conceptualizations of ACEs are presented. The association between ACEs and subgroups of the sample according to select sociodemographic variables are presented in Tables 7-9.

Individual ACEs

Prevalences of individual ACEs ranged from 11% for physical abuse to a high of 20% for either household substance abuse or mental illness in household. Nearly half of participants in the study experienced at least one form of household dysfunction (49.1%) and almost a third of participants (27.2%) experienced at least one type of abuse in before age 18. Almost 18% had experienced parental separation or divorce. Given increasing rates of separation and divorce over time, we examined the proportion of the ACE across age categories. The proportions ranged from a low of 8.2% among adults aged 65 years and older to a high of 31% for those between 18 and 34 years of age (data not shown).

Table 2. Adverse childhood experiences (n=1169*)

ACE	Question	n (%)
Abuse		
Emotional abuse	Did you frequently experience verbal insults or threats from an adult or parent in the household?	
	Yes	198 (16.9)
	No	971 (83.1)

Physical abuse	Were you ever injured or bruised from physical abuse by an adult or parent in the household? Yes No	128 (11.0) 1041 (89.0)
Sexual abuse	Did you experience inappropriate sexual advances or contact by an adult or someone who was 5 or more years older than you? Yes No	174 (14.9) 995 (85.1)
Any abuse	Yes No	318 (27.2) 851 (72.8)
Household dysfunction		
Domestic violence	Did you ever witness your mother or stepmother being treated violently? Yes No	153 (13.1) 1016 (86.9)
Household substance abuse	Were you part of a household where someone abused alcohol or drugs? Yes No	242 (20.7) 927 (79.3)
Mental illness in household	Were you part of a household where someone was depressed or mentally ill? Yes No	241 (20.6) 928 (79.4)
Chronic physical illness in household	Were you part of a household where someone was diagnosed with a serious chronic illness or physical disability that limited or interfered with his/her daily activities? Yes No	190 (16.3) 979 (83.7)
Parental separation or divorce	Were your parents separated or divorced? Yes No	205 (17.6) 964 (82.4)
Any household dysfunction	Yes No	574 (49.1) 595(50.9)

*Provided a valid response for all 8 ACEs

With respect to the chronic physical illness in household ACE, the most common conditions reported were: cancer (30.5%) and heart/stroke (21.0%). The least common conditions were developmental disabilities/chromosomal anomalies (4.3%) and pulmonary/respiratory conditions (5.4%).

ACE Score

The distribution of ACE score was highly skewed with the majority reporting none or just one adverse childhood experience (cumulative percent, 68.1%). Various operationalizations of ACEs are seen in the literature. One common operationalization includes categories of 0, 1, ≥ 2 ACEs. Among Albertan adults, 44.2% reported 0 ACEs, 23.9% reported only 1 ACE, and approximately 1/3 reported 2 or more ACEs (31.9%). Different categorizations of the ACE score are seen below (Table 3).

Figure 1. ACE score

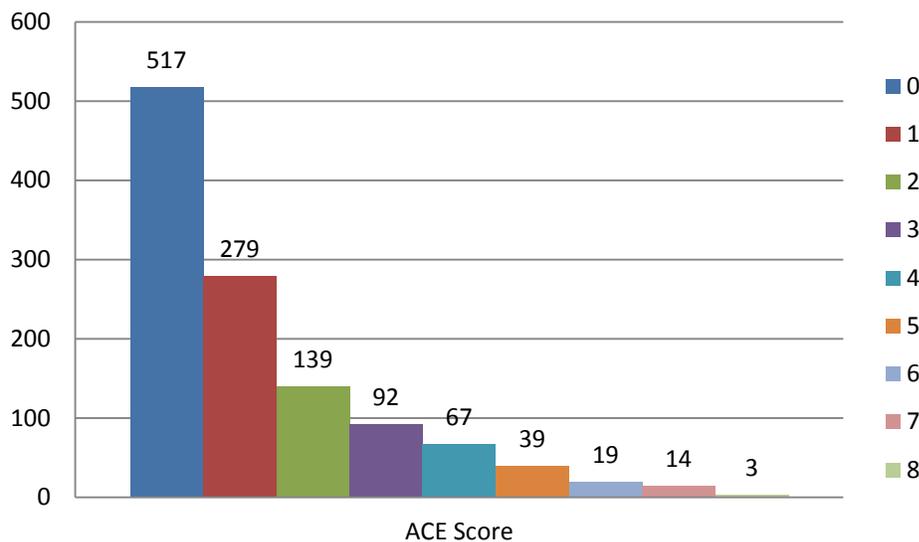


Table 3. ACE score

ACE score (continuous)	Mean (SD) Median (IQR)	1.31 (1.67) 1.00 (2.00)
ACE score (categorical)	0 1 ≥2	n (%) 517 (44.2) 279 (23.9) 373 (31.9)
ACE score (categorical)	0 1 2 3 ≥4	n (%) 517 (44.2) 279 (23.9) 139 (11.9) 92 (7.9) 142 (12.1)
ACE score (categorical)	0 1-2 ≥3	n (%) 517 (44.2) 418 (35.8) 234 (20.0)

Prevalence of ACEs among those with a specified number of ACEs (Part I)

Almost a quarter of the sample (23.9%) reported only one ACE. Among those with just one ACE, the top 3 ACEs were physical illness in household (28.4%), parental separation or divorce (18.4%), and mental illness in household (14.8%). The least prevalent ACEs were physical abuse (3.2%) and exposure to domestic violence (2.9%). Approximately 12% of the sample reported only two ACEs, and pairings were most likely to involve either mental illness in household or household substance abuse. This does not mean this was the most prevalent combination, just that pairings were likely to contain one of these. Among those with three ACEs (7.9%), triplet combinations were most likely to involve either household substance abuse, mental illness in household, or emotional abuse. Among those reporting four ACEs

(5.7%), household substance abuse was most likely to be involved. Just over 6% reported 5 or more ACEs (data not shown).

Table 4. Prevalence of ACEs among those with a specified number of ACEs (Part I*)

	1 ACE n = 279 23.9%		2 ACEs n = 139 11.9%		3 ACEs n = 92 7.9%		4 ACEs n = 67 5.7%	
	n	%	n	%	n	%	n	%
Abuse								
Emotional abuse	18	6.4	32	23.1	41	44.7	40	59.6
Physical abuse	9	3.2	12	8.6	23	25.2	29	43.4
Sexual abuse	33	11.9	31	22.3	37	40.3	28	41.8
Household dysfunction								
Domestic violence	8	2.9	24	17.2	22	23.9	40	59.8
Household substance abuse	39	14.0	49	35.3	46	49.9	47	70.4
Mental illness in household	41	14.8	56	40.2	45	48.9	37	55.0
Physical illness in household	79	28.4	34	24.5	26	28.2	18	26.8
Parental separation or divorce	51	18.4	40	28.7	36	39.0	29	43.3

*Not shown in table: No ACEs (44.2% of sample) and ≥ 5 ACEs (6.4% of sample)

Prevalence of ACEs among those with a specified number of ACEs (Part II)

Approximately 56% had one or more ACEs and household substance abuse or mental illness in household was most commonly reported. Among those with at least two ACEs, household substance abuse or mental illness was most often reported. Among those with three or more ACEs or four or more ACEs, household substance abuse or emotional abuse was most often reported.

Table 5. Prevalence of ACEs among those with a specified number of ACEs (Part II*)

	≥ 1 ACE n = 652 55.8%		≥ 2 ACEs n = 373 31.9%		≥ 3 ACEs n = 234 20.0%		≥ 4 ACEs n = 142 12.1%	
	n	%	n	%	n	%	n	%
Abuse								
Emotional abuse	198	30.4	180	48.3	148	63.3	107	75.3
Physical abuse	128	19.6	119	31.9	107	45.9	84	59.2
Sexual abuse	174	26.7	141	37.8	110	47.0	73	51.3
Household dysfunction								
Domestic violence	153	23.5	145	38.9	121	51.8	99	69.8
Household substance abuse	242	37.2	203	54.5	154	65.9	108	76.2
Mental illness in household	241	37.0	200	53.6	144	61.5	99	69.6
Physical illness in household	190	29.2	111	29.8	77	32.9	51	35.9
Parental separation or divorce	205	31.5	154	41.2	114	48.7	78	55.0

*The columns represent separate ACE variables, not categories within a variable

Interrelatedness of ACEs

When a respondent was exposed to 1 ACE, the probability of exposure to additional ACEs was increased. The median probability of exposure to any additional ACE given having experienced the first was 84.0%. For any 2 and 3 additional ACEs, the median probability was 64.2% and 44.1%, respectively.

Table 6. Interrelatedness of ACEs

ACE category	N	Prevalence (%)	Additional ACEs							
			0		≥1		≥2		≥3	
			n	%	n	%	n	%	n	%
Abuse										
Emotional abuse	198	16.9	18	9.0	180	91.0	151	76.2	110	55.5
Physical abuse	128	11.0	9	6.9	119	93.1	107	83.7	85	66.4
Sexual abuse	174	14.9	33	19.0	141	81.0	110	63.1	75	43.0
Household dysfunction										
Domestic violence	153	13.1	8	5.2	145	94.8	122	79.8	99	64.8
Household substance abuse	242	20.7	37	15.3	205	84.7	158	65.2	109	45.1
Mental illness in household	241	20.6	40	16.7	201	83.3	151	62.6	103	42.7
Physical illness in household	190	16.3	79	41.6	111	58.4	77	40.4	51	26.8
Parental separation or divorce	205	17.6	47	23.0	158	77.0	117	57.0	79	38.6
Median				16.0		84.0		64.2		44.1
Range				5.2-41.6		58.4-94.8		40.4-83.7		26.8-66.4

ACEs and sociodemographic subgroups (Objective 2)

We used bivariate analysis to examine the association between ACEs and select sociodemographic variables. Specifically, we examined the association between ACEs (operationalized in three ways) and gender, community type, marital status, education, ethnicity, income, employment status, born in Canada, and age. Chi-square analysis was used to examine these associations, with the exception of age, for which independent t-tests were used to examine mean differences. The three different ACE operationalizations were: 1) any abuse; 2) any household dysfunction; and 3) a three category ACE variable (none, 1-2 ACEs, ≥3 ACEs). The first two operationalizations are consistent with the literature. The ACE score was categorized to facilitate interpretation, and categories were collapsed due to data considerations, cell sizes, and theoretical considerations (i.e., interrelatedness of ACEs). Significance was set at p<0.05.

Any abuse and sociodemographic subgroups

Compared to adults who did not report a history of any abuse, adults who experienced abuse before the age of 18 were more likely to be female and report low household incomes (below \$40,000), and less likely to be married or in a common-law relationship.

Table 7. Any abuse and sociodemographic subgroups

Sociodemographic variable	No abuse n = 851 n (%)	Any abuse n = 318 n (%)	p-value
Gender			
Male	453 (53.2)	120 (37.7)	<0.001
Female	398 (46.8)	198 (62.3)	
Community type			
Rural	278 (32.7)	112 (35.2)	0.410
Urban	573 (67.3)	206 (64.8)	
Marital status			
Married/Common-Law	574 (67.7)	195 (61.5)	0.048
Other	274 (32.3)	122 (38.5)	
Education			
High school or less	186 (22.0)	69 (21.8)	0.941
Postsecondary	658 (78.0)	247 (78.2)	
Ethnicity			
Caucasian	728 (86.4)	270 (86.0)	0.871
Other	115 (13.6)	44 (14.0)	
Total household income			
\$39,999 or less	96 (14.0)	59 (21.4)	0.005
\$40,000 or more	592 (86.0)	217 (78.6)	
Employment status			
FT/PT	472 (55.5)	178 (56.0)	0.892
Other	378 (44.5)	140 (44.0)	
Born in Canada			
Yes	674 (79.3)	263 (82.7)	0.193
No	176 (20.7)	55 (17.3)	
Age (mean, SD)	52.1 (17.0)	53.5 (14.5)	0.214

Any household dysfunction and sociodemographic subgroups

Compared to adults who did not report a history of any household dysfunction, adults who experienced household dysfunction before the age of 18 were more likely to have been born in Canada and be younger.

