Impact of being taken into out-of-home care: a longitudinal cohort study of First Nations and other child welfare agencies in Manitoba, Canada

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Summary

Background Across Canada, Child Protection Services (CPS) disrupt Indigenous families by apprehending their children at alarmingly high rates. The harms borne by children in out-of-home care (OoHC) have been extensively documented. We examined the impact of OoHC on Manitoba children's health and legal system outcomes to provide rigorous evidence on how discretionary decision-making by CPS agencies can affect these outcomes.

Methods In partnership with First Nations researchers, we used linked administrative data to identify Manitoba children (born 2007–2018) served by First Nations and other Manitoba CPS agencies. We compared those taken into OoHC (n = 19,324) with those never in care but with an open CPS file due to child protection concerns (n = 27,290). We used instrumental variable analysis (CPS agency rates of OoHC as the instrument) to obtain odds ratios (aOR) and 95% confidence intervals adjusted for child, maternal, and family factors.

Findings Mean age (yrs ± standard deviation) at first CPS contact for children taken into OoHC was 2.8 ± 3.7 (First Nations) and 3.0 ± 3.8 (other), and for children never in care was 4.5 ± 4.5 (First Nations) and 5.1 ± 4.7 (other). Among children served by a First Nations agency, males made up 50.6% (n = 5496) in OoHC and 51.0% (n = 6579) never in care. Among children served by other agencies, males made up 51.0% (n = 4324) in OoHC and 51.0% (n = 7428) never in care. Odds of teen pregnancy (First Nations aOR 3.69, 1.40–9.77; other aOR 5.10, 1.83–14.25), teen birth (First Nations aOR 3.23, 1.10–9.49; other aOR 5.06, 1.70–15.03), and sexually transmitted infections (other aOR 7.21, 3.63–14.32) were higher for children in care than children never in care, as were odds of being accused (other aOR 2.71, 1.27–5.75), a victim (other aOR 1.68, 1.10–2.56), charged with a crime (other aOR 2.68, 1.21–5.96), or incarcerated (First Nations aOR 3.64, 1.95–6.80; other aOR 1.19, 1.19–8.04).

Interpretation Being in OoHC worsened children's health and legal system outcomes. The importance of reducing the number of children taken into care was emphasized in briefings to provincial and First Nations governments. The government response will be monitored.

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Research in context

Evidence before this study

We used Google Scholar and the University of Manitoba Libraries databases to search for studies exploring outcomes of children taken into the care of child protection services (September 2021–April 2023). We used the following search terms: ("foster care" OR "child welfare" OR "child protection services" OR "child welfare services") AND ("out-of-home-care" AND "in-home-care" AND "kinship care") AND ("child outcomes") OR ("child health outcomes" AND "child social outcomes" AND "child educational outcomes" AND "child justice outcomes") AND ("Indigenous" OR "Aboriginal" AND "First Nations" AND "Metis" AND "Inuit").

Most studies we identified focused on health and social outcomes of children who were in out-of-home care in the US, Europe, and Australia. Research from around the world suggests that compared to their peers in the general population, children in the child welfare system experience more mental health problems, are more likely to use alcohol, cannabis, and other substances, are at higher risk of being unhoused, are less likely to graduate high school, and are at higher risk of being involved in the justice system. Our literature review also included two reports produced by researchers at the Manitoba Centre for Health Policy; these reports focused specifically on outcomes of Manitoba children involved in Child Protection Services (CPS). The previously published literature makes a strong case for out-of-home care being a significant contributor to adverse child outcomes; however, most of the studies we found are observational and the direct cause of the outcomes is difficult to determine.

In addition to peer-reviewed literature, we sought evidence from a larger partnership called SPECTRUM to inform this study. SPECTRUM brings together government, community groups, academics, and people with lived experience to implement evidence-based approaches that strengthen social and health policies in Canada. Eleven partnership workshops were held between September 2019 and September 2023 to share knowledge and provide input on the research question, interpretation of results, and knowledge mobilization planning for the study presented here.

Added value of this study

The First Nations context of our study is unique and makes an important contribution, given the degree to which First Nations children are over-represented in the child welfare system. As well, to the best of our knowledge, this study is the first in Canada to use whole-population data to isolate the protective impacts of supporting at-risk children in their own homes. While most observational studies examining outcomes for children in out-of-home care have been unable to account for unmeasured confounding, our use of instrumental variable analysis is able to isolate the impact of being taken into care from associated factors, allowing us to gain a better understanding of the relationships between CPS and a broad range of health, social, and legal system outcomes, which will inform laws, policies, and practices to better support vulnerable children and youth.

Implications of all the available evidence

The new evidence our study provides about out-of-home care being as risky (or more) as leaving a child requiring protection at home will inform decision-making at both the service provider and the policy level. Our findings will also provide support for Indigenous communities across Canada which are beginning to enact their own child and family laws under the *Act Respecting First Nations, Inuit and Metis Children, Youth and Families*, which affirms their inherent right of self-government, as upheld by the Supreme Court of Canada. Manitoba child welfare authorities can now transfer information, supervision of care, and guardianship of children in care held by the province to First Nations that have enacted their own laws through coordination agreements. Within our research partnership, the Deputy Minister of the Department of Families has articulated the government's support for First Nations in this regard, and has noted the importance of the evidence presented here for driving changes to the child welfare system. We will monitor actions taken by governments in response to the evidence, such as changes to programs and policies.

Introduction

Canadian colonial policies and systems have created an intergenerational legacy of trauma among Indigenous Peoples. In 2021, ground-penetrating radar uncovered the remains of 215 Indigenous children buried on the grounds of the former Kamloops Indian Residential School in British Columbia, sparking a national movement to examine other former residential school grounds in Canada.[1] Thousands of unmarked graves have since been discovered, bringing to light the cruelty of Canada's historical treatment of Indigenous children and families. The residential school system is now acknowledged to have been a form of cultural genocide.[2] Although the last residential school closed in 1996, other systems

enacted by the Canadian government contribute to contemporary issues facing Indigenous families.[3] Indeed, the child welfare system has replaced residential schools as a disrupter of Indigenous families, identity, and culture.[4] There are now more Indigenous children in out-of-home care (OoHC) than there were in residential schools at the peak of their operation,[5] and in reports from Canadian provinces like Manitoba, as many as 90% of children in care are Indigenous.[6] Despite widespread awareness of the devastating impacts of residential schools on Indigenous families and communities, child welfare systems across Canada continue to apprehend Indigenous children at alarmingly high rates.[7]

