



Exploring alternate specifications to explain agency-level effects in placement decisions regarding aboriginal children: Further analysis of the Canadian Incidence Study of Reported Child Abuse and Neglect Part B[☆]

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ABSTRACT

Objective: This paper builds upon the analyses presented in two companion papers (Fluke et al., 2010; Fallon et al., 2013) using data from the 1998 and 2003 cycles of the *Canadian Incidence Study of Reported Child Abuse and Neglect (CIS-1998 and CIS-2003)* to examine the influence of clinical and organizational characteristics on the decision to place a child in out-of-home care at the conclusion of a child maltreatment investigation. This paper explores various model specifications to explain the effect of an agency-level factor, proportion of Aboriginal reports, which emerged as a stable and significant factor through the two data collection cycles. It addresses the issue of data comparability between the two cycles and explores various re-specifications and descriptive analyses of reported models to evaluate their solidity with regards to the sampling schemes and the precise contribution of a multi-level specification.

Methods: The decision to place a child in out-of-home care was examined using data from the *CIS-2003*. This child welfare dataset collected information about the results of nearly 12,000 child maltreatment investigations as well as a description of the characteristics of the workers and organization responsible for conducting those investigations. Multi-level statistical models were developed using MPlus software, which can accommodate dichotomous outcome variables and are more reflective of decision-making in child welfare. The models are thus multi-level binary logistic regressions.

Results: Final models revealed that two agency-level variables, 'Education degree of majority of workers' and 'Degree of centralization in the agency' clarify the nature of the effect of 'Proportion of Aboriginal reports', a stable, key second level predictor of the placement decision. The comparability of the effect of this agency-level variable across the 1998 and 2003 cycles becomes further evident through this analysis. By using a unified database including both cycles and various specifications of models, the comparability was found to be robust, in addition to clarifying the precise contribution of a multi-level specification.

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Conclusions: This third paper in a series establishes the 'Proportion of Aboriginal reports' received by the child welfare agency as an important agency level predictor associated with a child's likelihood of being placed in the Canadian child protection system. While the more complex models give support to the notion that unequal resources subtend those results, more analyses are needed to confirm this hypothesis. Unequal resources for agencies with larger Aboriginal caseloads may explain the persistence of the results. These findings suggest that specific resource constraints related to worker education may be explanatory.

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Introduction

This paper expands on two previous studies that examined the contribution of organizational factors to short-term service dispositions using data from the 2003 cycle of the *Canadian Incidence Study of Reported Child Abuse and Neglect (CIS-2003)* (Fallon et al., 2013), and the 1998 cycle (CIS-1998) (Fluke, Chabot, Fallon, MacLaurin, & Blackstock, 2010). Both analyses found that the single agency level factor contributing to the likelihood of a child being placed in out-of-home care was the proportion of reports to the agency coming from Aboriginal children. The higher the proportion of Aboriginal children investigated by the agency, the more likely a child was to be placed in out-of-home care. Unlike the 1998 analyses, the 2003 study found that the Aboriginal status of the child remained statistically significant in the first level variables, even when controlling for the clinical concerns of the investigation. In this study, we explored the CIS-2003 data further by using information from the *Organizational Questionnaire* completed for the 57 sampled agencies in 2003 which contained a larger set of measured contextual factors. The purpose of this analysis was to better explain the nature of the effect of the proportion of Aboriginal reports on placement decisions in the presence of other contextual organizational variables available in the CIS-2003.

The previous two papers focused on finding the best model to highlight the crucial role of organizational factors in the decision to place a child in the 1998 and 2003 cycles of the CIS, with the proportion of Aboriginal reports received by a child welfare agency appearing as a consistently strong, contextual, predictor. The present paper addresses four related sets of issues concerning the model specifications obtained through statistical testing. First, taking the final model presented in Fallon et al. (2013), it explores various re-specifications in order to explain the functional link between the proportion of Aboriginal reports as a contextual variable and formal placement. Secondly, the issue of over-specification of models in the present context of a stratified sampling scheme is addressed. A third objective of this study is to review the comparability of the two cycles which in turn is used to illustrate the specific contribution of a multi-level specification. Finally, certain important aspects of the models are highlighted and explored using descriptive means in order to further explore the relationship between clinical level variables and agency level variables.

Literature review

Over-representation of Aboriginal children in Canadian child welfare

The chronic over-representation of Aboriginal children in Canada has been well documented (Royal Commission on Aboriginal Peoples, 1996; Trocmé, Knoke, & Blackstock, 2004), and yet research on the factors contributing to the over-representation has been limited. The most reliable source of data on Aboriginal children in Canada comes from the *Canadian Incidence Study of Reported Child Abuse and Neglect (CIS)* (Public Health Agency of Canada (PHAC), 2010; Trocmé et al., 2001, 2005). This cross-sectional study, conducted in five year cycles, collects data on child welfare reports to the point of case disposition. In 2003, 17% of substantiated Aboriginal children were placed in formal child welfare care following investigation compared to six percent of non-Aboriginal children. In addition, 11% of Aboriginal children were placed in informal kinship care while four percent of non-Aboriginal children were placed informally (Trocmé et al., 2005). In 2003, the rate of formal child welfare placement for Aboriginal children varied by provincial and territorial jurisdiction ranging from nine percent in Ontario (Fallon et al., 2005) to 23% in Alberta (MacLaurin et al., 2005) and the Northwest Territories (MacLaurin, Trocmé, & Fallon, 2006). Based on national census data for 2008, while six percent of children in Canada were Aboriginal, Aboriginal children made up 22% of substantiated reports of child maltreatment in Canada (Trocmé et al., 2010). In 2008, for every 1,000 First Nations children living in the geographic areas served by sampled agencies, there were 140.6 child maltreatment related investigations in 2008; for every 1,000 non-Aboriginal children living in the geographic areas served by sampled agencies, there were 33.5 investigations in 2008 (Sinha, Trocmé, Fallon, MacLaurin, Fast, & Prokop, 2011).