Table 8. Any household dysfunction and sociodemographic subgroups

Sociodemographic variable	No household dysfunction n=595 n (%)	Any household dysfunction n=574 n (%)	p-value
Gender			
Male	297 (49.8)	277 (48.3)	0.590
Female	299 (50.2)	297 (51.7)	
Community type			
Rural	186 (31.3)	204 (35.5)	0.121
Urban	409 (68.7)	370 (64.5)	
Marital status			
Married/Common-Law	399 (67.1)	371 (65.0)	0.452
Other	196 (32.9)	200 (35.0)	
Education			
High school or less	121 (20.5)	134 (23.5)	0.217
Postsecondary	469 (79.5)	436 (76.5)	

Ethnicity			
Caucasian	512 (86.6)	486 (85.9)	0.705
Other	79 (13.4)	80 (14.1)	
Total household income			
\$39,999 or less	68 (14.5)	87 (17.6)	0.189
\$40,000 or more	401 (85.5)	407 (82.4)	
Employment status			
FT/PT	322 (54.1)	328 (57.2)	0.283
Other	273 (45.9)	245 (42.8)	
Born in Canada			
Yes	456 (76.5)	482 (84.1)	0.001
No	140 (23.5)	91 (15.9)	
Age (mean, SD)	54.2 (16.7)	50.8 (15.9)	<0.001

Categorical ACE score and sociodemographic subgroups

A higher ACE score was associated with female gender, low household income (below \$40,000), and being born in Canada. For gender and household income, there appeared to be a threshold effect; that is, the highest proportion of 'female' and '\$39,000 or less' was seen among those reporting 3 or more ACEs (61.5% and 21.9%, respectively), while the proportions for the other ACE categories were similar for these variables (around 48% and 14%, respectively). Those born in Canada were more likely to report more ACEs.

Table 9. Categorical ACE score and sociodemographic subgroups

Sociodemographic variable	No ACEs N=517 n (%)	1-2 ACEs N = 418 n (%)	≥3 ACEs N=234 n (%)	p-value
Gender				
Male	272 (52.5)	212 (50.7)	90 (38.5)	0.001
Female	246 (47.5)	206 (49.3)	144 (61.5)	
Community type				
Rural	158 (30.6)	155 (37.1)	77 (32.9)	0.108
Urban	359 (69.4)	263 (62.9)	157 (67.1)	
Marital status				
Married/Common-Law	356 (68.9)	267 (64.2)	147 (63.1)	0.185
Other	161 (31.1)	149 (35.8)	86 (36.9)	
Education				
High school or less	105 (20.4)	93 (22.5)	57 (24.5)	0.445
Postsecondary	409 (79.6)	321 (77.5)	176 (75.5)	
Ethnicity				
Caucasian	440 (85.8)	365 (88.0)	193 (84.3)	0.394
Other	73 (14.2)	50 (12.0)	36 (15.7)	
Total household income				
\$39,999 or less	57 (14.3)	54 (14.8)	44 (21.9)	0.042
\$40,000 or more	341 (85.7)	310 (85.2)	157 (78.1)	
Employment status				
FT/PT	282 (54.5)	233 (55.9)	135 (57.7)	0.719
Other	235 (45.5)	184 (44.1)	99 (42.3)	
Born in Canada				
Yes	395 (76.3)	340 (81.5)	203 (86.8)	0.003
No	123 (23.7)	77 (18.5)	31 (13.2)	
Age (mean, SD)	53.4 (16.9)	52.4 (16.8)	50.6 (14.2)	0.102

Adult health outcomes

Adult health outcomes that were assessed included perceived ratings of emotional and physical health, social support, and optimism, which were all measured using single item questions (Appendix I). Perceived physical and emotional health questions were taken from the Medical Outcomes Study Short Form-12 (SF-12). Single items on perceived social support and optimism were taken from the All Our Babies study, which used the full version of the respective scale (National Longitudinal Survey Social Support Scale and Life Orientation Test-Revised). The item with the highest item-total correlation using AOB data was chosen to represent the scale. In addition, health conditions were assessed using a checklist of diagnosed health conditions, ranging from high blood pressure to substance dependency problems. In total, we captured 12 categories of health conditions, including an 'other' category. The 12 categories are seen below. Excellent, very good, and good response choices for perceived emotional and physical health were collapsed to operationalize 'good' emotional/physical health. For social support and optimism, the response choices of strongly agree and agree were combined to define adequate social support /optimism. The majority of adults reported good emotional and physical health (88.9% and 80.8%, respectively), and adequate social support (95.6%). Just under two-thirds reported that they were optimistic. The top three diagnosed health conditions were backache/ back problems (28.8%), high blood pressure/heart condition/ stroke (28.4%), and allergies (23.0%). Thirteen percent reported mental health problems and only 2.6% reported substance dependency problems.

Table 10. Adult health outcomes: perceived psychosocial and physical health

Perceived psychosocial and physical health	n (%)
Emotional health	
Good	1040 (88.9)
Fair/poor	129 (11.1)
Physical health	
Good	944 (80.8)
Fair/poor	225 (19.2)
Social Support	
Adequate	1110 (95.6)
Inadequate	51 (4.4)
Optimism	
Adequate	752 (65.7)
Inadequate	392 (34.3)

Figure 2. Adult health outcomes: perceived psychosocial and physical health

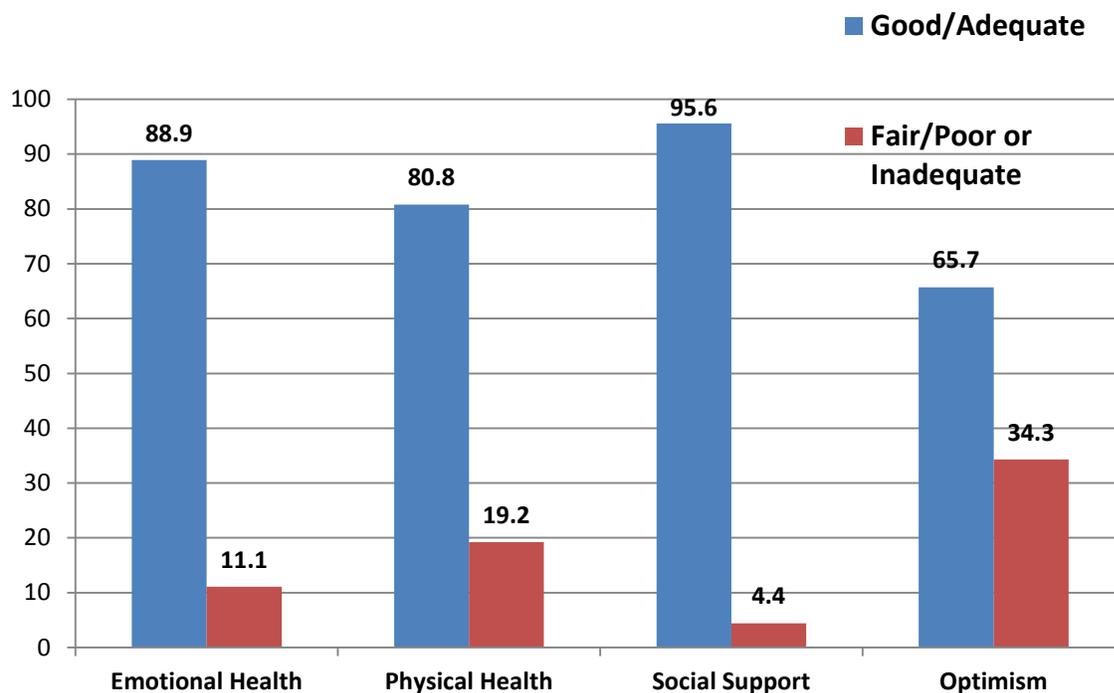
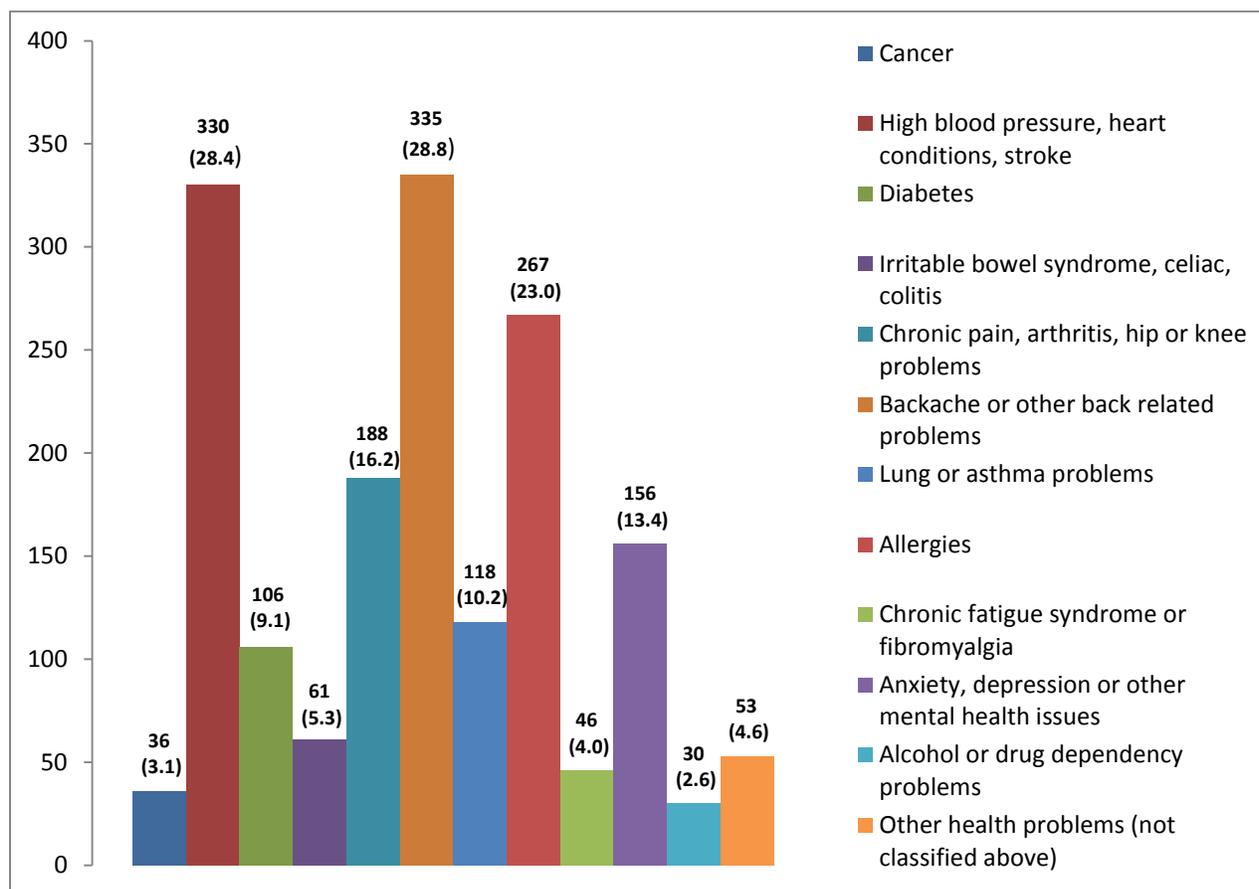


Table 11. Adult health conditions*

Diagnosed health conditions	n (%)
Cancer	36 (3.1)
High blood pressure, heart condition, or stroke	330 (28.4)
Diabetes	106 (9.1)
Irritable Bowel Syndrome, celiac, or colitis	61 (5.3)
Chronic pain, arthritis, hip or knee problems	188 (16.2)
Backache or other back related problems	335 (28.8)
Lung or asthma problems	118 (10.2)
Allergies	267 (23.0)
Chronic fatigue syndrome or fibromyalgia	46 (4.0)
Anxiety, depression, or other mental health problems	156 (13.4)
Alcohol or drug dependency problems	30 (2.6)
Other health problems (not classified above)	53 (4.6)

*Individual health conditions are not mutually exclusive

Figure 3. Adult health conditions



ACEs and adult health outcomes: Bivariate analysis

We performed Chi-square analysis to examine associations between ACEs and adult health outcomes. ACEs were operationalized three ways: 1) any abuse; 2) any household dysfunction; and 3) a three category cumulative ACE variable (none, 1-2 ACEs, ≥3 ACEs). Significance was set at $p < 0.05$.

Any abuse and adult health outcomes

Compared to adults who did not report a history of any abuse, adults who experienced abuse before the age of 18 were more likely to perceive their emotional and physical health as fair or poor, and to report inadequate social support and optimism. In addition, adults who experienced abuse before the age of 18 were more likely to have been diagnosed with a number of different health conditions as adults (9 out of 12 categories): Irritable Bowel Syndrome, celiac, or colitis; chronic pain, arthritis, hip or knee problems; back problems; respiratory problems; allergies; chronic fatigue syndrome or fibromyalgia; mental health problems; substance dependency problems; and ‘other’ health problems not otherwise classified.