The term OoHC refers to placement of children in residential, foster, community or kinship care[8]; children who are 'in care' have been removed from the care of their parents because the parents were deemed unfit to look after their children by Child Protection Services (CPS) authorities. Extensive research has documented the wide-reaching negative effects borne by children who have spent time in OoHC. A systematic review of studies from the US, Europe, and Australia reports that children who have been in care have more mental health problems and are more likely to use alcohol, cannabis, and other substances than peers in the general population.[9] In Canada, youth with a history of involvement with CPS are at higher risk of experiencing homelessness.[10] In a Manitoba study, almost half (48%) of youth who had previously been in care of CPS had criminal charges by age 21, and only 38% graduated from high school.[11] These types of negative outcomes have been linked to the trauma children experience when they are removed from their families and communities.[11] And the over-representation of Indigenous (and specifically First Nations) children in the Manitoba child welfare system result in disproportionate negative impacts on First Nations families, perpetuating a multi-generational cycle of disadvantage. However, although the above research presents a compelling case for OoHC being a contributor to adverse outcomes, these studies are observational and the direct cause of the outcomes is difficult to disentangle from other factors. Child maltreatment, exposure to intimate partner violence, parental mental disorders and addictions, extreme poverty, and other risk factors may all contribute to child apprehension[12] and thus to the negative outcomes attributed to being taken into OoHC. Some studies have used quasi-experimental methods[13–17] or sibling analyses[18,19] to try to isolate the impact of OoHC on outcomes—with varied results. Drange et al. conclude that despite high internal validity, the divergent findings of these studies underline the difficulties of extrapolating the current evidence to other settings.[14]

In Manitoba, we saw an opportunity to address some of the existing gaps in knowledge and produce important evidence to better support vulnerable children and youth. The province has high rates of children in care,[12] resulting from a combination of factors such as lower thresholds for neglect,[13] apprehension decisions influenced by poverty, inadequate housing, and parental substance use,[14] and a tendency towards higher risk aversion following the public scrutiny associated with high-profile CPS cases.[15] Manitoba also has a comprehensive population-wide Data Repository containing administrative data from the health system, social services, the education system, and the legal system, allowing for key individual and family characteristics to be taken into account in population-wide analyses, and providing the ability to examine a broad range of outcomes in a population generalizable to other settings.

In our study, researchers from the University of Manitoba (UM), the First Nations Family Advocate Office (FNFAO), and the First Nations Health and Social Secretariat of Manitoba (FNHSSM) worked together to determine the impact of OoHC on Manitoba children's health and legal system outcomes. We compared the outcomes of children who were taken into OoHC by CPS to those who were not taken into care but had an open CPS file due to child protection concerns.

Methods

Partnership approach

This research is part of a larger research partnership called SPECTRUM, which aims to implement collaborative, cross-sector, and evidence-based approaches to strengthen the policies that shape social services and systems in Canada.[20] The study described here was first conceptualized by the SPECTRUM partnership and carried out by a smaller research team, which included researchers from the UM, FNFAO, and FNHSSM, operating in accordance with the First Nations OCAP® principles for data governance.[21] As part of our partnership approach, we engaged an Advisory Circle of First Nations Elders and Grandmothers to provide input on the research question, interpretation of results, and knowledge mobilization plan.

Ethics approvals

The study received approval from the Health Information Research Governance Committee at FNHSSM (2019) and the UM Human Research Ethics Board (HS24744—H2021:110). With regard to privacy and confidentiality, under provincial legislation, individual patients or participants must give consent for disclosure and use of their data in research when direct contact with these individuals is anticipated. However, the UM Human Research Ethics Board waived the requirement for individual consent because the study employs secondary use of data, and therefore there is no direct contact with patients or participants; as well, several measures (such as de-identification of the data and both physical and digital limitations to accessing the data

used in this study) have been taken to protect individual privacy. More details on privacy and protection measures at MCHP are available here.[22]

Data sources

The study followed the STROBE guidelines for reporting observational studies (Supplementary Table S1). Data were derived from the Manitoba Population Research Data Repository housed at the UM. The Repository contains de-identified administrative data records for the entire population of Manitoba, which are routinely collected during the administration of the health, social services, education, and legal systems. Using a population registry, each contact with public systems and services can be linked at the level of the individual across sectors and over time. The Repository data have excellent linkage accuracy and have been used extensively for population health, public health, and social sciences research.[23] Databases used in this study are shown in Table 1.

Cohort development

We identified all children born in Manitoba (First Nations and non-First Nations) from fiscal years 2007/08–2017/18 who had a CPS file opened before age 18 (Fig. 1). We removed children who could not be linked to their birth mother; had a gap in health insurance coverage (e.g., due to living out of province); were in OoHC for three days or less; were recorded as having a CPS file open with a government department that does not make placement decisions; or had a record of substantiated abuse (including physical, sexual, and/or emotional abuse). This latter group was excluded because it was expected that these children would be unlikely candidates for remaining with their families. After exclusions, the cohort was divided into children served by First Nations CPS agencies and all other CPS agencies in Manitoba, and further divided into children who were taken into OoHC and children who were never in care but had an open CPS file due to child protection concerns. Outcomes were measured up to March 31, 2021.

Variables

Covariates

Child characteristics (sex; diagnosed mental disorder; diagnosed physical health condition[24]; age and year of first file opened with CPS; First Nations status; whether the child lived on/off reserve) and maternal characteristics (age at the birth of their first child; number of previous pregnancies; diagnosed mental disorder; involvement in the legal system; income assistance receipt; residing in social housing; and had a CPS file as a child). All covariates were determined based on information from prior to the child's first contact with CPS. More details are available in Supplementary Table S2.

Outcome variables

We selected a range of health and legal system outcomes from infancy to adolescence to describe the impact of being taken into OoHC. These included health outcomes (vaccination status at age 2; hospitalization; mortality; sexually transmitted infections; teen pregnancy; teen birth; suicide attempts and deaths; diagnosis of mental disorders) and legal system outcomes (being a witness, accused/charged, or victim of a crime; incarceration). The cohorts for the respective analyses were limited to those who would have been eligible for the outcomes, which we measured up to March 31, 2021. More details are available in Supplementary Table S3.

At study outset, we also planned to measure education outcomes (child development scores at school entry; and reading, writing and numeracy assessments in grades 3, 7, and 8, which was the farthest we could go forward in time, given the birth years of the cohort). However, there was substantial missing education assessment information (29.3% missing for grade 7 assessments; 48.2% missing for kindergarten assessments) for children served by First Nations agencies. Thus, the education outcomes were excluded from the final analyses.

Statistical analysis

We used SAS software V9.4 for all analyses. We reported descriptive characteristics using standardized differences to assess balance across exposure groups; differences <0.1 indicating balance were calculated as percentages with standard deviations.[25] We also reported crude proportions of the health and legal system outcomes. For the 28 CPS agencies in Manitoba, we calculated rates of placing children into OoHC (OoHC rate), where the numerator was the number of children placed into OoHC within one year of their first contact with that agency, and the denominator was the total number of children whose family had a file opened with the agency.

We used instrumental variable analysis to examine the impact of CPS involvement on outcomes, comparing children who were placed in OoHC to children who had never been in care but had an open CPS file.[26] Instrumental variable analysis is an econometric method used to remove hidden bias in observational studies. An instrumental variable has two key characteristics: it is associated with the treatment and it does not independently affect the outcome so that it is not associated with measured or unmeasured child/family characteristics. Instrumental variables can adjust for both observed and unobserved confounding effects, whereas other methods such as stratification, matching, and multiple regression can only adjust for observed confounders.[26] Our models used the individual child as the unit of analysis and the instrumental variable was the CPS agency's OoHC rate.