Previous research from the CIS suggests that case characteristics such as child maltreatment type, child functioning and harm levels do not account for the significant over-representation of Aboriginal children in care (Trocmé et al., 2004). Case factors that have been demonstrated to be strongly related to all decision points in the over-representation of Aboriginal children in the child welfare system are Aboriginal status, poverty, poor housing and substance misuse (Trocmé et al., 2004,

2005). These factors, when coupled with inequitable resources for First Nations children resident on reserves Blackstock (2011) have resulted in the over-representation of Aboriginal children in the Canadian child welfare system (Auditor General of Canada, 2008; Loxley et al., 2005; Standing Committee on Public Accounts, 2009). There are over 100 First Nations child and family service agencies in Canada providing a range of child welfare services on reserves and some provide services off reserve as well. For on reserve service delivery, the agencies are required by the Federal Government to operate according to provincial/territorial child welfare laws and are funded by the federal government. For off reserve service delivery the agencies follow provincial/territorial child welfare laws and receive their funding from the provinces/territories as well.

Racial over-representation in United States child welfare

Data from American Indian and Alaskan Natives child welfare programs operated by tribal agencies is not collected by either the National Child Abuse and Neglect Data System or Adoption and Foster Care Analysis and Reporting System data collection programs, so information regarding disparities among American Indian and Alaskan Natives is limited to those served by state and county agencies. There is emerging evidence that American Indian and Alaskan Native in the US are disproportionately represented among child welfare reports, investigations, and out-of-home placements (Carter, 2010; Magruder & Shaw, 2008; Olesnavage, Preston, Sorrells, & Tadjerson, 2010; Richardson, 2008; Texas Department of Family and Protective Services, 2010). Carter (2010) identifies the proportion of urban Native-American children in foster care at 2%, despite representing only 1% of the population. They are also more likely to be identified for caregiver risk factors such as mental health issues and substance abuse. Even when non-Aboriginal caregivers are found to have greater substance abuse issues than their Native-American counterparts, Native-American children are still more likely to be taken into care. Olesnavage et al. (2010) pinpointed failures in the American Child Welfare system to identify Native-American children and families early enough in the child protection process and an overall lack of culturally appropriate service provision. Furthermore, they noted insufficient efforts to connect with Aboriginal leaders and promote reunification with families.

Regional data presented by the Texas Health and Human Services Commission (2006) demonstrate that American Indian and Alaskan Native American children are more likely to be removed from their homes than Anglo children and Hispanic children (Texas Health and Human Services Commission, 2006; Texas Department of Family and Protective Services, 2010) and less likely to be reunited with their families (Wells, Merritt, & Briggs, 2009). Data analysis has shown a significant interaction between poverty and neglect as contributing factors to Child Protective Services involvement (Drake, Lee, & Jonson-Reid, 2009; Texas Health and Human Services Commission, 2006).

Impact of organizational and worker factors on child welfare decisions

It has been suggested that workers' personal attitudes may partially explain the variation in child welfare decision-making in meeting the best interests of the child. Arad-Davidzon and Benbenishty (2008) found that child protection workers could be characterized as either "pro-removal" or "anti-removal". Pro-removal attitudes were associated with assessments of higher risk and more intrusive interventions while anti-removal attitudes were associated with decisions to use family-based interventions (Arad-Davidzon & Benbenishty, 2008).

A number of studies have examined service outcomes experienced by clients and the presumed influence of worker characteristics, including ethnicity and education (Ryan, Garnier, Zyphur, & Zhai, 2006), ethnicity and gender (Woldegiorgis, 2003), ethnicity and political ideology (Jayaratne, Faller, Ortega, & Vandervort, 2008), and ethnicity and worker age (Surbeck, 2003). In one of the few multivariate analyses examining client outcomes that included worker characteristics, Ryan et al. (2006) found that when controlling for the clinical concerns of the case, White workers with a MSW degree were more likely to achieve family reunification for Hispanic children than African American caseworkers (Ryan et al., 2006). Jayaratne et al. (2008) found African American caseworkers more likely than White workers to believe that race should be considered in both general and placement decisions and agreed more often with placing children in single-parent families. Smith (2006) examined factors influencing permanency decisions made by child welfare workers and reported that a higher proportion of visible minority respondents recommended reunification in a case of an African American caregiver with three children who presented with mental health problems, compared to non-minority respondents. Focus group research with professionals involved in the child welfare process found that workers did not clearly recognize the impact of culture and race on their own process of assessing risk or family assessment when examining the over-representation of African and Native American children involved with child welfare (Harris & Hackett, 2008). Other studies however report that race and racial bias do not have a clear influence upon child welfare decision-making at intake (Howell, 2008); Drake et al. (2011) concluded that higher risk rather than bias was the major factor driving racial disproportionality in the United States.