Table 12. Any abuse and adult health outcomes

Adult health outcome	No abuse N = 851 n (%)	Any abuse N = 318 n (%)	p-value
Perceived psychosocial and physical health			
Emotional Health			
Good	776 (91.2)	264 (83.0)	<0.001
Fair/poor	75 (8.8)	54 (17.0)	
Physical Health			
Good	712 (83.7)	232 (73.0)	<0.001
Fair/poor	139 (16.3)	86 (27.0)	
Social Support			
Adequate	823 (97.3)	287 (91.1)	<0.001
Inadequate	23 (2.7)	28 (8.9)	
Optimism			
Adequate	572 (68.8)	180 (57.7)	<0.001
Inadequate	260 (31.3)	132 (42.3)	
Health condition			
Cancer			
No	817 (96.9)	308 (96.9)	0.958
Yes	26 (3.1)	10 (3.1)	
High blood pressure, heart, or stroke			
No	606 (71.9)	225 (70.8)	0.703
Yes	237 (28.1)	93 (29.2)	
Diabetes			
No	772 (91.6)	283 (89.0)	0.173
Yes	71 (8.4)	35 (11.0)	
Irritable Bowel Syndrome, celiac, or colitis			
No	816 (96.8)	284 (89.3)	<0.001
Yes	27 (3.2)	34 (10.7)	
Chronic pain, arthritis, hip or knee problems			
No	745 (88.4)	228 (71.7)	<0.001
Yes	98 (11.6)	90 (28.3)	
Backache or other back related problems			
No	641 (75.9)	186 (58.5)	<0.001
Yes	203 (24.1)	132 (41.5)	
Lung or asthma problems			
No	777 (92.2)	266 (83.6)	<0.001
Yes	66 (7.8)	52 (16.4)	
Allergies			
No	671 (79.6)	223 (70.1)	0.001
Yes	172 (20.4)	95 (29.9)	
Chronic fatigue syndrome or fibromyalgia			
No	821 (97.4)	294 (92.5)	<0.001
Yes	22 (2.6)	24 (7.5)	
Anxiety, depression, or other mental health problems			
No	766 (90.8)	240 (75.5)	<0.001
Yes	78 (9.2)	78 (24.5)	
Alcohol or drug dependency problems			
No	828 (98.2)	303 (95.3)	0.005
Yes	15 (1.8)	15 (4.7)	
Other conditions			
No	812 (96.3)	296 (93.1)	0.018
Yes	31 (3.7)	22 (6.9)	

Any household dysfunction and adult health outcomes

Compared to adults who did not report a history of any household dysfunction, adults who experienced household dysfunction before the age of 18 were more likely to perceive their emotional and physical health as poor or fair, and to report inadequate social support. In addition, adults who experienced household dysfunction before the age of 18 were more likely to have been diagnosed with a number of different health conditions as adults (9 out of 12 categories): diabetes; Irritable Bowel Syndrome, celiac, or colitis; chronic pain, arthritis, hip or knee problems; back problems; respiratory problems; allergies; chronic fatigue syndrome or fibromyalgia; mental health problems; and substance dependency problems.

Table 13. Any household dysfunction and adult health outcomes

Adult Health Outcome	No household dysfunction N = 595 n (%)	Any household dysfunction N = 574 n (%)	p-value
Perceived psychosocial and physical health			
Emotional Health			
Good	553 (92.9)	487 (84.8)	<0.001
Fair/poor	42 (7.1)	87 (15.2)	
Physical Health			
Good	509 (85.5)	435 (75.8)	<0.001
Fair/poor	86 (14.5)	139 (24.2)	
Social Support			
Adequate	576 (97.5)	534 (93.7)	0.002
Inadequate	15 (2.5)	36 (6.3)	
Optimism			
Adequate	397 (68.3)	355 (63.1)	0.060
Inadequate	184 (31.7)	208 (36.9)	
Health condition			
Cancer			
No	567 (96.1)	558 (97.7)	0.111
Yes	23 (3.9)	13 (2.3)	
High blood pressure, heart, or stroke			
No	429 (72.7)	401 (70.2)	0.349
Yes	161 (27.3)	170 (29.8)	
Diabetes			
No	549 (92.9)	507 (88.8)	0.015
Yes	42 (7.1)	64 (11.2)	
Irritable Bowel Syndrome, celiac, or colitis			
No	571 (96.8)	529 (92.6)	0.002
Yes	19 (3.2)	42 (7.4)	
Chronic pain, arthritis, hip or knee problems			
No	525 (89.0)	448 (78.5)	<0.001
Yes	65 (11.0)	123 (21.5)	
Backache or other back related problems			
No	445 (75.4)	382 (66.9)	0.001
Yes	145 (24.6)	189 (33.1)	
Lung or asthma problems			
No	546 (92.5)	497 (87.0)	0.002
Yes	44 (7.5)	74 (13.0)	

Allergies			
No	481 (81.4)	414 (72.5)	<0.001
Yes	110 (18.6)	157 (27.5)	
Chronic fatigue syndrome or fibromyalgia			
No	577 (97.8)	538 (94.2)	0.002
Yes	13 (2.2)	33 (5.8)	
Anxiety, depression, or other mental health problems			
No	555 (94.1)	450 (78.8)	<0.001
Yes	35 (5.9)	121 (21.2)	
Alcohol or drug dependency problems			
No	581 (98.5)	550 (96.3)	0.021
Yes	9 (1.5)	21 (3.7)	
Other conditions			
No	569 (96.3)	540 (94.6)	0.163
Yes	22 (3.7)	31 (5.4)	

Cumulative ACE score and adult health outcomes

A higher number of ACEs was associated with poorer perceived emotional and physical health, inadequate social support and optimism, and 9 out of 12 health condition categories. For each respective health outcome, the highest proportion of 'poor health' was seen among those who reported 3 or more ACEs. Those who reported no ACEs had the lowest proportion and the proportion for those who reported 1-2 ACEs fell roughly in between. For example, social support: among adults who reported 3 or more ACEs, 9.1% reported inadequate social support. Among adults who reported no ACEs, 2.1% reported inadequate social support. Among adults who reported 1-2 ACEs, 4.6% reported inadequate social support, which falls in between 2.1% (no ACEs) and 9.1% (3 or more ACEs).

Table 14. Cumulative ACE score and adult health outcomes

Adult Health Outcomes	None n=517 n (%)	1-2 ACEs n = 418 n (%)	≥3 ACEs n=234 n (%)	p-value
Emotional Health				
Good	480 (92.8)	371 (88.8)	189 (80.8)	<0.001
Fair/poor	37 (7.2)	47 (11.2)	45 (19.2)	
Physical Health				
Good	445 (86.1)	330 (78.9)	169 (72.2)	<0.001
Fair/poor	72 (13.9)	88 (21.1)	65 (27.8)	
Social Support				
Adequate	502 (97.9)	398 (95.4)	210 (90.9)	<0.001
Inadequate	11 (2.1)	19 (4.6)	21 (9.1)	
Optimism				
Adequate	349 (69.2)	268 (64.9)	136 (59.6)	0.036
Inadequate	155 (30.8)	145 (35.1)	92 (40.4)	
Cancer				
No	493 (96.3)	405 (97.4)	227 (97.4)	0.566
Yes	19 (3.7)	11 (2.6)	6 (2.6)	
High blood pressure, heart, or stroke				
No	374 (72.9)	294 (70.7)	164 (70.4)	0.679

Yes	139 (27.1)	122 (29.3)	69 (29.6)	
Diabetes				
No	478 (93.2)	373 (89.7)	205 (88.0)	0.041
Yes	35 (6.8)	43 (10.3)	28 (12.0)	
Irritable Bowel Syndrome, celiac, or colitis				
No	500 (97.7)	388 (93.3)	212 (91.0)	<0.001
Yes	12 (2.3)	28 (6.7)	21 (9.0)	
Chronic pain, arthritis, hip or knee problems				
No	465 (90.8)	348 (83.7)	160 (68.7)	<0.001
Yes	47 (9.2)	68 (16.3)	73 (31.3)	
Backache or other back related problems				
No	396 (77.3)	298 (71.6)	133 (57.1)	<0.001
Yes	116 (22.7)	118 (28.4)	100 (42.9)	
Lung or asthma problems				
No	479 (93.6)	369 (88.7)	195 (83.7)	<0.001
Yes	33 (6.4)	47 (11.3)	38 (16.3)	
Allergies				
No	424 (82.8)	308 (74.0)	162 (69.5)	<0.001
Yes	88 (17.2)	108 (26.0)	71 (30.5)	
Chronic fatigue syndrome or fibromyalgia				
No	506 (98.8)	396 (95.2)	213 (91.4)	<0.001
Yes	6 (1.2)	20 (4.8)	20 (8.6)	
Anxiety, depression, or other mental health problems				
No	486 (94.9)	350 (84.1)	169 (72.5)	<0.001
Yes	26 (5.1)	66 (15.9)	64 (27.5)	
Alcohol or drug dependency problems				
No	506 (98.8)	404 (97.1)	221 (94.8)	0.006
Yes	6 (1.2)	12 (2.9)	12 (5.2)	
Other conditions				
No	496 (96.7)	397 (95.4)	216 (92.7)	0.054
Yes	17 (3.3)	19 (4.6)	17 (7.3)	

Figures 4-19. Unadjusted odds ratios (UOR) between cumulative ACE score and adult health outcomes

Examination of the unadjusted odds ratios between the three category ACE variable and adult health showed evidence of a dose-response trend for the majority of outcomes.