Domain	Database	Description	Years
Registry	Manitoba Health Insurance Registry	Whole-population demographic information on residents of Manitoba, including birthdate and biological sex	1997–2019
	Manitoba First Nations Research File	Demographic information on registered First Nations individuals living in Manitoba	2016
Health	Hospital Discharge Abstracts	Demographic and clinical information at discharge from hospital	1979/80–2018/19
	Drug Program Information Network	Prescription claims information from community pharmacies	1995/96–2018/19
	Manitoba Immunization Monitoring System	Vaccination history, including date, vaccine, number of doses	1996/97–2018/19
	Laboratory Information Management System	Laboratory services information, including tests performed and test results	2009–2019
	Medical Claims/Medical Services	Physician and nurse practitioner claims for patient visits, including reason for visit and treatment	1979/80–2018/19
	Manitoba Public Health Information Management System	Information on immunizations and communicable disease	1997–2019
Social	Child and Family Services	Application and intake information on children in care and families receiving services	1992/93–2018/19
	Tenant Management System	Information on individuals residing in social housing units	2004/05–2017/18
	Rent Assist	Information on individuals receiving financial support to pay for housing	2004/05–2017/18
	Employment Income Assistance and Social Allowances Management	Information on individuals receiving social assistance and employment insurance	2004/05–2017/18
Education	Early Development Instrument	Information on children's developmental vulnerability at school entry	2006–2019
	Enrollment, Marks, and Assessments	Information on student assessments in Grades 3, 7 and 8	1997–2019
Legal System	Prosecution Information and Scheduling Management	Information on involvement in legal system incidents (e.g., accused, victim, and witness to a crime)	2002–2019
	Criminal Courts Automated Information Network	Information on criminal charges and court appearances	2002–2018
	Corrections Offenders Management System	Information on incarceration	2002–2019

Housed in the Manitoba Population Research Data Repository.

Table 1: **Databases used in the study.**

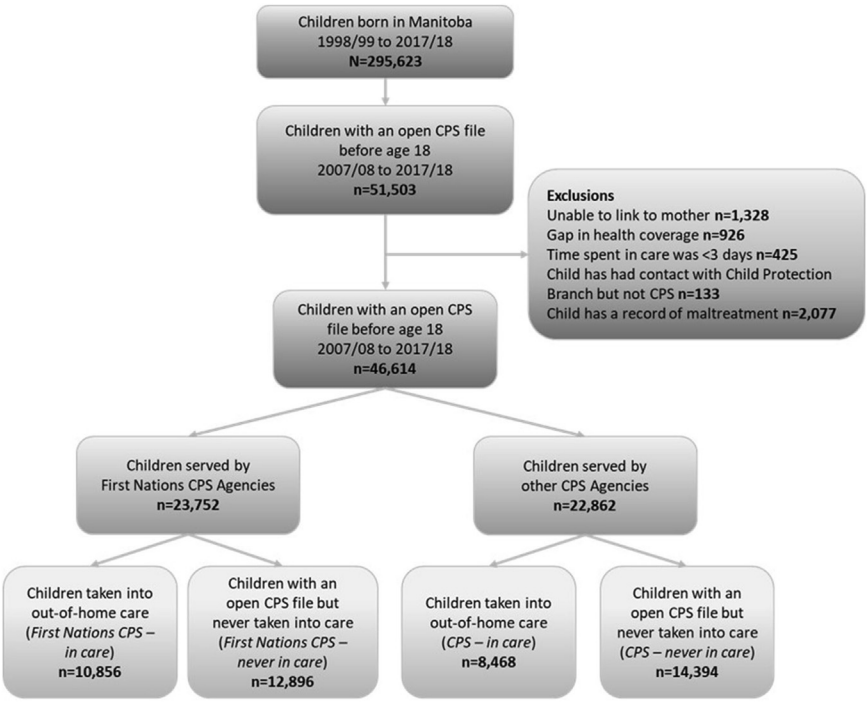

Fig. 1: **Cohort development**. CPS: Child protection services.

We hypothesized that children served by CPS agencies with high OoHC rates would be more likely to be taken into care than if they were served by an agency with a low OoHC rate (first key characteristic), and that an agency's OoHC rate would not directly impact an individual child's outcomes (second key characteristic). To confirm these two key characteristics, we compared children's characteristics between agencies with high and low levels of OoHC.[26] Due to differences in children's characteristics between agencies specifically serving First Nations families and agencies serving all Manitoba families, we stratified our analyses into these two groups of agencies. The instrumental variable behaves like a natural randomization of children to agencies that differ in the likelihood of OoHC: rather than comparing individual children with respect to the actual "treatment" of being taken into care, instrumental variable analysis compares groups of children that differ in the *likelihood* of going into care based on the agency where they are served. This method estimates the treatment effect on the "marginal" population, which are the children who would have been taken into care at a higher OoHC rate agency, but not at a lower OoHC rate agency.

Since the study outcomes are binary, we used two-stage multivariable probit regression models to calculate odds ratios (ORs) with 95% confidence intervals by multiplying the coefficients of the models by a scaling factor of 1.6, which approximates the log OR coefficients of a logistic regression model.[27] Probit models allow for the assumption of a bivariate normally distributed error term in the two stage model, and has been shown to produce similar results with smaller standard errors compared to other instrumental variable analysis approaches, such as logistic models or method of moment estimators. For the covariate-adjusted models, the variables were: child sex; diagnosed mental disorder; diagnosed physical health condition; age and year of first file opened with CPS; First Nations status; whether the child lived on/off reserve; maternal age at the birth of first child; number of previous pregnancies; diagnosed mental disorder; involvement in the legal system; income assistance receipt; residing in social housing; and had a CPS file as a child. All of these variables were determined based on information from prior to the child's first contact with CPS unless otherwise noted. The models were also run separately by child sex. We used the Hausman test for endogeneity, which when statistically significant, suggests evidence of correlation of the instrument with the error term (i.e., evidence of endogeneity).[28] Finally, E-values were calculated to ensure that the statistically significant findings were robust to unmeasured confounding. The E-value is the minimum strength of both the confounder associations that must be present, above and beyond the measured covariates, for an unmeasured confounder to explain away an association.[29]

Role of the funding source
The funders had no role in study design, data collection, data analysis, interpretation, or writing of the report.

Results

Cohort development
Among 295,623 Manitoba children born 1998/99–2017/18, 51,503 (17.4%) had an open file with CPS before age 18 from 2007/08–2017/18 (Fig. 1). After exclusions, the cohort comprised 46,614 children: 23,752 children served by First Nations CPS agencies and 22,862 children served by other CPS agencies in Manitoba. Among children served by First Nations agencies, 10,856 (45.7%) were taken into OoHC and 12,896 (54.3%) were never in care but had an open CPS file. Among children served by other CPS agencies, 8468 (37.0%) were taken into OoHC compared with 14,394 (63.0%) never in care but with an open CPS file.