There is no consensus on whether the type of education and professional orientation has a strong influence upon worker decisions. Studies have reported some differences in decision-making related to professional orientation and placement decisions (Britner & Mossler, 2002), professional orientation and definitions of child maltreatment (Shdaimah, 2009), professional positions and level of risk (Schuerman, Rossi, & Budde, 1999), educational degree and definitions of sibling maltreatment (Kominkiewicz, 2004), and worker education and family reunification (Smith, 2006). Other research suggests that professional status did not have a direct impact upon the placement decision (Benbenishty, Segev, & Surkis, 2002), and that there was great similarity in decisions made by respondents with a social work degree or other educational backgrounds (Howell, 2008).

In addition to educational experience, professional experience may influence the decision-making process. Novice workers' previous experience in a child welfare setting has been found to moderate anxiety about agency protocols and processes however anxiety was not clearly connected to decision making (Csiernik, Smith, Dewar, Dromgole, & O'Neill, 2010). A study of novice and expert child protection workers, reported that the level of professional experience influenced risk assessments (Drury-Hudson, 1999), however consensus has not been reached on this point (Howell, 2008; Smith, 2006; Sullivan, Whitehead, Leschied, Chiodo, & Hurley, 2008). Worker age, as well as experience, may influence decision-making with younger workers making more interventionist decisions (Lazar, 2006; Rossi, Schuerman, & Budde, 1999).

Select studies have examined the influence of organizational factors on child protection decisions. In a cross-sectional study, Ashton (2007) examined the impact of organizational factors on the reporting decisions of child protection social workers. Agency variables found to influence reporting included the presence of an expressed mandate to report, worker involvement in decision-making, and the combination of an expressed mandate and negative sanctions for failing to report, however agency size did not influence reporting. Hollingsworth, Bybee, Johnson, and Swick (2010) reported that caseworkers in private and public agencies differed on their perception of parental risk factors (mental illness and substance abuse), however, other work has found that workers from four service types took very similar approaches to assessment and intervention (Darlington, Healy, & Feeney, 2010).

Alternatively, the variation in child welfare decisions has also been attributed to the jurisdiction in which the investigation occurs as opposed to worker differences within a jurisdiction. Studies by Rossi et al. (1999) and Schuerman et al. (1999) examined decision-making among groups of child protection experts and workers, and reported differences in decisions for respondents in the states of Michigan, New York, and Texas. Decision-making also varied in a sample of child welfare workers from three European countries (Denmark, Iceland and Norway), as workers' decisions were seen to reflect national child welfare perspectives and priorities (Grinde, 2007). There is some evidence in the literature that suggests that intervention standards vary by neighborhood or jurisdiction (Giovannoni & Becerra, 1979; Johnson & L'Esperance, 1984; Wolock, 1982). Social workers rating a vignette were significantly more likely to make a decision to refer a case for ongoing services with limited information in high and low risk areas, than in medium risk areas (Craft & Bettin, 1991). Agencies located in high-risk areas were less likely to open an investigation with the same clinical issues than agencies in lower risk areas (Giovannoni & Becerra, 1979).

Few studies are able to empirically account for organizational factors even when examining service decisions (Grasso & Epstein, 1988; Hoagwood, 1997; Yoo, 2002). Organizations serve diverse populations, but studies examining differences in worker and organizational characteristics have not controlled for differences in the population served. Relevant clinical factors are not consistently taken into consideration. Dissimilarities in clinical factors may explain divergent case dispositions for different groups. The decision to provide ongoing services after a child maltreatment investigation has serious resource implications. In a fiscally constrained child welfare service environment, decisions regarding the targeting and deployment of scarce resources needs to be better understood particularly with respect to over-represented groups such as Indigenous children (Blackstock, 2009). This article is an attempt to illuminate this question in a principled way.

Methods

The *CIS-2003's* primary objective was to produce a national estimate of the incidence of child maltreatment in Canada in 2003. Using a multi-stage sampling design, a representative sample of 57 child welfare agencies, including 8 First Nations child and family service agencies, was selected from 400 child welfare service areas in Canada. A stratified cluster sampling design was used first to select a representative sample of child welfare offices and then to sample cases within these offices. Quebec investigations did not provide enough information to be included in this analysis. Cases opened for service at the randomly selected sites between October 1st and December 31st 2008 were eligible for inclusion. Three months was considered to be the optimum period to maintain participation and compliance with study procedures. Only children in the household for whom maltreatment was alleged or suspected during the investigation were included in the final sample.

Data collection instruments

The information was collected using a three-page data collection instrument. Data collected included: Aboriginal heritage of the child and caregiver (s), type of abuse and neglect investigated; level of substantiation and duration of maltreatment; physical and emotional harm to the child; functioning concerns for the children and their caregivers; income source; housing information, and information about short-term service dispositions.

The *CIS-2003* study collected information about the participating child welfare workers. Workers were asked their age, caseload size, educational degree, and years of experience in social services and child protection. They were also asked to identify any additional training they had received in the course of their child protection experience. Fifty-seven sites completed an *Organizational Questionnaire* that included questions about the structure of the organization, organizational morale, staffing vacancies, and whether the organization had recently experienced a child fatality or had conducted a high-profile case; this questionnaire is used to derive contextual variables to enrich the final model presented in Fallon et al. (2013).