Figure 4. Perceived physical health

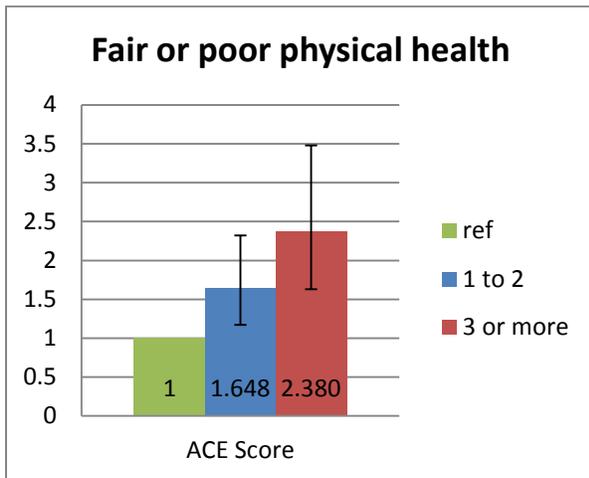


Figure 5. Perceived emotional health

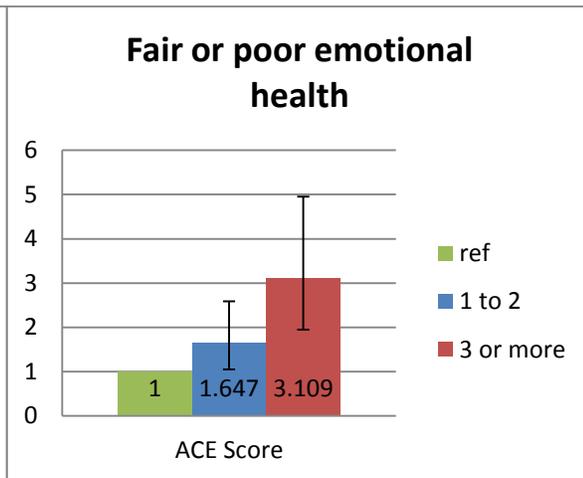


Figure 6. Perceived social support

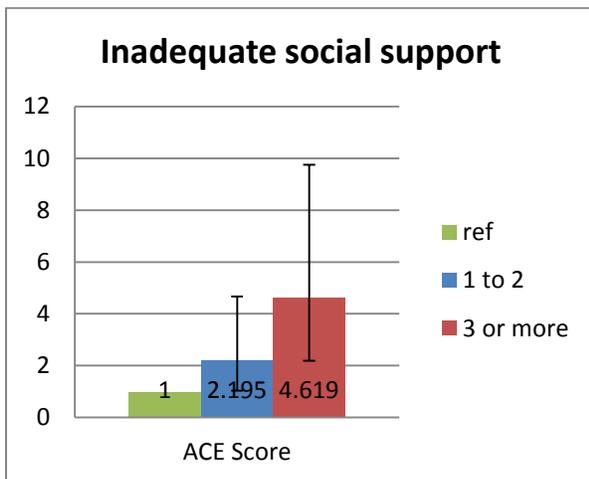


Figure 7. Perceived optimism

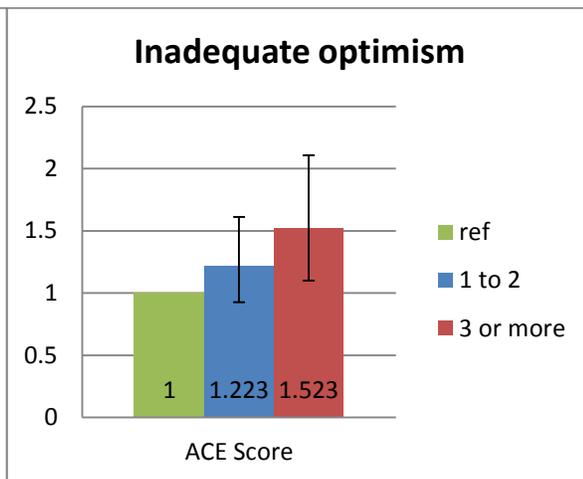


Figure 8. Cancer

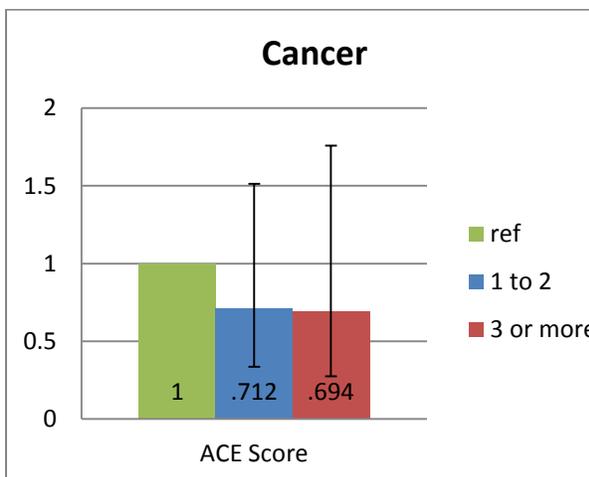


Figure 9. Circulatory conditions

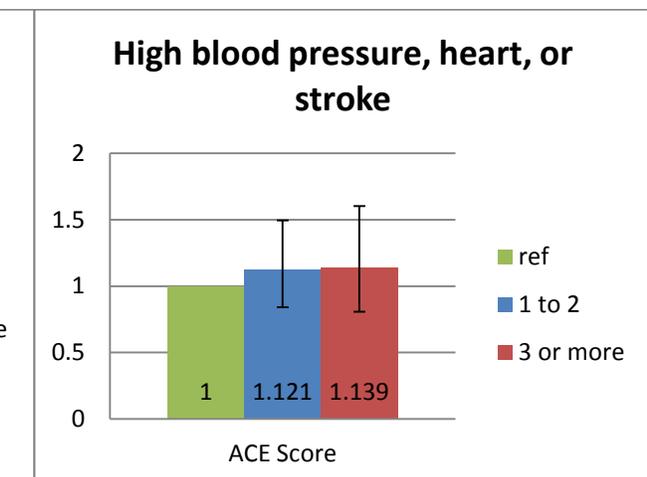


Figure 10. Diabetes

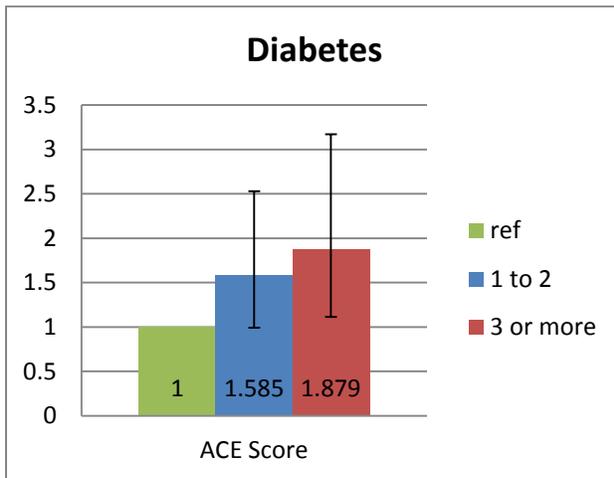


Figure 11. Gut conditions

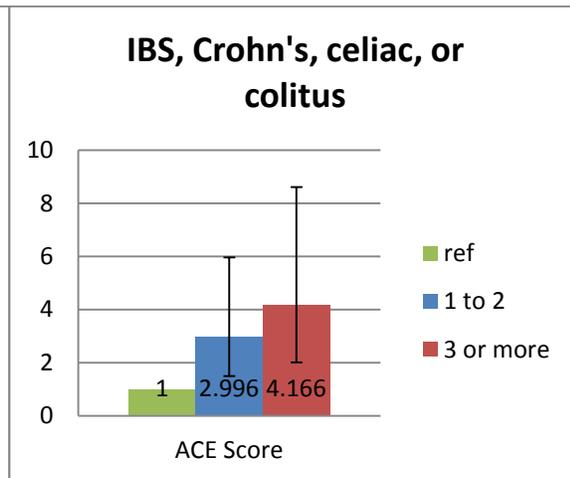


Figure 12. Chronic pain, joint conditions

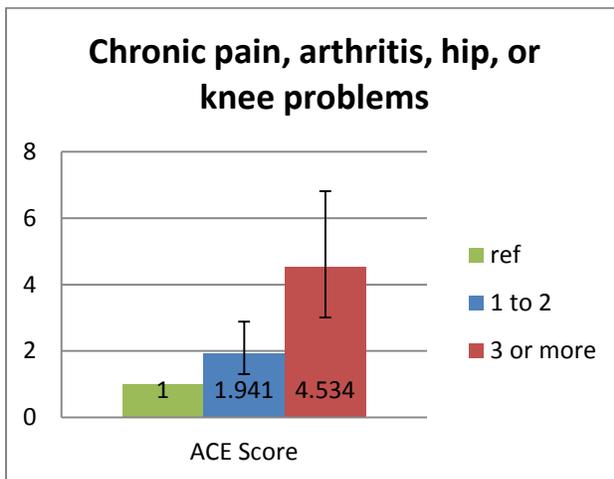


Figure 13. Back conditions

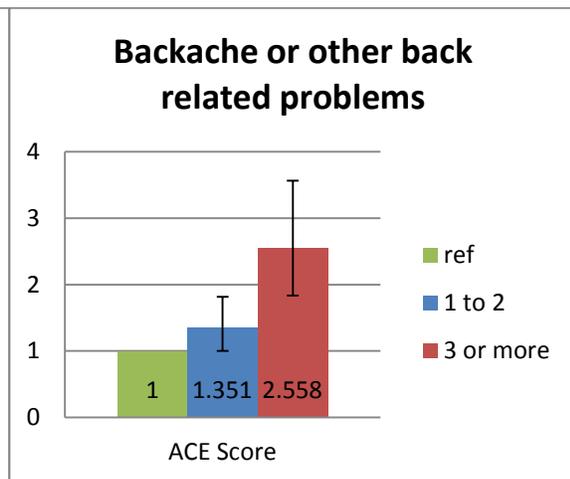


Figure 14. Respiratory conditions

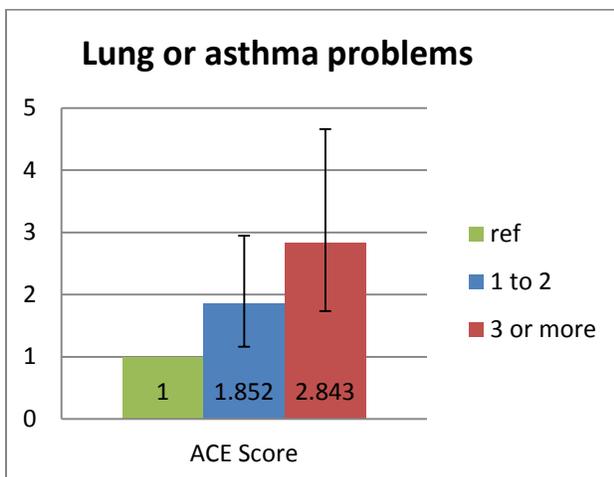


Figure 15. Allergies

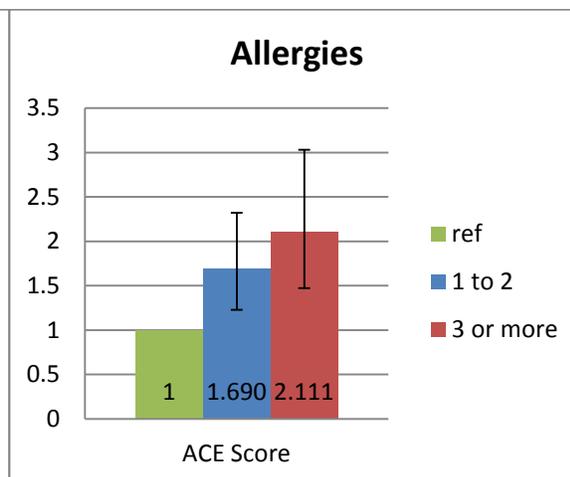


Figure 16. CFS, Fibromyalgia

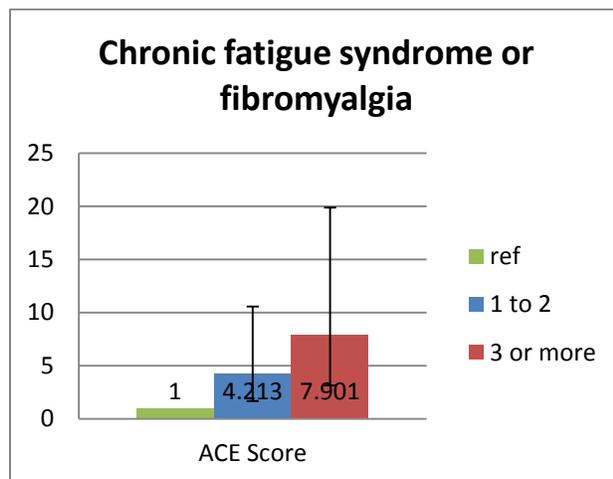


Figure 17. Mental health conditions

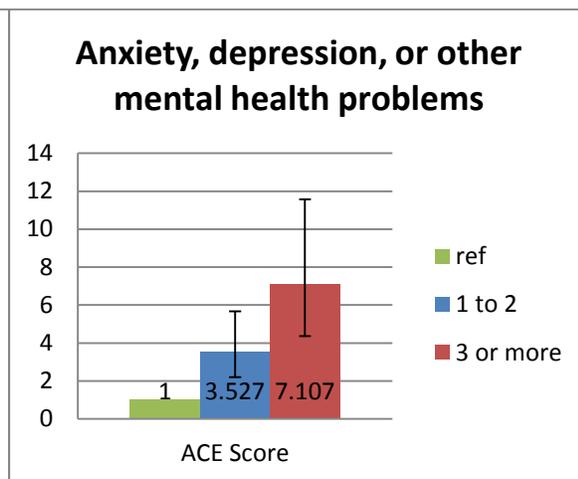


Figure 18. Substance dependence

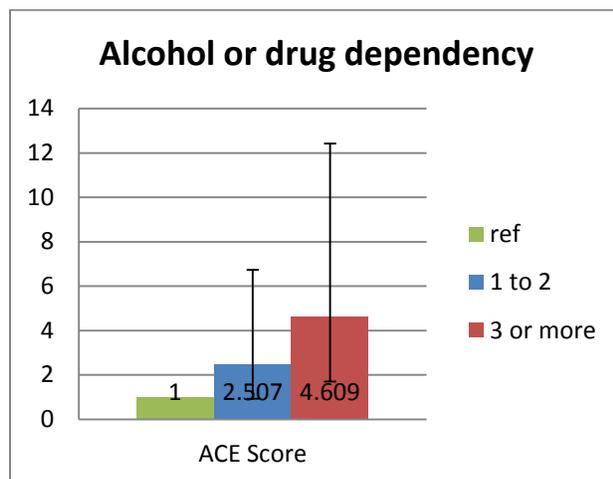
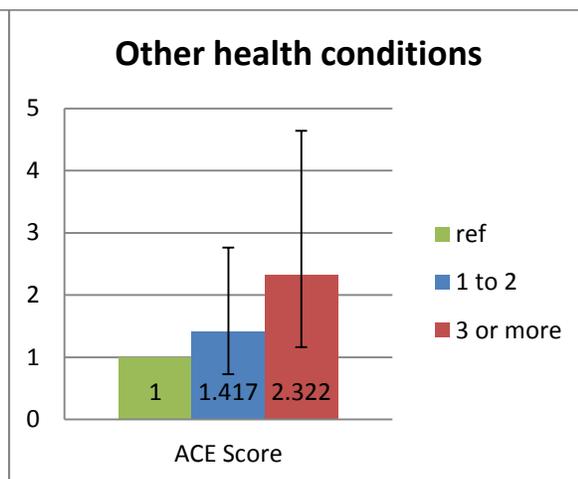


Figure 19. Other health conditions



Summary: Among Albertan adults, there is evidence for an association between a history of ACEs and poor health outcomes in adulthood. This was seen for different operationalizations of ACEs and across perceived psychosocial and physical health ratings, as well as diagnosed physical and mental health conditions. There was evidence of a graded association with number of ACEs for the majority of adult health outcomes.