Cohort characteristics
Table 2 presents the cohort characteristics at first open file with CPS. Compared with children who had never been in care, children in care of First Nations CPS agencies were more likely to be First Nations; as well, their mothers were more likely to be diagnosed with a mental disorder, receive income assistance, live in social housing, be involved in the legal system, be younger at their first child's birth, and have more children; the children themselves were less likely to be diagnosed with a mental or physical health condition. The average age of first involvement with First Nations CPS agencies was also lower for children in care than for children with only an open CPS file. We found a similar pattern of results at other CPS agencies when comparing children in care with children with only an open file, with the exception of physical health conditions, for which there was no difference between the two groups. As indicated by standardized differences >0.1 for most variables, the groups did not achieve balance, but these differences between groups were taken into account in the Instrumental Variable model.

Instrumental variable analysis: model validation
Table 3 reports baseline characteristics for children served by First Nations and other CPS agencies. Mean OoHC rates ranged from 10 to 43% for First Nations agencies and 10–35% for other CPS agencies and increased consistently from lowest to highest agency groups. The balance in the baseline distribution of covariates across CPS agency groups allowed us to infer that the unmeasured covariates were likely also balanced, lending support to CPS agency OoHC rates being a valid and moderately strong instrumental variable.

	First Nations CPS agencies				Standardized difference	Other CPS agencies				Standardized difference
	Children in out-of-home care n = 10,856		Children with an open CPS file but never taken into care n = 12,896			Children in out-of-home care n = 8468		Children with an open CPS file but never taken into care n = 14,394		
	n	%	n	%		n	%	n	%	
Child characteristics (categorical variables)										
Sex (male)	5496	50.63	6579	51.02	0.8	4324	51.06	7428	51.60	1.1
First Nations	10,666	98.25	12,394	96.11	13.0	3879	45.81	2873	19.96	57.2
Mental disorder diagnosis	396	3.65	723	5.61	9.3	580	6.85	1704	11.84	17.2
Physical health condition	1153	10.62	1731	13.42	8.6	1081	12.77	1995	13.86	3.2
Maternal characteristics (categorical variables)										
Mental disorder diagnosis	7198	66.3	6527	50.61	32.3	5935	70.09	8105	56.31	28.9
Received income assistance	6471	59.61	7015	54.40	10.5	6720	79.36	7452	51.77	60.7
Lived in social housing	1600	14.74	1538	11.93	8.3	1596	18.85	1765	12.26	18.2
Legal system involvement	8772	80.80	9044	70.13	25.0	5971	70.51	6434	44.70	54.1
Witness to a crime	3547	32.67	3546	27.50	11.3	2185	25.80	2037	14.15	29.5
Victim of a crime	6904	63.60	6623	51.36	24.9	4344	51.30	4618	32.08	39.7
Accused of a crime	5370	49.47	4487	34.79	30.0	3455	40.80	2385	16.57	55.6
Child characteristics (continuous variables)										
Age at first CPS contact (yrs)										
Mean (SD)	2.81 (3.70)		4.45 (4.53)		39.7	3.00 (3.84)		5.11 (4.71)		49.0
Maternal characteristics (continuous variables)										
Age at first birth (yrs)										
Mean (SD)	20.66 (4.52)		21.20 (4.91)		11.4	22.12 (5.27)		23.99 (5.97)		33.3
No. of previous pregnancies										
Mean (SD)	2.36 (2.12)		2.02 (1.98)		16.8	1.69 (1.73)		1.36 (1.50)		20.3

Manitoba children served by First Nations or other CPS agencies, placed in out-of-home care or with an open CPS file but never taken into care (2007/08–2017/18). CPS: Child Protection Services; SD: standard deviation. Standardized differences <0.1 indicate balance across baseline cohort characteristics.

Table 2: **Cohort characteristics.**

	First Nations CPS agencies					Other CPS agencies			
Group	1	2	3	4	5	1	2	3	4
Mean rate of being taken into OoHC (%)	10.0	22.0	28.5	33.1	43.0	10.7	17.7	26.2	35.5
Number of children (n)	1132	7093	2812	11,574	1141	2543	11,331	4990	3998
Child characteristics									
Male (%)	50.1	51.3	49.8	51	50.3	52.3	51.5	51.8	50.1
Age (mean)	5.2	3.6	3.1	3.7	4.6	4.2	4.8	3.8	3.9
First Nations (%)	99.6	95.5	95.8	98.3	95.6	19.0	22.1	28.4	58.7
Mental health diagnosis (%)	5.1	4.2	4.8	4.7	7.5	9.8	11.9	8.3	6.9
Physical health diagnosis (%)	12.0	11.6	10.5	12.7	13.5	13.8	14.0	11.8	13.7
Maternal characteristics									
Age at first birth (mean)	20.8	21.2	20.8	20.8	21.2	23.8	23.9	22.1	22.8
Previous pregnancies (mean)	2.1	2.1	2.0	2.3	2.2	1.3	1.4	1.6	1.8
Mental health diagnosis (%)	36.7	59.6	63.4	57.1	60.7	61.9	59.1	65.9	62.2
Legal system involvement (%)	73.3	75.5	77.1	73.9	79.7	39.5	50.2	64.2	63.0
Receipt of income assistance (%)	34.0	59.0	72.6	54.2	52.4	49.0	55.7	76.1	70.5
Lived in social housing (%)	7.9	13.8	17.5	12.3	13.4	13.3	12.7	17.5	17.8

Manitoba children served by First Nations or other CPS agencies (2007/08–2017/18). CPS: Child Protection Services; OoHC: Out of home care.

Table 3: **Baseline characteristics across aggregated groups of First Nations and all other CPS agencies' rates of children in care.**

	First Nations CPS agencies				Other CPS agencies			
	Children in out-of-home care n = 10,856		Children with an open CPS file but never taken into care n = 12,896		Children in out-of-home care n = 8468		Children with an open CPS file but never taken into care n = 14,394	
Health outcomes	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Childhood vaccinations complete at age 2	2651	45.00	2198	45.72	2319	52.47	2483	53.70
Hospitalization (any reason)	2396	22.07	1971	15.28	1348	15.92	1486	10.32
Hospitalization for injury	55	0.51	53	0.41	23	0.27	31	0.22
Child death during study period	47	0.43	60	0.47	22	0.26	38	0.26
STI diagnosis	367	3.38	306	2.37	214	2.53	149	1.04
Teen pregnancy	140	6.50	201	7.48	101	5.43	92	2.94
Teen birth	121	5.61	181	6.73	67	3.96	80	2.33
Mental health outcomes								
Suicide attempt	91	0.84	58	0.45	54	0.64	38	0.26
Death by suicide	9	0.08	10	0.08	7	0.08	6	0.04
Diagnosed with mood or anxiety disorder	399	3.68	277	2.15	318	3.76	474	3.29
Legal system outcomes								
Youth legal system involvement								
Any involvement	2751	51.17	2343	52.39	1584	18.71	1616	11.23
Witness to a crime	1008	60.25	971	59.36	417	4.92	436	3.03
Victim of a crime	1810	28.62	1312	26.48	1078	12.73	966	6.71
Accused of a crime	1172	25.85	906	23.55	621	7.33	562	3.90
Charged with a crime	1207	33.27	979	34.24	642	6.59	571	3.32
Incarcerated (after CPS contact)	716	34.40	443	34.10	411	4.85	266	1.85

CPS: Child Protection Services; STI: sexually transmitted infection. Manitoba children served by First Nations or other CPS agencies, placed in out-of-home care or with an open CPS file but never taken into care (2007/08–2017/18).