Study sample

Only those child maltreatment investigations from the *CIS-2003* sample where the worker had completed a *Worker Information Form* were selected. Nine-hundred and thirty-six investigating workers yielded a sample of 11,562 child maltreatment investigations in 57 child welfare agencies. Eighty-seven percent of workers completed a *Worker Information Form* ($n=819$). The sub-sample for this study was made up of investigations that remained open for ongoing services ($n=2,059$ investigations, 57 agencies), in order to examine predictors of placement in out-of-home care. Investigations with the exposure to domestic violence as the primary concern for the investigation were excluded from this analysis because service dispositions for these investigations differed significantly from other maltreatment types (Black, Trocmé, Fallon, & MacLaurin, 2008). For example, children involved in substantiated investigations that involve exposure to domestic violence with another form of substantiated maltreatment are almost four times more likely than investigations involving only exposure to domestic violence to be placed in a child welfare setting.

Measures

Outcome variable: formal placement versus no formal placement

Workers were asked to indicate the category that best described the placement decision for the investigation. The categories included: no placement required; placement is being considered; informal placement; foster placement; group home placement; and residential/secure treatment center. The decision to place a child was coded as a dichotomous variable, with categories foster placement, group home placement, and residential/secure treatment center coded as one.

Level one and level two variables

Key clinical variables representing an ecological model of child maltreatment were included in the model to determine the relative contribution of clinical variables and variables that, in principle, should be extraneous to the case disposition, specifically worker and organizational variables. Clinical variables were chosen based on empirical literature on factors related to child maltreatment or risk of child maltreatment. Worker and organizational variables that impact services provided to children and families by child welfare agencies were selected based on theoretical literature. A table presenting the operational definitions and codes used in the analysis is provided in [Appendix A](#).

The binary variables derived from the *Organizational Questionnaire* that were significantly correlated with the decision to place a child were included in the current analysis. [Table 1](#) presents the operational definitions and codes of these level two variables.

Table 1
Variable definitions of level 2 variables not included in the previous analysis.

Variable	Measurement
Stress	Dichotomous variable Majority of workers' current caseload described as unmanageable, very high, or high (1) Majority of workers' current caseload described as manageable (0)
Specialization	Dichotomous variable Majority of staff were 'generic' workers (1) Majority of staff were specialized workers (0)
Centralization	Dichotomous variable Localized intake process at agency (1) Centralized or mixed intake process at agency (0)
Education	Dichotomous variable Majority of workers' minimum level of education Diploma or Certificate (1) Majority of workers' minimum level of education Social Work degree, or related degree (0)
Deaths	Dichotomous variable Child death(s) in the previous year (1) No child death(s) in the previous year (0)
Inquests	Dichotomous variable Child inquests in the previous year (1) No child inquests in the previous year (0)
High profile cases	Dichotomous variable High profile case in the agency in the previous year (1) No high profile case in the agency in the previous year (0)

Table 2Model A (parsimonious level one and parsimonious level two) – CIS-2003 ($n = 2,059$ investigations, 57 agencies).

	Estimate	S.E.	Est./S.E.	P-Value	Odds ratio	95% Confidence interval	
Physical harm	0.703	0.158	4.458	0.000	2.02	1.48	2.75
Emotional harm	0.422	0.124	3.396	0.001	1.53	1.20	1.94
Household level of cooperation	−0.898	0.148	−6.064	0.000	0.41	0.30	0.54
Aboriginal Status	0.623	0.160	3.887	0.000	1.86	1.36	2.55
Level 2							
Proportion of Aboriginal reports (45%)	0.795	0.301	2.641	0.008	2.21	1.23	3.99

Table 3Model B (parsimonious level one and parsimonious level two) – CIS-2003 ($n = 2,059$ investigations, 57 agencies).

	Estimate	S.E.	Est./S.E.	P-Value	Odds ratio	95% Confidence interval	
Physical harm	0.656	0.16	4.103	0.000	1.93	1.41	2.64
Emotional harm	0.362	0.126	2.881	0.004	1.44	1.12	1.84
Household level of cooperation	−0.979	0.147	−6.661	0.000	0.38	0.28	0.50
Aboriginal status	0.557	0.156	3.566	0.000	1.75	1.29	2.37
Level 2							
Proportion of Aboriginal reports (45%)	0.843	0.317	2.661	0.008	2.32	1.25	4.32
Minimum education	0.572	0.296	1.932	0.053	1.77	0.99	3.17

Table 4Model C (parsimonious level one and parsimonious level two) – CIS-2003 ($n = 2,059$ investigations, 57 agencies).

	Estimate	S.E.	Est./S.E.	P-Value	Odds ratio	95% Confidence interval	
Physical harm	0.675	0.161	4.192	0.000	1.96	1.43	2.69
Emotional harm	0.355	0.127	2.8	0.005	1.43	1.11	1.83
Household level of cooperation	−0.936	0.149	−6.266	0.000	0.39	0.29	0.53
Aboriginal status	0.603	0.156	3.868	0.000	1.83	1.35	2.48
Level 2							
Proportion of Aboriginal reports (45%)	1.189	0.298	3.985	0.000	3.28	1.83	5.89
Degree of centralization	−0.004	0.251	−0.014	0.989	1.00	0.61	1.63

Analysis plan

Through multi-level logistic regressions, the previous two studies (Fallon et al., 2013; Fluke et al., 2010) established that agency-level variables and the proportion of Aboriginal reports influenced the likelihood of a child being placed. In this paper, we use the final model presented in the analysis of the 2003 cycle (Fallon et al., 2013) as a starting point (Table 2), and embed it in the contextual factors measured by agency-level binary variables derived from the *Organizational Questionnaire* of the CIS-2003. The continuous variable proportion of Aboriginal reports was transformed into a binary variable using a cut-point value of 45%. This value was arrived upon based on a number of factors the most important being the comparability between the univariate effect of the variable in the 1998 and 2003 cycles. The statistical software MPlus 5 (Muthén & Muthén, 1998–2007) is used to estimate two-level logistic regression models, as in the previous studies.