ACEs and adult health outcomes: Multivariable analysis (Objective 3)

We further examined the association between ACEs and adult health outcomes in multivariable analysis, controlling for confounding variables. Similar to bivariate analysis, ACEs were operationalized three ways: 1) any abuse; 2) any household dysfunction; and 3) a three category cumulative ACE variable (none, 1-2 ACEs, ≥3 ACEs). The following five adult health outcomes were examined: 1) perceived

physical health; 2) perceived emotional health; 3) social support; 4) optimism; 5) any diagnosed chronic physical health condition; 6) any diagnosed mental health or substance dependence condition. All multivariable models were adjusted for the following sociodemographic variables: income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age. For comparison purposes, the crude (unadjusted) odds ratio is presented for each ACE variable. Result summaries based on perceived ratings (physical health, emotional health, social support, optimism) and diagnosed conditions (any chronic physical health condition and mental health condition/substance dependence) are presented separately. Final multivariable models with ORs (95% CI) for all variables are shown in Appendix II.

Perceived adult health ratings

For all three operationalizations of ACEs, there was, on average, at least a two-fold increase in the likelihood of poor perceived physical health, poor perceived emotional health, and inadequate social support with having experienced adversity in childhood. Associations remained robust even when controlling for sociodemographic variables. There was no consistent evidence for an association between ACEs and perceived optimism. Strongest ACE effects, in terms of magnitude of association (higher ORs), were seen for the 3 category ACE variable, likely due to the crudeness of the other two operationalizations and thus dilution of effect. Results suggest a cumulative effect of number of ACEs with poor perceived physical health, emotional health, and inadequate social support.

Common to the epidemiological literature, an OR (estimate of association between a putative risk factor and health outcome) of at least 2 is considered to be clinically important. Taking into consideration the lower bound of the CIs, results for the categorical ACE score suggest a threshold of 3 or more ACEs that operationalize 'at risk' status for poor perceived health outcomes (perceived physical and emotional health, perceived adequacy of social support and optimism).

Table 15. Perceived physical health

ACE operationalization*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)**
Any abuse		
Yes	1.90 (1.40,2.59)	1.93 (1.35,2.76)
No (ref)	1.00	1.00
Any household dysfunction		
Yes	1.89 (1.41,2.56)	2.45 (1.71,3.51)
No (ref)	1.00	1.00
ACE score		
≥3	2.38 (1.63,3.48)	3.10 (1.96,4.93)
1-2	1.65 (1.17,2.32)	2.05 (1.36,3.08)
None (ref)	1.00	1.00

*Separate models were run for each ACE operationalization

**Adjusted for income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age

Table 16. Perceived emotional health

ACE operationalization*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)**
Any abuse		
Yes	2.13 (1.46,3.10)	2.18 (1.40,3.37)
No (ref)	1.00	1.00
Any household dysfunction		
Yes	2.36 (1.60,3.48)	2.42 (1.53,3.83)
No (ref)	1.00	1.00
ACE score		
≥3	3.11 (1.95,4.95)	3.15 (1.81,5.46)
1-2	1.65 (1.05,2.59)	1.71 (1.01,2.90)
None (ref)	1.00	1.00

*Separate models were run for each ACE operationalization

**Adjusted for income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age

Table 17. Perceived inadequate social support

ACE operationalization*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)**
Any abuse		
Yes	3.55 (2.01,6.26)	3.78 (1.89,7.56)
No (ref)	1.00	1.00
Any household dysfunction		
Yes	2.59 (1.40,4.78)	2.42 (1.16,5.01)
No (ref)	1.00	1.00
ACE score		
≥3	4.62 (2.19,9.75)	4.19 (1.68,10.43)
1-2	2.20 (1.03,4.67)	2.34 (0.97,5.62)
None (ref)	1.00	1.00

*Separate models were run for each ACE operationalization

**Adjusted for income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age

Table 18. Perceived inadequate optimism

ACE operationalization*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)**
Any abuse		
Yes	1.61 (1.23,2.11)	1.39 (1.02,1.90)
No (ref)	1.00	1.00
Any household dysfunction		
Yes	1.27 (0.99,1.62)	1.26 (0.94,1.67)
No (ref)	1.00	1.00
ACE score		
≥3	1.52 (1.10,2.11)	1.35 (0.92,1.99)
1-2	1.22 (0.93,1.61)	1.27 (0.93,1.75)
None (ref)	1.00	1.00

*Separate models were run for each ACE operationalization

**Adjusted for income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age

Diagnosed conditions

For all three operationalizations of ACEs, there was, on average, at least a two-fold increase in the likelihood of any diagnosed physical health condition and at least a three-fold increase in the likelihood of any diagnosed mental health condition or substance dependence. Associations remained robust even when controlling for sociodemographic variables. Strongest ACE effects, in terms of magnitude of association (higher ORs), were seen for the association between the 3 category ACE variable and diagnosed mental health condition or substance dependence. Indeed, the lower bound for the confidence interval for at least 3 ACEs was above 3.0. In addition, results suggest a cumulative effect of number of ACEs with this outcome.

Table 19. Any chronic physical health condition

ACE operationalization*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)**
Any abuse		
Yes	2.19 (1.60,2.99)	1.82 (1.28,2.59)
No (ref)	1.00	1.00
Any household dysfunction		
Yes	2.34 (1.81,3.03)	2.54 (1.87,3.45)
No (ref)	1.00	1.00
ACE score		
≥3	2.80 (1.94,4.04)	2.74 (1.80,4.18)
1-2	2.37 (1.78,3.17)	2.52 (1.79,3.53)
None (ref)	1.00	1.00

*Separate models were run for each ACE operationalization

**Adjusted for income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age

Table 20. Any mental health condition/substance dependence

ACE operationalization*	Unadjusted OR (95% CI)	Adjusted OR (95% CI)**
Any abuse		
Yes	3.11 (2.23,4.34)	3.00 (2.05, 4.38)
No (ref)	1.00	1.00
Any household dysfunction		
Yes	3.65 (2.54, 5.26)	3.11 (2.08, 4.65)
No (ref)	1.00	1.00
ACE score		
≥3	6.08 (3.85, 5.11)	5.48 (3.28, 9.17)
1-2	3.30 (2.13, 5.11)	2.84 (1.75, 4.62)
None (ref)	1.00	1.00

*Separate models were run for each ACE operationalization

**Adjusted for income, education, employment status, marital status, number of children in household, born in Canada, ethnicity, community type, gender, and age

Population attributable risk (PAR) fractions

The estimated proportion of each adult health outcome that are attributable to ACEs were estimated from adjusted multivariable analysis results for one or more ACE vs. no ACEs, given that even one ACE increased the risk for poor adult health outcomes. *Note: We chose to use this operationalization of ACEs*

vs. the 3 category cumulative ACE score for estimating ARFs, given that interpretation would be difficult for a category of 1-2 ACEs for this purpose. Levin's formula was used for these calculations: $PAR = P_e (RR-1) / [1 + P_e (RR-1)]$, where P_e is the prevalence of at least one ACE and $RR=OR$ of each adult health outcome for at least one ACE. The PAR is an estimate of the proportion of the adult health condition that would not have occurred if no people had been exposed to at least one ACE. The prevalence of at least one ACE used for this calculation was 55.8%.

The estimated PARs for each adult health outcome are shown in Table 21 and range from 39.9% to 59.9%. The highest PAR was seen for a diagnosed mental health condition and at least one ACE. The current analysis suggests that approximately 60% of mental health/substance dependence diagnoses are attributable to early experiences of abuse or household dysfunction. These PARs are of the order of magnitude rarely seen in epidemiology and public health. *Note: the PAR is dependent on both the prevalence of the exposure (in this case, at least one ACE), and the OR estimate between the exposure and the outcome.*

Table 21. Crude ORs and PARs for adult health outcomes for at least one ACE

Adult health outcome	Crude OR (95% CI)	PAR
Poor perceived physical health	2.37 (1.63,3.46)	43.3%
Poor perceived emotional health	2.19 (1.36,3.53)	39.9%
Inadequate social support	2.94 (1.31,6.59)	52.0%
Inadequate optimism	1.30 (0.97,1.74)	N/A*
Any diagnosed chronic physical health condition	2.59 (1.91,3.51)	47.0%
Any diagnosed mental health condition or substance dependence	3.68 (2.34,5.77)	59.9%

*Did not calculate due to non-significant OR (95% CI crosses 1)

Methodological issues: Reconceptualizing ACEs

A number of different operationalizations of ACEs are seen in the literature. Common approaches include individual ACEs or individual domains (a specific approach) and ACE score (a cumulative approach) and their associations with adult health outcomes. Such approaches may oversimplify ACEs as a risk factor for adult health outcomes. For example, a cumulative approach assumes equal weighting for ACEs and that any joint effects are additive. We sought to examine a more comprehensive approach that combines both individual domains and cumulative ACEs. Given two individual domains (abuse and household dysfunction) made up of 3 and 5 ACEs respectively, we defined high and low risk within each domain according to cut-off scores. Cut-off scores were determined based on the number of components within each domain. For abuse, high risk was defined as reporting at least one ACE. For household dysfunction, at least 2 ACEs were considered high risk. These cut-offs also ensure that categories did not simply reflect a greater number of ACEs.

Since each individual could be either high or low on each domain, four profiles were identified to capture the different risk combinations: (1) low risk abuse, low risk household dysfunction; (2) low risk abuse, high risk household dysfunction; (3) high risk abuse, low risk household dysfunction; (4) high risk abuse, high risk household dysfunction. The combined risk variable was entered as an independent

predictor in the multivariable regression models predicting adult health outcomes, controlling for sociodemographic variables. Individuals in the first risk profile (low, low) were used as the reference group.

Results show that the profile with high risk in both domains (high risk abuse and high risk household dysfunction) profile conferred the greatest risk for poor adult health outcomes, with the exception of inadequate social support. In terms of high risk in a single domain, the profile with high risk abuse was more consistently associated with poor adult health outcomes compared to the profile with high risk household dysfunction. This more comprehensive approach to ACEs suggests that number of ACEs and domain interact to increase the likelihood of poor adult health outcomes, and that approaches that rely on individual domains or simple summation may oversimplify the risk associated with ACEs.

Table 22. Comprehensive ACE (risk profiles) and adult health outcomes

	Perceived poor physical health OR (95% CI)	Perceived poor emotional health OR (95% CI)	Inadequate Social Support OR (95% CI)	Inadequate optimism OR (95% CI)
Comprehensive ACE*				
High,high	2.72 (1.70,4.36)	3.02 (1.75,5.20)	3.53 (1.46,8.52)	1.59 (1.05,2.41)
High,low	1.89 (1.18, 3.03)	1.85 (1.01,3.38)	4.35 (1.84,10.33)	1.27 (0.85,1.91)
Low,high	2.36 (1.39,3.99)	1.74 (0.90,3.35)	1.21 (0.37,3.91)	1.11 (0.70,1.78)
Low,low (ref)	1.00	1.00	1.00	1.00
	Any diagnosed chronic physical health condition		Any diagnosed mental health condition/substance dependence	
Comprehensive ACE				
High,high	2.44 (1.48,4.01)		4.13 (2.53,6.74)	
High,low	1.73 (1.10,2.73)		3.20 (1.94,5.28)	
Low,high	2.28 (1.34,3.85)		2.64 (1.49,4.67)	
Low,low (ref)	1.00		1.00	

*low,low=low risk abuse, low risk household dysfunction; low,high=low risk abuse, high risk household dysfunction; high,low=high risk abuse, low risk household dysfunction; high,high = high risk abuse, high risk household dysfunction.

Methodological issues: Validity of the chronic physical illness in household ACE

To better understand the contribution of a new household dysfunction ACE (growing up in a household where there was a chronic physical illness or disability), additional analyses were performed. First, we examined the crude association between this ACE and each of the 5 adult health outcomes that were examined in multivariable analyses above. This ACE significantly increased the risk of perceived poor physical health, perceived poor emotional health, any diagnosed chronic physical health condition, and any diagnosed mental health condition or substance dependence. There was no evidence of an association between this ACE and outcomes of perceived social support or optimism.

Table 23. Estimate of association between pilot household dysfunction ACE

Adult health outcome	Crude OR (95% CI) for pilot ACE
Poor physical health rating	2.05 (1.44, 2.92)
Poor emotional health rating	1.78 (1.51, 2.76)
Inadequate social support	0.69 (0.29, 1.63)
Inadequate optimism	1.27 (0.92, 1.75)
Any diagnosed chronic physical health condition	2.38 (1.59,3.56)
Any diagnosed mental health condition or substance dependence	2.11 (1.44, 3.10)

Second, we compared the association of the ACE score (5 categories: 0, 1, 2, 3, 4 or more) with the 5 adult health outcomes, with and without this pilot household dysfunction ACE in the final ACE score. The OR estimates for one ACE were similar in magnitude and statistical significance for the two different operationalizations of the ACE score for each adult health outcome. However, estimates for incremental ACEs starting with 2 ACEs were slightly different between the two operationalizations, particularly for diagnosed conditions. These findings suggest that the addition of the new ACE **did contribute additional information** regarding adverse childhood experiences not already captured by the other ACEs, specifically for ≥ 2 ACEs and the odds of diagnosed conditions.