Table 4: **Distribution of health and legal system outcomes (unadjusted).**

Distribution of outcomes

Table 4 shows the unadjusted distribution of outcomes (proportions) in the cohort. Compared with children with only an open CPS file, children in care were more likely to be hospitalized, have a positive sexually transmitted infection test, and have attempted suicide, regardless of whether they were served by First Nations or other CPS agencies. For children served by First Nations agencies, those in care were more likely to be diagnosed with a mood/anxiety disorder than those with only an open CPS file. For children served by other CPS agencies, teen pregnancies and births were more common for children in care than children with only an open CPS file. Children in care also had higher legal system involvement across all measures than children with only an open CPS file, regardless of CPS agency.

Outcome measures

Fig. 2 shows the results of the instrumental variable analysis, with the ORs adjusted for the child and maternal characteristics listed above under Covariates. Numeric values for both the unadjusted and adjusted odds ratios with 95% confidence intervals are shown in Supplementary Tables S4 and S5, respectively. E-values are reported in Supplementary Table S5; for findings that were statistically significant, the E-values indicate that the result is robust to unmeasured confounding. While the Hausman test suggested that some of our findings are potentially compromised by endogeneity (Supplementary Table S5), the ORs for these outcomes were so large that even if attenuated, they are still strongly associated with being in OoHC.

In Fig. 2, for both First Nations and other CPS agencies, the odds of teen pregnancy (First Nations aOR 3.69, 95% CI 1.40–9.77; other aOR 5.10, 95% CI 1.83–14.25) and teen birth (First Nations aOR 3.23, 95% CI 1.10–9.49; other aOR 5.06, 95% CI 1.70–15.03) were higher for children in care than children with only an open CPS file. For children served by other CPS agencies, the odds of being fully vaccinated at age 2 (other aOR 0.49, 95% CI 0.29–0.80) were lower and the odds of having a positive sexually transmitted infection test (other aOR 7.21, 95% CI 3.63–14.32) were higher for children in care compared with children with only an open CPS file. For children served by First Nations agencies, the odds of being a witness to a crime (First Nations aOR 0.23, 95% CI 0.18–0.30) were lower but the odds of incarceration (First Nations aOR 3.64, 95% CI 1.95–6.80) were higher for children in care than children with only an open CPS file. For children served by other CPS agencies, the odds of being accused of a crime (other aOR 2.71, 95% CI 1.27–5.75), charged with

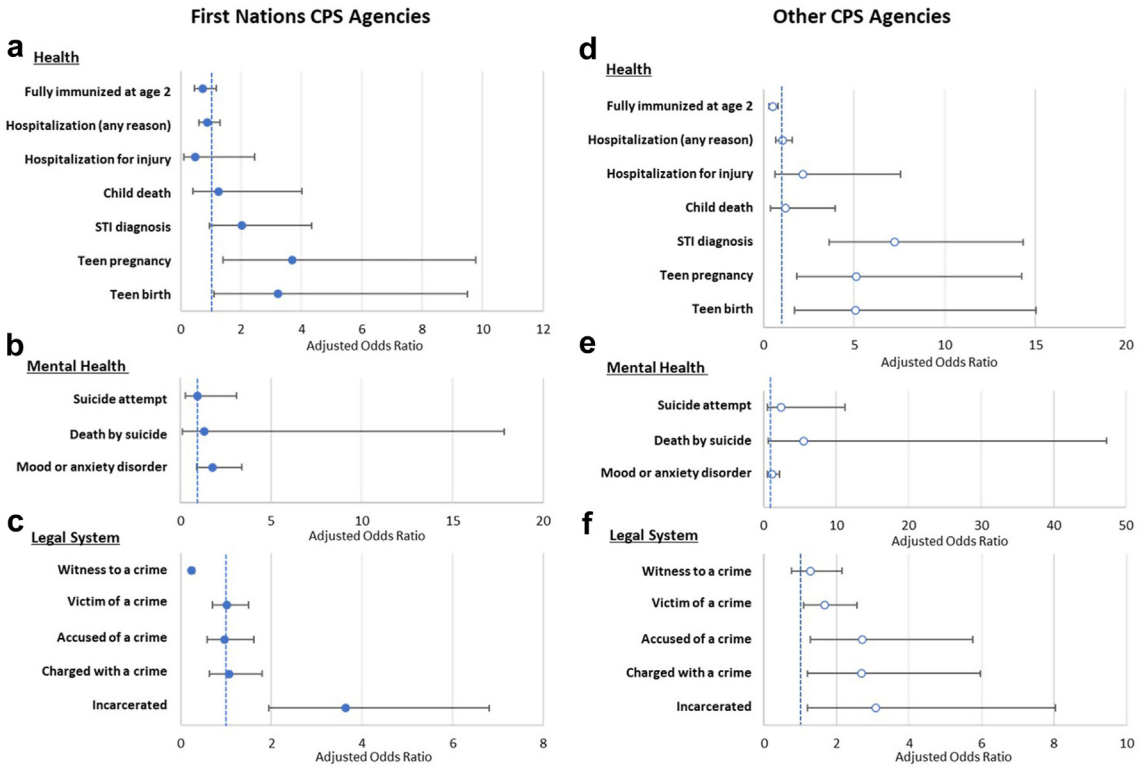

Fig. 2: **Health, mental health, and legal system outcomes for manitoba children served by First Nations and other CPS agencies**. Instrumental variable analysis using a two-stage multivariable probit regression model. Adjusted odds ratios and 95% confidence intervals compare children placed in out-of-home care to children with an open CPS file but living with family (2007/08–2017/18). Adjustment variables: Child sex; diagnosed mental disorder; diagnosed physical health condition; age and year of first file opened with CPS; First Nations status; whether the child lived on/off reserve; maternal age at the birth of first child; number of previous pregnancies; diagnosed mental disorder; involvement in the legal system; income assistance receipt; residing in social housing; and had a CPS file as a child. All variables were determined based on information from prior to the child's first contact with CPS. The dashed blue line represents the null value on the x-axis. Solid blue dots represent the estimates for the First Nations CPS Agencies in a–c and open blue dots represent the estimates for the Other CPS Agencies in d–f. Numeric estimates for these charts are available in Supplementary Table S5. CPS: Child Protection Services; STI: sexually transmitted infection.

a crime (other aOR 2.68, 95% CI 1.21–5.96), the victim of a crime (other aOR 1.68, 95% CI 1.10–2.56), or incarcerated (other aOR 1.19, 95% CI 1.19–8.04) were all higher for children in OoHC than children with only an open CPS file.

We also examined the outcomes by child sex (Supplementary Table S6). Most of the outcomes did not differ between male and female children, with the exception of legal system involvement. Female children in OoHC had greater involvement in the legal system than females with only an open file, whereas for male children, the differences between those in OoHC and those with an open file were not statistically significantly different.