Improvement of model specification by the addition of relevant factors is always an objective in statistical modeling. By definition, a multilevel analysis implies the presence of nesting of lower-level units (Bickel, 2007). However, it is important to note that whether the researcher acknowledges the presence of nesting or not, the associated dependency in the dependent variable within group, measured by intraclass correlation, will affect the analysis by biasing the results. The estimation of a multilevel model takes the nesting effect into account, leading to more robust estimates. It also allows the introduction of explanatory variables both at higher levels and as cross-level interactions (Snijders & Bosker, 1999). By explaining part of the between group variation, relevant higher-level variables in the model can diminish the intraclass correlation. This in effect leads to an effective *conditional* intraclass correlation of the dependent variable that can be substantially lower, consequently providing more powerful models (Bickel, 2007).

The first objective was to examine the influence of the contextual factors measured by agency-level contextual variables derived from the *Organizational Questionnaire* of the CIS-2003 on the effect of the proportion of Aboriginal reports on the decision to place a child. In order to do so, each of the seven new variables was added to Model A one by one (Model B and Model C show significant findings) and possible moderator effects were retained (Tables 3 and 4). These agency-level contextual variables and their interactions with the *Proportion of Aboriginal reports* (PAR) were then included for a more complex re-specification of our final model (Table 5). Cross-level interaction terms were not included to avoid over-fitting and colinearity problems, given the number of agency-level variables already present and the limited second-level sample size ($n = 57$).

Table 5
Model D (parsimonious level one and interactions) – CIS-2003 (n = 2,059 investigations, 57 agencies).

	Estimate	S.E.	Est./S.E.	P-Value	Odds ratio	95% Confidence interval
Physical harm	0.627	0.164	3.816	0.000	1.87	1.36 2.58
Emotional harm	0.322	0.129	2.499	0.012	1.38	1.07 1.78
Household level of cooperation	-0.981	0.151	-6.502	0.000	0.37	0.28 0.50
Aboriginal status	0.564	0.157	3.605	0.000	1.76	1.29 2.39
Level 2						
Proportion of Aboriginal reports (45%)	0.140	0.533	0.263	0.793	1.15	0.40 3.27
Minimum education	0.441	0.402	1.095	0.273	1.55	0.71 3.42
Degree of centralization	0.031	0.309	0.101	0.919	1.03	0.56 1.89
Proportion of Aboriginal reports × minimum education	1.004	0.680	1.476	0.140	2.73	0.72 10.35
Proportion of Aboriginal reports × degree of centralization	1.488	0.796	1.870	0.061	4.43	0.93 21.08
Proportion of Aboriginal reports × degree of centralization × minimum education	-1.647	0.933	-1.765	0.078	0.19	0.03 1.20

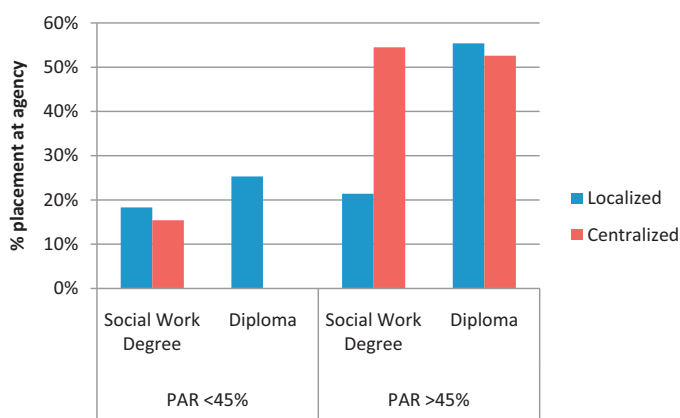


Fig. 1. Proportion of placements by Three Agency-level Variables: binary proportion of Aboriginal reports (PAR), level of education and centralization.

Fig. 1 presents these interactions descriptively. To further assess the nature of the interactions included in the analysis, two types of agencies were contrasted based on the two minimum levels of education categories (majority of workers with social work degrees and majority of workers with diplomas or certificates). The proportion of placements and the continuous proportion of Aboriginal reports variable were examined, comparing the two categories of minimum level of education (Fig. 2).