Table 24. ACE score with and without pilot household dysfunction ACE

	Perceived poor physical health OR (95% CI)	Perceived poor emotional health OR (95% CI)	Inadequate Social Support OR (95% CI)	Inadequate optimism OR (95% CI)
ACE score WITH pilot ACE				
≥ 4				
3	2.69 (1.74,4.15)	3.35 (1.98,5.67)	4.74 (2.07,10.83)	1.63 (1.11,2.40)
2	1.95 (1.14,3.34)	2.76 (1.46,5.19)	4.44 (1.74,11.33)	1.37 (0.86,2.18)
1	2.68 (1.73,4.15)	2.58 (1.48,4.50)	4.35 (1.88,10.08)	1.54 (1.05,2.28)
0 (ref)	1.22 (0.81,1.82)	1.22 (0.72,2.09)	1.18 (0.45,3.09)	1.08 (0.79,1.48)
	1.00	1.00	1.00	1.00
ACE score WITHOUT pilot ACE				
≥ 4	2.33 (1.49,3.65)	3.43 (2.01,5.83)	6.39 (2.79,14.65)	1.61 (1.08,2.41)
3	2.04 (1.19,3.48)	2.19 (1.11,4.34)	5.69 (2.23,14.54)	1.37 (0.85,2.21)
2	2.24 (1.44,3.49)	2.89 (1.69,4.97)	4.45 (1.85,10.68)	1.53 (1.03,2.26)
1	1.20 (0.80,1.81)	1.47 (0.87,2.49)	2.12 (0.86,5.19)	1.02 (0.73,1.41)
0 (ref)	1.00	1.00	1.00	1.00
	Any diagnosed chronic physical health condition		Any diagnosed mental health condition/substance dependence	
ACE score WITH pilot ACE				
≥ 4				
3	3.91 (2.39,6.37)		6.32 (3.81,10.51)	
2	1.85 (1.13,3.02)		5.72 (3.19,10.24)	
1	3.06 (1.93,4.85)		5.64 (3.36,9.45)	
0 (ref)	2.11 (1.53,2.92)		2.31 (1.41,3.81)	
	1.00		1.00	
ACE score WITHOUT pilot ACE				
≥ 4	3.94 (2.30,6.76)		5.43 (3.31,8.90)	
3	1.54 (0.94,2.55)		4.57 (2.57,8.13)	
2	2.47 (1.56,3.92)		4.89 (2.98,8.00)	
1	1.73 (1.24,2.42)		2.34 (1.46,3.75)	
0 (ref)	1.00		1.00	

Finally, nested models with and without the pilot household dysfunction ACE were compared to examine whether the additional ACE improved the model. To examine this, likelihood ratio tests were used. Likelihood ratio tests compare two models provided the simpler model is a special case of the more complex model (i.e., "nested"). For these comparisons, this test statistic is approximately Chi square with 1 df under the null hypothesis. Results in Table 25 show that the pilot ACE significantly improved the model for perceived physical health and diagnosed conditions.

Table 25. Comparing nested models with and without the pilot household dysfunction ACE (having a parent with a chronic physical condition)

Adult health outcome	Likelihood ratio test (Chi square)	P value
Poor physical health rating	10.25	0.001
Poor emotional health rating	1.98	0.16
Inadequate social support	2.34	0.13
Inadequate optimism	1.10	0.29
Any diagnosed chronic physical health condition	14.16	<0.001
Any diagnosed mental health condition or substance dependence	5.25	0.022

APPENDIX

APPENDIX I. ALBERTA SURVEY 2013

APPENDIX II. FINAL MULTIVARIABLE MODELS

2013 Alberta Survey

INTRO1

Hello, my name is _____. I'm calling (long distance) from the Population Research Laboratory at the University of Alberta. Have I dialed XXX-XXXX? Your phone number was randomly selected.

PRESS '1' TO CONTINUE

Hello, I am calling back from the Population Research Laboratory to continue an interview that we started previously.

INTRO2

The Population Research Laboratory is conducting a public opinion survey on behalf of university and policy researchers on various topics such as climate change, China's role in Canada's economy, interactions with financial institutions/debt usage/debt management, life experiences and health, Temporary Foreign Workers, public health/injuries, and alcohol use. This survey addresses different but current issues facing Albertans. Your opinions are very important and valuable to us and the information will be used to help with decision-making in developing public policies to improve programs and services in Alberta.

[OPTIONAL READ: The study sponsors are the Population Research Laboratory, University of Alberta researchers, Alberta Centre for Child, Family and Community Research, China Institute, and Alberta Centre for Injury Control and Research.]

PRESS '1' TO CONTINUE

NUMWOM

Before we start this interview, we need to make sure that we speak to an equal number of men and women. Can you please tell me ...

How many women (including yourself) aged 18 and older live at this number?

_____ Number of women (including yourself)

99 Refused **[DO NOT READ]**

NUMMEN

And how many men (including yourself) aged 18 and older live at this number?

_____ Number of men (including yourself)

99 Refused **[DO NOT READ]**

[TERMINATE THE INTERVIEW: If no one 18 years or older lives in the household.]

[RESPONDENT SELECTION GUIDELINES: Select a household respondent according to the standardized respondent selection guidelines.]

[OPTIONAL READ: We don't always speak to the person who answers the phone. If possible, we would like to speak to an adult member of the household who is 18 years of age or older. May I speak to the male/female who is available? (Repeat **INTRO** if necessary)] **[SCHEDULE CALLBACK IF NOT AVAILABLE]**

[INTERVIEWER NOTE: If looking for MALE – can say: as MALE QUOTA is harder to fill.]

VERIFY18

This interview will take approximately 20 minutes depending on how many questions apply to you. Is this a good time for me to continue?

And just to confirm, are you 18 years of age or older?

1 Yes, 18 years or older

2 No, underage **[ASK TO SPEAK TO ADULT MEMBER OF HOUSEHOLD]**

INTRO4

May we start the interview now?

1 Yes

2 No

[NOTE: CELL PHONES - If the person is on a cell phone, continue if he/she says it is okay. If they provide you with another number they would like you to call instead, record the new number in message line and schedule callback.]

FOIPP

I would like to assure you that your participation in this interview is completely voluntary. If there are any questions you don't wish to answer, please point these out to me and we'll go on to the next question. You, of course, have the right to end this phone call at any time.

The information you provide will be used only for the indicated purposes in conformity with the Alberta Freedom of Information and Protection of Privacy Act (FOIPP). Your answers are confidential and will be stored in a secured database only for study purposes. The results of this study will be analyzed only in group format. No single person will be identifiable.

If you have any questions about this study, you can call Rosanna Shih, Research Coordinator at the Population Research Lab at (780) 492-4659.

The plan for this study has been reviewed for its adherence to ethical guidelines by a Research Ethics Board at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at 780-492-2615.

PRESS '1' TO CONTINUE

STRATA Area of the Province

- 1 Metro Edmonton
- 2 Metro Calgary
- 3 Other Alberta

SEX1

RECORD GENDER OF RESPONDENT (IF NOT SURE, PLEASE ASK)

- 1 Male
- 2 Female

TIME

[INTERVIEWER NOTE: START TIMING NOW].

PRESS '1' TO CONTINUE

Section 4

Life Experiences and Health

Alberta Centre for Child, Family and Community Research

For Questions 1- 7:

The following questions have been asked to over 10,000 people to help us understand the relationship between life experiences and health.

Your answers are confidential. When survey results are published, only grouped information will be provided and no individuals will be identified.

While you were growing up, before your 18th birthday ...

E1

1. Did you frequently experience verbal insults or threats from an adult or parent in the household?

- 1 Yes
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

E2

(While you were growing up, before your 18th birthday ...)

2. Were you ever injured or bruised from physical abuse by an adult or parent in the household?

- 1 Yes
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

E3

(While you were growing up, before your 18th birthday ...)

3. Did you experience inappropriate sexual advances or contact by an adult or someone who was 5 or more years older than you?

- 1 Yes
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

[INTERVIEWER NOTE: This can be in household OR outside of household.]

E4

(While you were growing up, before your 18th birthday ...)

4. Did you ever witness your mother or stepmother being treated violently?

- 1 Yes
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

[INTERVIEWER NOTE: Types of violence included: pushed, grabbed, slapped, had something thrown at her, kicked, bitten, hit, etc.]

E5

(While you were growing up, before your 18th birthday ...)

5. Were you part of a household where someone abused alcohol or drugs?

- 1 Yes
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

E6

(While you were growing up, before your 18th birthday ...)

6. Were you part of a household where someone was depressed or mentally ill?

- 1 Yes
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

E7a

(While you were growing up, before your 18th birthday ...)

7. a. Were you part of a household where someone was diagnosed with a serious chronic illness or physical disability that limited or interfered with his/her daily activities?

- 1 Yes (GO TO 7b)
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

E7b

(While you were growing up, before your 18th birthday ...)

b. If Yes, please specify the chronic condition/illness or physical disability:

E8

(While you were growing up, before your 18th birthday ...)

8. Were your parents separated or divorced?

- 1 Yes
- 2 No

8 Don't know (volunteered) 0 No response (volunteered)

[INTERVIEWER NOTE: "Parents" – either biological or adopted (or combination – referring to those individuals that were the legal guardians.)

E9

(While you were growing up, before your 18th birthday ...)

9. On a scale of 1 to 10, where 1 is not at all stressful, and 10 is very stressful, and you can choose any number between 1 and 10, how stressful would you rate your childhood experiences?

- 1 Not at all stressful
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 Very stressful

- 11 Don't know (volunteered)
- 12 No response (volunteered)

E10

10. In general, how would you rate your emotional health today? (READ)

- 1 Excellent
- 2 Very good
- 3 Good
- 4 Fair
- 5 Poor

- 8 Don't know (volunteered)
- 0 No response (volunteered)

E11

11. In general, how would you rate your physical health today? (READ)

- 1 Excellent
- 2 Very good
- 3 Good
- 4 Fair
- 5 Poor

- 8 Don't know (volunteered)
- 0 No response (volunteered)

E12

How much do you agree with the following statements...

12. I have family and friends who help me feel safe, secure and happy. (READ)

- 1 Strongly agree
- 2 Agree
- 3 Disagree
- 4 Strongly disagree

8 Don't know (volunteered) 0 No response (volunteered)

E13

13. I usually expect things to go my way. (READ)

- 1 Strongly agree
- 2 Agree
- 3 Disagree
- 4 Strongly disagree

8 Don't know (volunteered) 0 No response (volunteered)

E14_1 to E14_28

14. Have you been diagnosed with any of the following health problems as an adult? (READ)

	E14_1 to E14_13		If Yes, did you receive treatment? E14_16 to E14_28	
	Yes	No	Yes	No
a. High Blood Pressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Diabetes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Irritable Bowel Syndrome/Crohn's disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Chronic Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Backache	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Asthma	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Allergies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Chronic fatigue syndrome/ fibromyalgia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Anxiety Disorder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. MDD (Major Depressive Disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Alcohol dependency problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Drug dependency problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Other - <u>NAME ONE MOST PROMINENT CONDITION</u> E14o <u>th</u>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

E14_14 No response to health problems

E14_15 Diagnosed with no health problems

Section 8: Demographic Section

These last questions will give us a better picture of the Albertans who took part in this study. The first questions are about employment.

K1a

1. What is your present employment status? Are you... **(READ)**

- 1 Employed full-time (30 or more hours/week)
- 2 Employed part-time (less than 30 hours/week)
- 3 Unemployed, LOOKING for work
- 4 Not in labour force, NOT looking for work
- 5 Student employed part-time or full-time
- 6 Student not employed
- 7 Retired
- 8 Homemaker
- 9 Maternity leave
- 10 On disability
- 11 Other (please specify) **K1aoth**

0 No response/Refused (volunteered) -1 Don't know (volunteered)

[NOTE: If semi-retired, probe for hours and put in "Other specify". If self-employed, probe for hours and enter as "1 – Full-time" or "2 – Part-time".]

K3a

2a. Including yourself, how many ADULTS live in your household (related to you or not)?

_____ # Adults (18+)

-1 No Response/Refused (volunteered)

K3b

2b. ...and how many CHILDREN under the age of 18 (live in your household)?

_____ # Children (Under 18)

-1 No Response/Refused (volunteered)

-2 NA-No response/Refused to K3a

K3c

2c. That is a total of ___people in the household, right?