Discussion

This study determined that being taken into OoHC affected Manitoba children's health and legal system outcomes more adversely than staying with their families. Our analytic approach provides rigorous evidence on how discretionary decision-making by CPS agencies can impact children's outcomes and thereby influence the wellbeing of families and communities. This research is particularly timely as new legislation giving Indigenous communities the authority to manage CPS for their own children was recently passed in Canada and is starting to be enacted in Manitoba. Among children served by First Nations CPS agencies, OoHC increased the odds of a teen pregnancy or birth and the odds of being incarcerated compared with having an open CPS file but remaining with family. Among children served by other Manitoba CPS agencies, OoHC decreased the odds of being fully vaccinated at age 2 and increased the odds of a teen pregnancy or birth, the odds of a positive test for a sexually transmitted infection, and the odds of involvement in the legal system, compared with having an open CPS file but remaining with family.

While there is a growing body of quasi-experimental[13–17] and sibling studies[18,19] in this field, to the best of our knowledge, this study is the first in Canada to use whole-population data to produce rigorous quantitative evidence that isolates the protective impacts of supporting at-risk children in their own homes instead of removing them into OoHC.

The relationship between being in care and teen pregnancy and birth has been extensively documented; predictive factors include experiences of maltreatment, instability at home and school, poor access to preventive healthcare, and high rates of mental disorders.[30,31] A meta-analysis of qualitative studies exploring this relationship also highlights a lack of consistent education and low sexual literacy among care-experienced individuals as probable underlying factors.[32] The risks of adverse sexual health outcomes, including high-risk sexual behaviours and exposure to sexually transmitted infections, are also elevated in young people with a history of CPS involvement and may contribute to educational and economic disruptions experienced by many young parents and their children.[33] A substantial body of literature also describes the overlap between child welfare and legal system involvement and the many negative outcomes stemming therefrom.[34,35] Predictors of legal system involvement in a care-experienced population include being male, being Indigenous, having a history of abuse, and (notably) being placed in OoHC.[35,36] The legal system outcomes of youth with a history of OoHC are also reported to be disproportionately harsh compared to other youth. For example, younger CPS-involved youth are more likely to experience custodial remand than those with similar risk factors not in OoHC, and the care environment designed to protect them from harm instead puts them at risk for offending.[34] Our finding that female (but not male) children taken into OoHC by non-First Nations CPS agencies are more likely to become involved with the justice system than female children with only an open file is novel and will be examined in more detail in future analyses. The results of our study otherwise align closely with the literature and add to the existing evidence through use of a rigorous econometric method to isolate the cause of adverse outcomes as being taken into OoHC. Instrumental variable analysis was previously applied in a US study[17] and a Canadian study focused on adolescent males[15] to examine variation in foster care placement in 'marginal cases', where CPS agencies have some discretion in deciding on whether a child should be apprehended.[37] Marginal cases are the cases most likely to be affected by policy changes that alter the threshold for placement, and thus are an important population to study. While the fear of potential consequences for not apprehending a child judged at risk may drive some decision-making in CPS,[38] the evidence of harm stemming from removal requires that there be careful consideration in determining what the "best interests of the child" truly are.

The Canadian and First Nations context of our study is unique to this field of study and makes an important contribution, given the degree to which First Nations children are overrepresented in the child welfare system. Although the high proportion of Indigenous children in care reflects a multitude of social and economic issues Indigenous families face, key among them is the harm perpetrated by centuries of colonial policies, including the residential school system and the 'Sixties Scoop', which systematically separated Indigenous children from their families and communities.[2,11] There is also strong evidence that racial discrimination plays a role in the large number of Indigenous children in care: child welfare agencies with more Indigenous children in their case loads have access to fewer resources.[39] The reallocation of funds from housing, water and sanitation to address shortfalls in CPS places those children at higher risk of needing supports from CPS, since poor housing is one of the key factors leading to children being taken into care. Even when controlling for poverty-related risk factors, Indigenous children are still more likely than non-Indigenous children to be taken into care,[40] and they are also at higher risk of the adverse outcomes detailed in this study. Our findings support the Calls to Action from the Truth and Reconciliation Commission of Canada[2] in holding governments accountable for reducing the number of Indigenous children in care and provide evidence for policy changes to child welfare legislation. Indigenous communities across Canada are beginning to enact their own child and family laws under the *Act Respecting First Nations, Inuit and Metis Children, Youth and Families*, which affirms their inherent right of self-government and was upheld by the Supreme Court of Canada. Manitoba child welfare authorities can now transfer information, supervision of care, and guardianship of children in care from the province to First Nations that have enacted their own laws. Within our research partnership, the Deputy Minister of Manitoba Families has articulated the Manitoba government's support for First Nations as they enact their own laws, and has noted the importance of the evidence presented here for driving changes to the child welfare system. We will monitor actions taken by governments in response to the evidence, such as changes to programs and policies, and these will inform our partnership's future research projects.

A major study strength is our use of instrumental variable analysis to account for unmeasured confounding and isolate to the best of our ability the impact of being taken into care from endogenous factors. Furthermore, using linked administrative data allows us to take key individual and family characteristics into account, and in the unique case of Manitoba, provides the ability to examine a broad range of health, social, and legal system outcomes. A better understanding of

the relationships between CPS and these outcomes will inform laws, policies, and practices to better support vulnerable children and youth. Notable study limitations include bias in the systems that collect administrative data and a lack of detail or nuance in many administrative data sources. For example, we lack information on systemic and structural factors that predispose some children over others to become involved with CPS, health services, and legal systems, such as measures of systemic racism within current laws and policies. We have attempted to overcome this limitation by conducting the research in partnership with frontline agency and department staff familiar with the data systems and with community members and advisors who represent the people about whom the data are collected. Our measure of OoHC was dichotomous; future research should also explore length of time and age of exposure to OoHC. Missing values in the First Nations education data may have occurred because their school systems are not required to submit the data to the provincial repository; this remains an opportunity for future data curation partnerships. Finally, the higher rates of children in OoHC in Canada compared to other countries, and in Manitoba particularly, coupled with apprehension decisions influenced more by adverse conditions imposed on families, as opposed to substantiated abuse, may limit the generalizability of findings for other jurisdictions.

Conclusion

Our findings clearly demonstrate the harms that can and do result from children being taken into OoHC and stand in stark contrast to the current practices in Manitoba and other Canadian jurisdictions that have led to many children being removed from their families and communities. This new knowledge about OoHC being as harmful (or more) as leaving a child requiring protection at home should inform decision-making at both the service and policy levels. On a broader scale, there is a need to address the social and structural factors that are driving high rates of apprehension and ensure that all families have adequate housing, employment, income, and food security to support their children. First Nations traditionally believe in family, kinship, and the sacredness of children's lives. As they continue to heal from transgenerational trauma and exercise their right to jurisdiction over their own laws, it is imperative that First Nations have equitable access to resources to safeguard the best interests of their children, families, and communities.

Contributors

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Note: The authors who had direct access to and verified the underlying data used in the study were MB and LF.