A second set of analyses was conducted to examine over-specification. There are only 57 units contributing to variation on placement at the agency level in the 2003 cycle, and the specific shape of the relationship expressed by a model is specific to the sample obtained. Rather than including all variable combinations to create a full set of models and comparing sub-models of increasing complexity, a simple naive resampling method was used to portray over-specification of our main model (Model A) by the imposition of three arbitrary sub-sampling schemes: for a model, 100 random samples of three

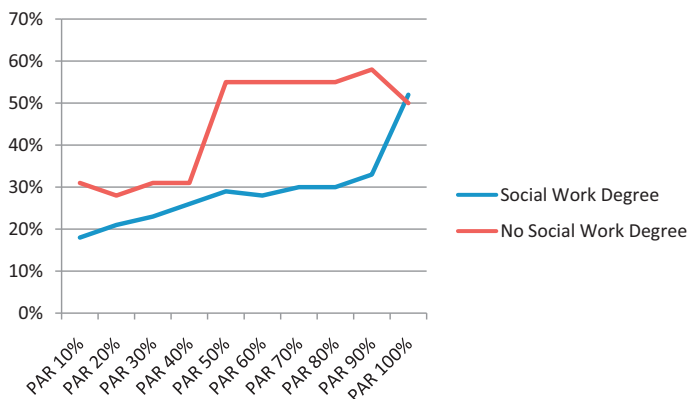


Fig. 2. Proportion of placements for two types of agencies: majority of social work degrees versus majority with lesser degree, by proportion of Aboriginal reports (PAR).

varying proportions of the CIS-2003 database (25%, 50%, 75%) are created to re-compute 100 models (regression estimates). While this method is descriptive in nature, it provides a comparative view of the specificity of a model to the precise sample attained in the 2003 cycle.

To assess the possible effect of changes in the consecutive cycles on the models, the 1998 and 2003 databases were merged into a single dataset to be analyzed with MPlus, including the cycle variable, representing a property of individual clusters or sites. We make explicit the unique contribution of a multi-level specification (Bickel, 2007). Bickel (2007) encourages analysts to frame the models in increasingly appropriate statistical structures for data with contextual factors (2007). We use three frameworks: (1) simple linear regression on the site data set (57 sites in 2003 + 47 sites in 1998); (2) a logistic regression on the children database (2059 children in 2003 + 1304 children in 1998), with the contextual variable proportion of Aboriginal reports coded as a dummy variable at the child's level; and (3) an actual multi-level logistic regression.

Finally, the effects obtained in Model A are decomposed through multi-level modeling into simpler descriptive methods, not parametrically related to the final multi-level model (Greenland, 2000). While the model is indeed useful, individual variables are likely going to be used in application, that is clinical practice, and it is important to frame individual, non-model specific effects in their own right.

Results

Of the seven new organizational variables (*Stress, Specialization, Education, Deaths, Inquests, High profile cases, Centralization*) only *Education* approaches a significant relationship ($p = 0.053$). The parsimonious form of this model is presented in Table 3 (Model B).

The coefficient for *Proportion of Aboriginal reports* (PAR) is reduced in the presence of all seven variables but one, paired with *Centralization*, where the regression coefficient for the proportion of Aboriginal reports increases (Table 4, Model C). The interpretation of this finding is that the six variables (*Stress, Specialization, Education, Deaths, Inquests, High profile cases*) explain a portion of the variability of the dependent variable previously explained by the proportion of Aboriginal reports, although only *Education* approaches significance when controlled for *Proportion of Aboriginal reports*. As *Centralization* has both a unique mediation effect on *Proportion of Aboriginal reports* and the highest (negative) correlation with *Education*, it is included in the final full model. Recall that the variable *Centralization* refers to the nature of the intake process at the agency, with a value of 1 associated with an exclusively local intake process.

The final full model was refitted adding *Centralization, Education* and their interactions with *Proportion of Aboriginal reports*. In Table 5 (final Model D), only the interaction between *Proportion of Aboriginal reports* and *Centralization* and the interaction between *Proportion of Aboriginal reports, Education* and *Centralization* approach significance ($p = 0.061$ and $p = 0.078$, respectively), and the effect of *Proportion of Aboriginal reports* has greatly diminished to a value of 0.140 ($p = 0.793$). This indicates that the effect of proportion of Aboriginal reports is mediated by workers education (lower proportion of SW degrees) and institutionally (higher proportion of centralized offices). Fig. 1 presents this 3-way interaction descriptively, corresponding to a chi-square value of 76.6 ($p < 0.000$). Simple descriptive presentations of these interactions is particularly crucial since Model D has six variables at the cluster level, for a total number of 57 clusters, and parametric modeling is an explanatory instrument that reveals contextual effects.

The simplest way to understand the nature of this interaction is to revert back to the continuous proportion of Aboriginal reports variable categorized in 10 increasing increments of 10% and contrast the two types of agencies: majority of social work degrees versus majority with diploma credentials (Fig. 2). There appears to be a discernible subgroup of agencies with both a majority of Aboriginal reports and a minority of workers with social work degrees associated with a much higher rate of formal placement.

If the results of Model B (Table 3) are reflective of lower resources for agencies with a higher proportion of Aboriginal reports, that is, if *Education* acts a proxy for inequity in explaining away a sizable portion of the effect of the *Proportion of Aboriginal reports* on placement, then the distribution of *Education* in the sample should show dependence with the distribution of *proportion of Aboriginal reports*. Indeed, and consistent with the hypothesis that the individual effects of *Proportion of Aboriginal reports* and *Level of worker education* on the decision to place a child reflect unequal access to resources across agencies, the odds ratio of having a minority of workers with a social work degree is 2.8 for agencies with 45% or more of Aboriginal reports ($p = 0.001$).