Enter the total number of people: ___

- 1 No Response/Refused (volunteered)
- 2 NA-No response/Refused to K3a

AGE

3. What is your age?

___ Years Old

- 17 No response/Refused (volunteered)

AGEX – AGE GROUPED (COMPUTED VARIABLE)

- 1 18-24
- 2 25-34
- 3 35-44
- 4 45-54
- 5 55-64
- 6 65 and over

- 17 No response/Refused

K5a

4. What is your CURRENT marital status? (READ)

- 1 Never Married (Single)
- 2 Married
- 3 Common-Law Relationship/Live-In Partner
- 4 Divorced
- 5 Separated
- 6 Widowed

- 0 No Response/Refused (volunteered)

K6

5. What is your highest level of education (This includes complete and incomplete.)
[DO NOT READ]

- NO SCHOOLING.....1 (GO to question 7)
- ELEMENTARY
 - Incomplete.....2
 - Complete.....3
- JUNIOR HIGH
 - Incomplete.....4
 - Complete.....5
- HIGH SCHOOL
 - Incomplete.....6
 - Complete.....7
- COLLEGE/TECHNICAL INSTITUTE (non-University)
 - Incomplete.....8
 - Complete.....9
- UNIVERSITY
 - Incomplete.....10
 - Diploma/certificate11
 - Bachelor's Degree12
 - Professional Degree (vets,doctors,dentists,lawyers).....13
 - Master's Degree.....14
 - Doctorate.....15
- No Response/Refused (volunteered) 0 (GO TO question 7)

<p>K6GROUP – EDUCATION GROUPED (COMPUTED VARIABLE)</p> <p>1 Less Than High School</p> <p>2 High School Complete</p> <p>3 Post Secondary</p> <p>0 No Response/Refused</p>
--

K7

6. In total, how many years of schooling do you have? (This includes the total of grade school, high school, vocational, technical, and university.)

_____ Years of Schooling

- 98 No Response (volunteered)
- 99 Not applicable - No response/Refused to K6/

K8a

7. What is your religion, if any? (Probe with categories if needed)

- 1 No Religion (Including agnostic and atheist)
 - 2 Anglican
 - 3 Baptist
 - 4 Greek/Ukrainian Orthodox
 - 5 Jewish
 - 6 Lutheran
 - 7 Mennonite
 - 8 Latter Day Saints (Mormon)
 - 9 Pentecostal
 - 10 Presbyterian
 - 11 Catholic (including Roman Catholic, Ukrainian Catholic, Greek Catholic)
 - 12 United Church
 - 13 Protestant (not on list, Probe: Any particular denomination?)
 - 14 Christian (not on list, Probe: Any particular denomination?)
 - 15 Islam (including Sunni Islam, Shia Islam)
 - 16 Other (specify) _____ **K8aoth** _____
- 0 No Response (volunteered)

[NOTE: Other includes other faiths, i.e. Hindu, Buddhism, Bahai, Wicca, Native Spirituality, etc.]

MRELIG – RELIGION GROUPED (COMPUTED VARIABLE)

- 1 Protestant
- 2 Catholic
- 3 Other
- 4 No religion

- 0 No Response

CANB

8a. Were you born in Canada?

- 1 Yes (GO TO question 8b)
- 2 No (GO TO question 9)

- 0 No response/Refused (volunteered) (GO TO question 9)

ABB

8b. Were you born in Alberta?

- 1 Yes
- 2 No

- 0 No response/Refused (volunteered)
- 9 Not applicable – Born outside Canada/No response to CANB

CGRP

9. People living in Canada come from many different backgrounds. Are you ...?
(READ) (SELECT ONE ONLY)

- 1 White (Caucasian)
- 2 Aboriginal (e.g., First Nations, Inuit or Métis)
- 3 South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- 4 Chinese
- 5 Black
- 6 Filipino
- 7 Latin American
- 8 Arab
- 9 Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian, etc.)
- 10 West Asian (e.g., Iranian, Afghan, etc.)
- 11 Korean
- 12 Japanese
- 13 Other (please specify) _____ **cgrpoth** _____

- 0 No Response

K10

10. Would you say that you (and your family) are BETTER OFF, just the SAME, or WORSE OFF financially than you were a year ago?

- 1 Better Off
- 2 Just the Same
- 3 Worse Off

- 8 Don't Know (volunteered)
- 0 No Response (volunteered)

K11

11. Now looking ahead, do you think that a YEAR FROM NOW, you (and your family), will be BETTER OFF, just about the SAME, or WORSE OFF financially than now?

- 1 Better Off
- 2 Just the Same
- 3 Worse Off

- 8 Don't Know (volunteered)
- 0 No Response (volunteered)

K12a

12. What is the TOTAL income of ALL members of this HOUSEHOLD for the past year, BEFORE taxes and deductions? We're just looking for a ballpark figure.

[INTERVIEWER NOTE: Probe with categories as examples if needed.]

- | | | |
|------------------|------------------|------------------------------|
| 1 Under \$6,000 | 13 28,000-29,999 | 25 70,000-74,999 |
| 2 6,000-7,999 | 14 30,000-31,999 | 26 75,000-79,999 |
| 3 8,000-9,999 | 15 32,000-33,999 | 27 80,000-84,999 |
| 4 10,000-11,999 | 16 34,000-35,999 | 28 85,000-89,999 |
| 5 12,000-13,999 | 17 36,000-37,999 | 29 90,000-94,999 |
| 6 14,000-15,999 | 18 38,000-39,999 | 30 95,000-99,999 |
| 7 16,000-17,999 | 19 40,000-44,999 | 31 100,000-124,999 |
| 8 18,000-19,999 | 20 45,000-49,999 | 32 125,000-149,999 |
| 9 20,000-21,999 | 21 50,000-54,999 | 33 150,000+ |
| 10 22,000-23,999 | 22 55,000-59,999 | |
| 11 24,000-25,999 | 23 60,000-64,999 | 34 Don't Know (volunteered) |
| 12 26,000-27,999 | 24 65,000-69,999 | 35 No Response (volunteered) |

K13

13. Do you (or your spouse/partner/parents) presently own or rent your residence?

[INTERVIEWER NOTE: If respondent lives in parents' home and they own it, put own for respondent too.]

- 1 Own
- 2 Rent

- 0 No Response (volunteered)

K16a

14a. For this next question, please tell me: If an election was held today, how would you vote federally? (**DO NOT READ CATEGORIES**)

- 1 Conservative Party of Canada (PC or Tory)
- 2 Green Party of Canada
- 3 Liberal Party of Canada (Liberals)
- 4 New Democratic Party (NDP)
- 5 Other (specify) _____ **K16aoth** _____

- 6 Would not vote
- 7 Not eligible

- 8 Don't know (volunteered) 0 No response/Refused (volunteered)

[**INTERVIEWER:** Only if necessary, probe for the name of a political party.]

K16b

(If an election was held today, how would you vote?)

14b. Provincially? (**DO NOT READ CATEGORIES**)

- 1 Alberta First Party
- 2 Alberta Liberal Party (Liberal)
- 3 Alberta New Democratic Party (NDP)
- 4 Alberta Party
- 5 Alberta Social Credit Party
- 6 Communist Party – Alberta
- 7 Green Party of Alberta
- 8 Progressive Conservative Association of Alberta (PC/Tory)
- 9 Wildrose Alliance Party
- 10 Other (Specify) _____ **K16both** _____

- 11 Not eligible
- 12 Eligible to vote but would not vote
- 13 No response/Refused (volunteered)
- 14 Don't know (volunteered)

[**INTERVIEWER:** Only if necessary, probe for the name of a political party.]

K17

15. To ensure that we have reached people from all areas of the province, may I please have **the first 3 digits of** your postal code?

ENTER POSTAL CODE _____ [T#X]
[INTERVIEWER NOTE: It should start with a CAPITAL "T", e.g., T2A]

T99 No Response/Don't know (volunteered)

WTX – Weights from Cansim estimate for 2012

The weighting factors used for the 2013 Alberta Survey are as follows:

Metro Edmonton: 0.968297
Metro Calgary: 1.024013
Other Alberta: 1.007867

BLAST

We've reached the end of the interview. All your answers are confidential and anonymous. If you have any questions about this study, here is the name and number again of the PRL research coordinator. You may call Rosanna Shih at (780) 492-4659. Thank you very much for your time and participation.

LENGTH

Please enter length of interview.

____ Length in minutes

SEX2

Enter sex of respondent

- 1 MALE
- 2 FEMALE

(Interviewer Note: This should be the same as SEX1.)

SEX3

Please type in "him" or "her" to indicate the sex of the respondent you just interviewed.

_____ enter 'him' or 'her'

DECLARE

I declare that this interview was conducted in accordance with the interviewing and sampling instructions given by the Population Research Laboratory at the University of Alberta. I agree that the content of all respondent's comments/answers will be kept confidential.

PLEASE ENTER YOUR INTERVIEWER NUMBER

_____ Interviewer #

ENDQ

Go back through the questionnaire for your final edit before recording it as complete.

Please ensure you edit all responses. Once you have finished editing your responses, press '1' to code as complete.

TERMZ

Unfortunately we have already interviewed all the people we need for your region of Alberta. Thank you very much for your time.

PRESS '1' TO CONTINUE

TER18

Unfortunately we can only interview people over the age of 18. Thank you for your time today.

[Interviewer instruction: If no one 18 years or older lives in the household, terminate the interview. Select a household respondent only according to the standardized respondent selection guidelines. Code as 'no qualified respondent'.]

MISTAKE

Sex1 and sex2 do not match. Please escape to sex1 and sex2 and edit so that both sexes match. Thank you!

APPENDIX II. FINAL MULTIVARIABLE MODELS

Multivariable regression models for adult health outcomes

Perceived physical health and any abuse

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any abuse		
Yes	1.93 (1.35, 2.76)	1.90 (1.40, 2.59)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.46 (1.58, 3.84)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	2.37 (1.64, 3.44)	
FT/PT (ref)	1.00	
Education		
High school or less	1.16 (0.78, 1.74)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.32 (0.82, 2.12)	
≥1 (ref)	1.00	
Marital status		
Other	0.97 (0.65, 1.45)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.19 (0.83, 1.70)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.17 (0.72, 1.89)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.70 (0.40, 1.22)	
Other (ref)	1.00	
Gender		
Female	0.94 (0.66, 1.33)	
Male (ref)	1.00	
Age	1.00 (0.99, 1.02)	

Perceived physical health and any household dysfunction

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any household dysfunction		
Yes	2.45 (1.71, 3.51)	1.90 (1.41, 2.56)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.48 (1.58, 3.88)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	2.32 (1.60, 3.36)	
FT/PT (ref)	1.00	
Education		
High school or less	1.15 (0.77, 1.72)	
Postsecondary (ref)	1.00	
Number of children in household		

None ≥1 (ref)	1.28 (0.80, 2.07) 1.00	
Marital status Other Married/Common-Law (ref)	0.98 (0.65, 1.47) 1.00	
Community type Rural Urban (ref)	1.19 (0.83, 1.70) 1.00	
Born in Canada Yes No (ref)	1.06 (0.65, 1.73) 1.00	
Ethnicity Caucasian Other (ref)	0.73 (0.42, 1.28) 1.00	
Gender Female Male (ref)	1.03 (0.73, 1.45) 1.00	
Age	1.01 (0.99, 1.02)	

Perceived physical health and cumulative ACE score

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
ACE score		
≥3	3.10 (1.96, 4.93)	2.38 (1.63, 3.48)
1-2	2.05 (1.36, 3.08)	1.65 (1.17, 2.32)
None (ref)	1.00	1.00
Total household income \$39,999 or less \$40,000 or more (ref)	2.48 (1.58, 3.89) 1.00	
Employment status Not FT/PT FT/PT (ref)	2.36 (1.63, 3.43) 1.00	
Education High school or less Postsecondary (ref)	1.15 (0.77, 1.72) 1.00	
Number of children in household None ≥1 (ref)	1.28 (0.80, 2.07) 1.00	
Marital status Other Married/Common-Law (ref)	0.95 (0.64, 1.43) 1.00	
Community type Rural Urban (ref)	1.20 (0.84, 1.72) 1.00	
Born in Canada Yes No (ref)	1.06 (0.65, 1.73) 1.00	
Ethnicity Caucasian Other (ref)	0.73 (0.42, 1.27) 1.00	
Gender Female Male (ref)	0.94 (0.66, 1.34) 1.00	
Age	1.01 (0.99, 1.02)	

Perceived emotional health and any abuse

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any abuse		
Yes	2.18 (1.40, 3.37)	2.13 (1.46, 3.10)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.38 (1.39, 4.06)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.71 (1.09, 2.68)	
FT/PT (ref)	1.00	
Education		
High school or less	1.89 (1.19, 3.01)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.77 (1.00, 3.14)	
≥1 (ref)	1.00	
Marital status		
Other	1.01 (0.62, 1.65)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.11 (0.72, 1.73)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.79 (0.89, 3.61)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.88 (0.44, 1.78)	
Other (ref)	1.00	
Gender		
Female	1.05 (0.68, 1.62)	
Male (ref)	1.00	
Age	0.97 (0.96, 0.99)	