Data sharing statement

The source data used in this study were originally collected during the routine administration of the health system, social services, education system and legal system in Manitoba, and were provided to the Manitoba Centre for Health Policy (MCHP) for secondary use in research under specific data sharing agreements between the data trustees and MCHP. The data are approved for use at MCHP only. They are not owned by the researchers or by MCHP and cannot be deposited in a public repository. To review source data specific to this project, interested parties should contact the Repository Access & Use team at MCHP (access@umanitoba.ca), who will facilitate data access by seeking the consent of the original data holders and the required privacy and ethics review bodies on behalf of the party requesting access.

Research studies using First Nations data require ethics approval from the Health Information Research Governance Committee (https://www.fnhssm.com/hirgc), and we comply with their policies for data access, linkage and sharing. For inquiries about accessing Manitoba First Nations data, please contact info@fnhssm.com.

Declaration of interests

The authors declare no competing interests.

Acknowledgements

The University of Manitoba campuses are located on the original lands of the Anishinaabeg, Ininiwak, Anisininewuk, Dakota Oyate and Dene, and the National Homeland of the Red River Métis. We respect the Treaties that were made on these territories, acknowledge the harms and mistakes of the past, and dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

This project is part of a larger research partnership called SPECTRUM, which aims to implement collaborative, cross-sector, and evidence-based approaches to strengthen the policies that shape social services and systems in Canada. The project was first conceptualized by the SPECTRUM partnership and carried out by a smaller research team operating in accordance with the First Nations OCAP® data governance principles. With gratitude, we acknowledge the contributions of the SPECTRUM core team, demonstration project team, student fellows, and project advisory circle. We appreciate the support and engagement of the SPECTRUM partnership as a whole in the completion of this project. Funding for SPECTRUM was provided through a Partnership Development Grant from the Social Sciences and Humanities Research Council (#890-2018-0029). The views expressed in this manuscript are those of the authors. The funders had no input into the research design, analysis, or interpretation.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.lana.2024.100886.

References

1 Luo C, Story Map. *Missing children of Indian residential schools*; 2024 [cited 2024 Mar 26] Available from: https://storymaps.arcgis.com/stories/cfe29bee35c54a70b9621349f19a3db2.
2 Truth and Reconciliation Commission of Canada. *Honouring the truth, reconciling the future: summary of the final report of the truth and reconciliation commission of Canada*. Ottawa (CA): Truth and Reconciliation Commission of Canada; 2015 [cited 2023 Aug 14]. Available from: https://publications.gc.ca/collections/collection_2015/trc/IR4-7-2015-eng.pdf.
3 Tait C, Henry R, Loewen Walker R. Child welfare: a social determinant of health for Canadian First Nations and Métis children. *Pimatisiwin*. 2013;11(1):39–53. A Journal of Aboriginal and Indigenous Community Health.
4 Logan T. Settler colonialism in Canada and the Métis. *J Genocide Res*. 2015;17(4):433–452.
5 Global News. *More Indigenous family separations now than during residential schools, advocate says*. Global News Canada; 2021 [cited 2023 Dec 4]. Available from: https://globalnews.ca/news/7983112/indigenous-family-separations-advocate/.
6 Brownell M, Chartier M, Au W, et al. *The educational outcomes of children in care in Manitoba*. Winnipeg (CA): Manitoba Centre for Health Policy; 2015 [cited 2024 Aug 14]. Available from: http://mchp-appserv.cpe.umanitoba.ca/reference//CIC_report_web.pdf.
7 Galley V. *Summary review of aboriginal over-representation in the child welfare system*. Regina: SK; 2010 [cited 2023 Dec 4]. Available from: https://cwrp.ca/sites/default/files/publications/en/cw-summary-review-aboriginal-over-representation.pdf.
8 Canadian Child Welfare Research Portal. *Topics: out-of-home care*. Canada: Canadian Child Welfare Research Portal; 2024 [cited 2024 Aug 14]. Available from: https://cwrp.ca/out-home-care.
9 Gypen L, Vanderfaeillie J, De Maeyer S, Belenger L, Van Holen F. Outcomes of children who grew up in foster care: systematic-review. *Child Youth Serv Rev*. 2017;76:74–83.
10 Bonakdar A, Gaetz S, Banchani E, Schwan K, Kidd SA, O'Grady B. Child protection services and youth experiencing homelessness: findings of the 2019 national youth homelessness survey in Canada. *Child Youth Serv Rev*. 2023;153:107088. https://doi.org/10.1016/j.childyouth.2023.107088 [cited 2024 Aug 21] Available from: https://cwrp.ca/publications/child-protection-services-and-youth-experiencing-homelessness-findings-2019-national.
11 Brownell M, Nickel N, Turnbull L, et al. The overlap between the child welfare and youth criminal justice systems: documenting "cross-over kids". In: *Manitoba*. Winnipeg (CA): Manitoba Centre for Health Policy; 2020 [cited 2024 Aug 14]. Available from: http://mchp-appserv.cpe.umanitoba.ca/reference/MCHP_JustCare_Report_web.pdf.
12 Rijbroek B, Strating MMH, Konijn HW, Huijsman R. Child protection cases, one size fits all? Cluster analyses of risk and protective factors. *Child Abuse Negl*. 2019;95:104068. https://doi.org/10.1016/j.chiabu.2019.104068 [cited 2024 Aug 21] Available from: https://www.sciencedirect.com/science/article/pii/S0145213419301784?via%3Dihub.
13 Jason Baron E, Jacob B, Mueller-Smith M, et al. *Is there a foster care-to-prison pipeline? Evidence from quasi-randomly assigned investigators Report No.: 29922*. Cambridge (USA); 2022 [cited 2024 Jun 24]. Available from: http://www.nber.org/data-appendix/w29922.
14 Drange N, Hernæs Ø, Markussen S, Oterholm I, Raaum O, Slettebø T. *Barn, unge og familier i barnevernet—En longitudinell registerstudie. Delprosjekt 2: Hvordan går det med barna? [Children, youth and families in child welfare—a longitudinal register study. Part 2: how are the children doing?]*. Oslo; 2022 [cited 2024 Jun 24]. Available from: https://www.frisch.uio.no/publikasjoner/pdf/rapp22_02.pdf.
15 Warburton WP, Warburton RN, Sweetman A, Hertzman C. The impact of placing adolescent males into foster care on education, income assistance, and convictions. *Can J Econ*. 2014;47(1):35–69 [cited 2024 Jun 24] Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/caje.12064.
16 Cavalca PG, Ejrnæs M, Gørtz M. *Before and after out-of-home placement: child health, education and crime*. Copenhagen: University of Copenhagen, Department of Economics, Center for Economic Behavior and Inequality (CEBI); 2022 [cited 2024 Jun 24]. (CEBI Working Paper Series). Available from: https://www.econbiz.de/Record/before-and-after-out-of-home-placement-child-health-education-and-crime-cavalca-petra-gram/10014551593.
17 Doyle JJ. Causal effects of foster care: an instrumental-variables approach. *Child Youth Serv Rev*. 2013;35(7):1143–1151.
18 Sariaslan A, Kääriälä A, Pitkänen J, et al. Long-term health and social outcomes in children and adolescents placed in out-of-home care. *JAMA Pediatr*. 2022;176(1):e214324 [cited 2024 Jun 24] Available from: https://jamanetwork.com/journals/jamapediatrics/fullarticle/2785375.
19 Brännström L, Vinnerljung B, Hjern A. Outcomes in adulthood after long-term foster care: a sibling approach. *Child Maltreat*. 2020;25(4):383–392 [cited 2024 Jun 24] Available from: https://journals.sagepub.com/doi/abs/10.1177/1077559519898755.
20 Enns JE, Brownell M, Casidsid HJM, et al. The full SPECTRUM: developing a tripartite partnership between community, government and academia for collaborative social policy research. *Gatew Int J Community Res Engagem*. 2023;16(1) [cited 2023 Jul 11] Available from: https://epress.lib.uts.edu.au/journals/index.php/ijcre/article/view/8433.
21 The First Nations Information Governance Centre. *The first nations principles of OCAP®*. Ottawa (CA): The First Nations Information Governance Centre; 2024 [cited 2024 Aug 14]. Available from: https://fnigc.ca/ocap-training/.
22 Katz A, Enns J, Smith M, Burchill C, Turner K, Towns D. Population data centre profile: the Manitoba centre for health policy. *Int J Popul Data Sci*. 2020;4(2):1131 [cited 2022 Jul 10] Available from: https://pubmed.ncbi.nlm.nih.gov/32935035/.
23 Smith M, Roos L, Burchill C, et al. Health services data: managing the data warehouse: 25 years of experience at the Manitoba centre for health policy. In: Sobolev B, Levy A, Goring S, eds. *Data and measures in health services research*. Boston, MA: Springer; 2015:1–26.
24 Johns Hopkins University. *The Johns Hopkins ACG® system version 11.0 technical reference guide*. Baltimore (USA): Johns Hopkins Bloomberg School of Public Health; 2014 [cited 2024 Aug 14]. Available from: https://www2.gov.bc.ca/assets/gov/health/conducting-health-research/data-access/johns-hopkins-acg-system-technical-reference-guide.pdf.
25 Austin PC. Using the standardized difference to compare the prevalence of a binary variable between two groups in observational research. *Commun Stat Simul Comput*. 2009;38(6):1228–1234 [cited 2024 Jun 23] Available from: https://www.tandfonline.com/doi/abs/10.1080/03610910902859574.
26 Stukel TA, Fisher ES, Wennberg DE, Alter DA, Gottlieb DJ, Vermeulen MJ. Analysis of observational studies in the presence of treatment selection bias: effects of invasive cardiac management on AMI survival using propensity score and instrumental variable methods. *JAMA*. 2007;297(3):278–285 [cited 2023 Dec 6] Available from: https://jamanetwork.com/journals/jama/fullarticle/205172.
27 Wong K, Campitelli M, Stukel T, Kwong J. Estimating influenza vaccine effectiveness in community-dwelling elderly patients using the instrumental variable analysis method. *Arch Intern Med*. 2012;172(6).
28 Wooldridge J. *Introductory econometrics: a modern approach*. 7th ed. Cengage Learning; 2019:1–816.
29 Van Der Weele TJ, Ding P. Sensitivity analysis in observational research: introducing the E-value. *Ann Intern Med*. 2017;167(4):268–274 [cited 2024 Jun 24] Available from: https://pubmed.ncbi.nlm.nih.gov/28693043/.
30 Taussig H, Roberts L. Early parenthood for males and females with foster care experience: an exploratory study of predictive factors at entry to care during preadolescence. *Child Adolesc Soc Work J*. 2022;39(6):657–668 [cited 2024 Jan 14] Available from: https://link-springer-com.uml.idm.oclc.org/article/10.1007/s10560-022-00852-6.
31 Purtell J, Mendes P, Saunders BJ. Care leavers, ambiguous loss and early parenting: explaining high rates of pregnancy and parenting amongst young people transitioning from out-of-home care. *Child Aust*. 2020;45(4):241–248 [cited 2024 Jan 15] Available from: https://www.cambridge.org/core/journals/children-australia/article/abs/care-leavers-ambiguous-loss-and-early-parenting-explaining-high-rates-of-pregnancy-and-parenting-amongst-young-people-transitioning-from-outofhome-care/11D0F51592807D085AB4807D70763D5A.
32 Connolly J, Heifetz M, Bohr Y. Pregnancy and motherhood among adolescent girls in child protective services: a meta-synthesis of qualitative research. *J Public Child Welf*. 2012;6(5):614–635.
33 Font SA, Caniglia M, Kennedy R, Noll JG. Child protection intervention and the sexual and reproductive health of female adolescents ages 13 to 17 years. *JAMA Pediatr*. 2022;176(5):461 [cited 2024 Jan 15] Available from: https://pmc/articles/PMC8861893/.
34 McFarlane K. Care-criminalisation: the involvement of children in out-of-home care in the New South Wales criminal justice system. *Aust N Z J Criminol*. 2018;51(3):412–433.