Over-specification

Figs. 3.1.1, 3.1.2 and 3.1.3 are the estimates arrived at for Model A, with independent variables rearranged in order of estimated parameter value: *Household level of cooperation, Emotional harm, Physical harm, Aboriginal status of the child* and the *Proportion of Aboriginal reports*. Figs. 3.1.1, 3.1.2 and 3.1.3 indicate that the simpler multi-level model is robust under a wide range of sub-sampling, only showing serious degradation with the 25% sub-samples. This process also allows for an examination of one specific consequence of over-specification, namely the effect of 'model' outliers. For example in Fig. 3.1.3, one particular sub-sample, the lower red line, has an estimated parameter for *Aboriginal status of the child* that is negative (-0.211), which is the only such sample. While the usual way of finding outliers is through the use of joint probability plots, model-level outliers allows for more specific questions centered on child welfare practice.

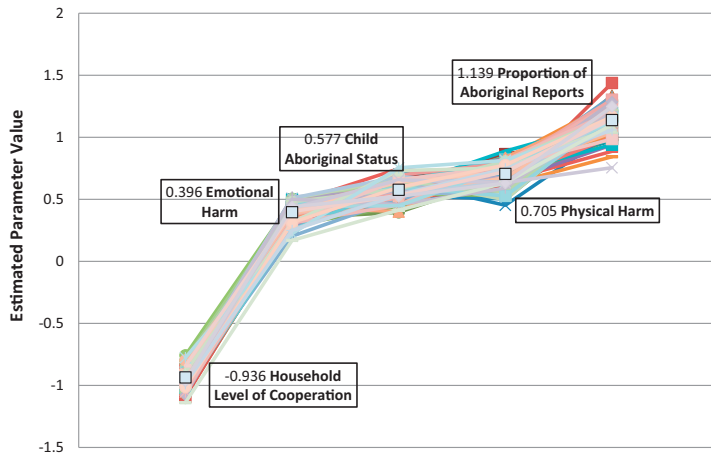


Fig. 3.1.1. Model A: estimated parameter values on 100 random samples of 75% of the sample.

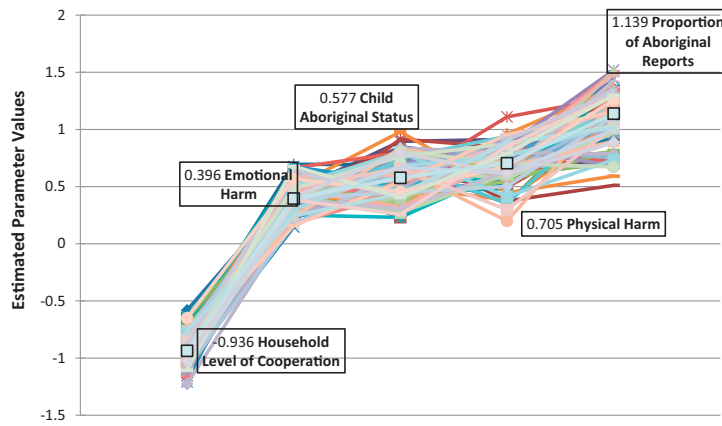


Fig. 3.1.2. Model A: estimated parameter values on 100 random samples of 50% of the sample.

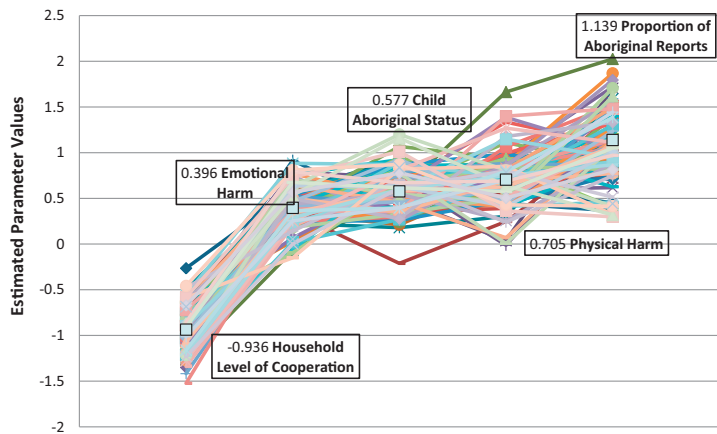


Fig. 3.1.3. Model A: estimated parameter values on 100 random samples of 25% of the sample.

Comparison of cycles and multi-level specification

Fig. 4.1 shows the regression coefficient estimates for the continuous proportion of Aboriginal reports, while Fig. 4.2 displays the regression coefficient estimates for our binary proportion of Aboriginal reports variable. Both figures show the coefficients for the proportion of Aboriginal reports in relation to cycle in three contextual models: linear regressions at

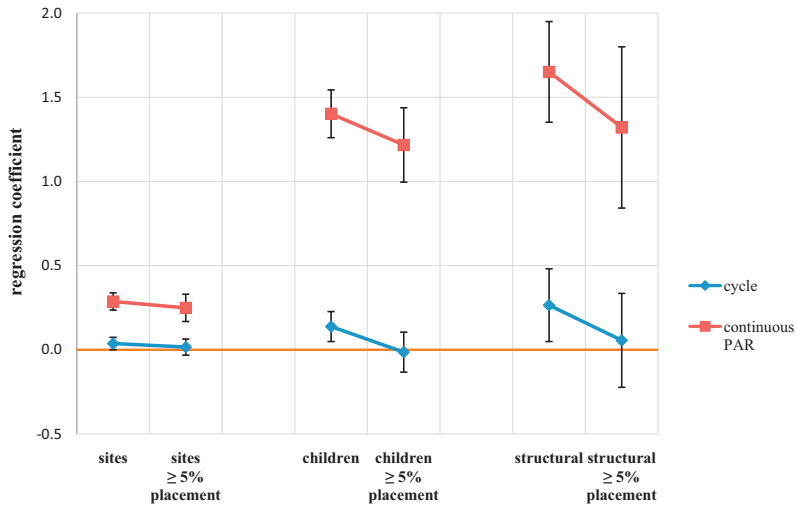


Fig. 4.1. Regression coefficient estimates for the proportion of Aboriginal reports (continuous) in relation to cycle (2003 vs 1998).