Perceived emotional health and any household dysfunction

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any household dysfunction		
Yes	2.42 (1.53, 3.83)	2.36 (1.60, 3.48)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.39 (1.39, 4.09)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.64 (1.04, 2.58)	
FT/PT (ref)	1.00	
Education		
High school or less	1.80 (1.13, 2.86)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.72 (0.97, 3.04)	
≥1 (ref)	1.00	
Marital status		
Other	1.02 (0.62, 1.66)	
Married/Common-Law (ref)	1.00	

Community type		
Rural	1.12 (0.72, 1.74)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.70 (0.84, 3.43)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.89 (0.44, 1.79)	
Other (ref)	1.00	
Gender		
Female	1.17 (0.76, 1.79)	
Male (ref)	1.00	
Age	0.98 (0.97, 1.00)	

Perceived emotional health and cumulative ACE score

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
ACE score		
≥3	3.15 (1.81, 5.46)	3.11 (1.95, 4.95)
1-2	1.71 (1.01, 2.90)	1.65 (1.05, 2.59)
None (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.36 (1.38, 4.04)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.68 (1.07, 2.65)	
FT/PT (ref)	1.00	
Education		
High school or less	1.80 (1.13, 2.86)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.71 (0.96, 3.05)	
≥1 (ref)	1.00	
Marital status		
Other	1.01 (0.62, 1.65)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.14 (0.73, 1.78)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.65 (0.82, 3.31)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.90 (0.45, 1.82)	
Other (ref)	1.00	
Gender		
Female	1.06 (0.69, 1.63)	
Male (ref)	1.00	
Age	0.98 (0.96, 0.99)	

Perceived inadequate social support and any abuse

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any abuse		
Yes	3.78 (1.89, 7.56)	3.55 (2.01, 6.26)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	3.34 (1.50, 7.47)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.83 (0.88, 3.83)	
FT/PT (ref)	1.00	
Education		
High school or less	1.44 (0.67, 3.07)	
Postsecondary (ref)	1.00	
Number of children in household		
None	0.86 (0.36, 2.10)	
≥1 (ref)	1.00	
Marital status		
Other	1.26 (0.57, 2.75)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	0.67 (0.31, 1.44)	
Urban (ref)	1.00	
Born in Canada		
Yes	0.62 (0.26, 1.48)	
No (ref)	1.00	
Ethnicity		
Caucasian	2.67 (0.75, 9.52)	
Other (ref)	1.00	
Gender		
Female	0.47 (0.23, 0.95)	
Male (ref)	1.00	
Age	0.98 (0.95, 1.00)	

Perceived inadequate social support and any household dysfunction

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any household dysfunction		
Yes	2.42 (1.16, 5.01)	2.59 (1.40, 4.78)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	3.23 (1.44, 7.23)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.78 (0.85, 3.70)	
FT/PT (ref)	1.00	
Education		
High school or less	1.30 (0.61, 2.78)	
Postsecondary (ref)	1.00	
Number of children in household		
None	0.85 (0.36, 2.05)	
≥1 (ref)	1.00	
Marital status		
Other	1.31 (0.60, 2.85)	
Married/Common-Law (ref)	1.00	

Community type		
Rural	0.73 (0.34, 1.56)	
Urban (ref)	1.00	
Born in Canada		
Yes	0.60 (0.25, 1.43)	
No (ref)	1.00	
Ethnicity		
Caucasian	2.32 (0.66, 8.17)	
Other (ref)	1.00	
Gender		
Female	0.60 (0.30, 1.78)	
Male (ref)	1.00	
Age	0.98 (0.96, 1.01)	

Perceived inadequate social support and cumulative ACE score

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
ACE score		
≥3	4.19 (1.68, 10.43)	4.62 (2.19, 9.75)
1-2	2.34 (0.97, 5.62)	2.20 (1.03, 4.67)
None (ref)	1.00	1.00
Total household income		
\$39,999 or less	3.18 (1.42, 7.14)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.79 (0.86, 3.75)	
FT/PT (ref)	1.00	
Education		
High school or less	1.32 (0.62, 2.81)	
Postsecondary (ref)	1.00	
Number of children in household		
None	0.84 (0.35, 2.03)	
≥1 (ref)	1.00	
Marital status		
Other	1.29 (0.59, 2.81)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	0.72 (0.34, 1.55)	
Urban (ref)	1.00	
Born in Canada		
Yes	0.58 (0.24, 1.38)	
No (ref)	1.00	
Ethnicity		
Caucasian	2.41 (0.69, 8.48)	
Other (ref)	1.00	
Gender		
Female	0.53 (0.27, 1.06)	
Male (ref)	1.00	
Age	0.98 (0.96, 1.01)	

Perceived inadequate optimism and any abuse

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any abuse		
Yes	1.39 (1.02, 1.90)	1.61 (1.23, 2.11)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	1.40 (0.93, 2.11)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.17 (0.86, 1.60)	
FT/PT (ref)	1.00	
Education		
High school or less	1.61 (1.14, 2.26)	
Postsecondary (ref)	1.00	
Number of children in household		
None	0.92 (0.63, 1.32)	
≥1 (ref)	1.00	
Marital status		
Other	1.71 (1.23, 2.40)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.46 (1.08, 1.98)	
Urban (ref)	1.00	
Born in Canada		
Yes	0.95 (0.64, 1.42)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.63 (0.40, 1.01)	
Other (ref)	1.00	
Gender		
Female	1.03 (0.77, 1.38)	
Male (ref)	1.00	
Age	1.00 (0.99, 1.01)	

Perceived inadequate optimism and any household dysfunction

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any household dysfunction		
Yes	1.26 (0.94, 1.67)	1.27 (1.00, 1.62)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	1.42 (0.94, 2.13)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.16 (0.85, 1.58)	
FT/PT (ref)	1.00	
Education		
High school or less	1.59 (1.13, 2.23)	
Postsecondary (ref)	1.00	
Number of children in household		
None	0.91 (0.63, 1.32)	
≥1 (ref)	1.00	
Marital status		
Other	1.71 (1.23, 2.40)	
Married/Common-Law (ref)	1.00	

Community type		
Rural	1.46 (1.08, 1.98)	
Urban (ref)	1.00	
Born in Canada		
Yes	0.94 (0.63, 1.40)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.64 (0.40, 1.01)	
Other (ref)	1.00	
Gender		
Female	1.08 (0.81, 1.44)	
Male (ref)	1.00	
Age	1.00 (0.99, 1.01)	

Perceived inadequate optimism and cumulative ACE

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
ACE score		
≥3	1.35 (0.92, 1.99)	1.52 (1.10, 2.11)
1-2	1.27 (0.93, 1.75)	1.22 (0.93, 1.61)
None (ref)	1.00	1.00
Total household income		
\$39,999 or less	1.42 (0.94, 2.14)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.16 (0.85, 1.59)	
FT/PT (ref)	1.00	
Education		
High school or less	1.59 (1.13, 2.23)	
Postsecondary (ref)	1.00	
Number of children in household		
None	0.91 (0.63, 1.31)	
≥1 (ref)	1.00	
Marital status		
Other	1.70 (1.22, 2.38)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.46 (1.08, 1.98)	
Urban (ref)	1.00	
Born in Canada		
Yes	0.93 (0.63, 1.40)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.64 (0.40, 1.01)	
Other (ref)	1.00	
Gender		
Female	1.06 (0.79, 1.41)	
Male (ref)	1.00	
Age	1.00 (0.99, 1.01)	

Diagnosed any chronic physical health condition and any abuse

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any abuse		
Yes	1.78 (1.26, 2.52)	2.15 (1.58, 2.92)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	1.22 (0.75, 2.00)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.54 (1.12, 2.13)	
FT/PT (ref)	1.00	
Education		
High school or less	1.08 (0.74, 1.57)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.17 (0.82, 1.66)	
≥1 (ref)	1.00	
Marital status		
Other	1.33 (0.93, 1.92)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.11 (0.81, 1.52)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.63 (1.08, 2.44)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.93 (0.58, 1.49)	
Other (ref)	1.00	
Gender		
Female	0.84 (0.62, 1.13)	
Male (ref)	1.00	
Age	1.03 (1.02, 1.04)	

Diagnosed any chronic physical health condition and any household dysfunction

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any household dysfunction		
Yes	2.33 (1.73, 3.14)	2.25 (1.74, 2.90)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	1.21 (0.74, 2.16)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.53 (1.11, 2.13)	
FT/PT (ref)	1.00	
Education		
High school or less	1.03 (0.70, 1.51)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.13 (0.79, 1.60)	
≥1 (ref)	1.00	
Marital status		
Other	1.35 (0.94, 1.95)	
Married/Common-Law (ref)	1.00	

Community type		
Rural	1.10 (0.75, 1.37)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.29 (0.80, 1.52)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.96 (0.59, 1.55)	
Other (ref)	1.00	
Gender		
Female	0.88 (0.65, 1.18)	
Male (ref)	1.00	
Age	1.03 (1.02, 1.05)	

Diagnosed any chronic physical health condition and cumulative ACE score

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
ACE score		
≥3	2.55 (1.69, 3.84)	2.71 (1.90, 3.87)
1-2	2.32 (1.66, 3.23)	2.27 (1.71, 3.02)
None (ref)	1.00	1.00
Total household income		
\$39,999 or less	1.22 (0.75, 2.01)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.54 (1.11, 2.14)	
FT/PT (ref)	1.00	
Education		
High school or less	1.03 (0.70, 1.51)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.12 (0.78, 1.59)	
≥1 (ref)	1.00	
Marital status		
Other	1.33 (0.92, 1.91)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.09 (0.79, 1.51)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.55 (1.03, 2.34)	
No (ref)	1.00	
Ethnicity		
Caucasian	0.95 (0.59, 1.54)	
Other (ref)	1.00	
Gender		
Female	0.83 (0.62, 1.12)	
Male (ref)	1.00	
Age	1.03 (1.02, 1.05)	

Diagnosed any mental health condition/substance dependence and any abuse

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any abuse		
Yes	3.00 (2.05, 4.38)	3.11 (2.23, 4.34)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.14 (1.31, 3.48)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.38 (0.93, 2.06)	
FT/PT (ref)	1.00	
Education		
High school or less	0.87 (0.56, 1.37)	
Postsecondary (ref)	1.00	
Number of children in household		
None	2.04 (1.23, 3.37)	
≥1 (ref)	1.00	
Marital status		
Other	1.37 (0.90, 2.09)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.02 (0.69, 1.51)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.83 (0.99, 3.40)	
No (ref)	1.00	
Ethnicity		
Caucasian	2.46 (1.14, 5.33)	
Other (ref)	1.00	
Gender		
Female	1.29 (0.88, 1.88)	
Male (ref)	1.00	
Age	0.97 (0.96, 0.99)	

Diagnosed any mental health condition/substance dependence and any household dysfunction

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
Any household dysfunction		
Yes	3.11 (2.08, 4.65)	3.65 (2.54, 5.26)
No (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.18 (1.34, 3.56)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.31 (0.88, 1.95)	
FT/PT (ref)	1.00	
Education		
High school or less	0.82 (0.52, 1.29)	
Postsecondary (ref)	1.00	
Number of children in household		
None	2.00 (1.21, 3.31)	
≥1 (ref)	1.00	
Marital status		
Other	1.35 (0.88, 2.05)	
Married/Common-Law (ref)	1.00	

Community type		
Rural	1.05 (0.71, 1.55)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.70 (0.92, 3.16)	
No (ref)	1.00	
Ethnicity		
Caucasian	2.43 (1.13, 5.21)	
Other (ref)	1.00	
Gender		
Female	1.52 (1.05, 2.22)	
Male (ref)	1.00	
Age	0.98 (0.97, 0.99)	

Diagnosed any mental health condition/substance dependence and cumulative ACE score

Independent variable	Adjusted OR (95% CI)	Unadjusted OR (95% CI)
ACE score		
≥3	5.48 (3.28, 9.17)	6.08 (3.85, 5.11)
1-2	2.84 (1.75, 4.62)	3.30 (2.13, 5.11)
None (ref)	1.00	1.00
Total household income		
\$39,999 or less	2.16 (1.32, 3.54)	
\$40,000 or more (ref)	1.00	
Employment status		
Not FT/PT	1.35 (0.90, 2.02)	
FT/PT (ref)	1.00	
Education		
High school or less	0.81 (0.52, 1.28)	
Postsecondary (ref)	1.00	
Number of children in household		
None	1.96 (1.18, 3.26)	
≥1 (ref)	1.00	
Marital status		
Other	1.34 (0.88, 2.06)	
Married/Common-Law (ref)	1.00	
Community type		
Rural	1.07 (0.72, 1.59)	
Urban (ref)	1.00	
Born in Canada		
Yes	1.65 (0.89, 3.07)	
No (ref)	1.00	
Ethnicity		
Caucasian	2.56 (1.18, 5.52)	
Other (ref)	1.00	
Gender		
Female	1.33 (0.91, 1.95)	
Male (ref)	1.00	
Age	0.98 (0.97, 0.99)	