35 Malvaso CG, Delfabbro PH, Day A, Nobes G. Young people under youth justice supervision with varying child protection histories: an analysis of group differences. *Int J Offender Ther Comp Criminol*. 2019;63(2):159–178 [cited 2024 Mar 17] Available from: https://pubmed.ncbi.nlm.nih.gov/30095011/.

36 Malvaso CG, Delfabbro PH, Day A. The child protection and juvenile justice nexus in Australia: a longitudinal examination of the relationship between maltreatment and offending. *Child Abuse Negl*. 2017;64:32–46 [cited 2024 Mar 17] Available from: https://pubmed.ncbi.nlm.nih.gov/28017908/.

37 Doyle JJ. Child protection and child outcomes: measuring the effects of foster care. *Am Econ Rev*. 2007;97(5):1583–1610.

38 Keddell E, Cleaver K, Fitzmaurice L. The perspectives of community-based practitioners on preventing baby removals: addressing legitimate and illegitimate factors. *Child Youth Serv Rev*. 2021;127:106126. https://doi.org/10.1016/j.childyouth.2021.106126 [cited 2024 Aug 21] Available from: https://www.sciencedirect.com/science/article/abs/pii/S0190740921002024.

39 Fallon B, Chabot M, Fluke J, Blackstock C, MacLaurin B, Tonmyr L. Placement decisions and disparities among Aboriginal children: further analysis of the Canadian incidence study of reported child abuse and neglect part A: comparisons of the 1998 and 2003 surveys. *Child Abuse Negl*. 2013;37(1):47–60 [cited 2024 Mar 17] Available from: https://pubmed.ncbi.nlm.nih.gov/23260121/.

40 Trocmé N, MacLaurin B, Fallon B, Knoke D, Pitman L, McCormack M. *Mesnmimk Wasatek: Catching a drop of light. Understanding the overrepresentation of First Nations children in Canada's child welfare system: an analysis of the Canadian Incidence Study of reported child abuse and neglect*. Toronto (CA): Centre of Excellence for Child Welfare; 2006 [cited 2024 Aug 14]. Available from: https://cwrp.ca/sites/default/files/publications/MesnmimkWasatek_revised2011.pdf.