the agency level; logistic regressions at the child level; and multilevel logistic regressions, along with standard errors bars. Each model is also estimated on the sub-sample consisting of agencies with at least 5% of formal placement. All coefficients for proportion of Aboriginal reports are significant ($p < 0.05$), and all those for Cycle are non-significant except for simple children model in Fig. 4.2 ($p = 0.047$).

Visual inspection of these figures reinforces Bickel's (2007) conclusion that the main imports of multi-level specification are, in order: correct estimation of standard errors, and better individual parameters. Comparison of Figs. 4.1 and 4.2 support the inter-comparability of the two versions of our main second-level variable *Proportion of Aboriginal reports* (20% cut point, used in Fluke et al., 2010) and *Proportion of Aboriginal reports* (45% cut point), and also the strength of its effect on placement, irrespective of cycle.

Descriptive effects

Fig. 5.1 reports different odds ratios of formal placement for first level variables of Model A: *Household Level of Cooperation*, *Emotional Harm*, *Physical Harm* and *Child Aboriginal Status* which are inverted to have odds ratios on a common scale. In all graphs, the blue columns represent the simple odds ratios. The red and green columns in Fig. 5.1 depict the odds ratios for the same variable, controlling for their respective *Proportion of Aboriginal reports* (45%) (PAR45) groups (For interpretation of the references to color in this sentence, the reader is referred to the web version of the article.). Figs. 5.2 and 5.3 separate the two groups and adds a comparison estimate. The green columns in these two graphs show the ratios of odds ratios for

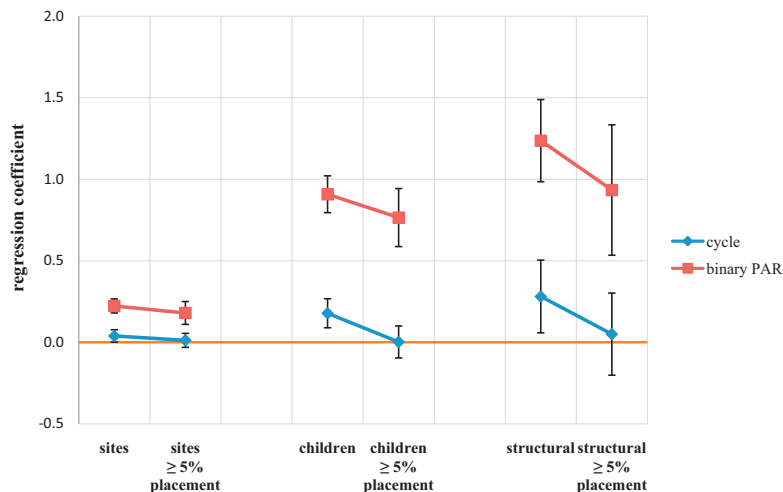


Fig. 4.2. Regression coefficient estimates for the proportion of Aboriginal reports (binary) in relation to cycle (2003 vs 1998).

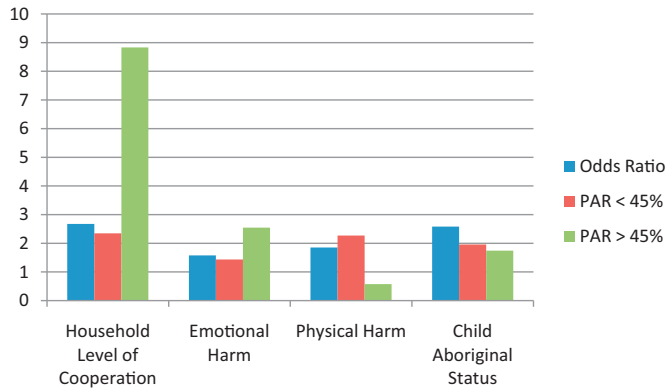


Fig. 5.1. Odds ratios for first level variables controlling for proportion of Aboriginal reports (45%).

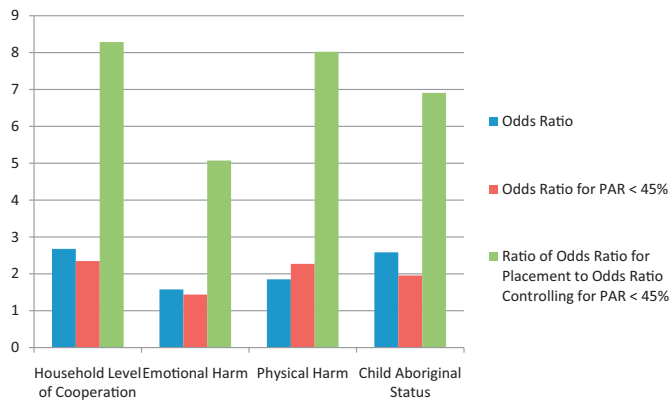


Fig. 5.2. Odds ratio for first level controlling for proportion of Aboriginal reports (<45%).

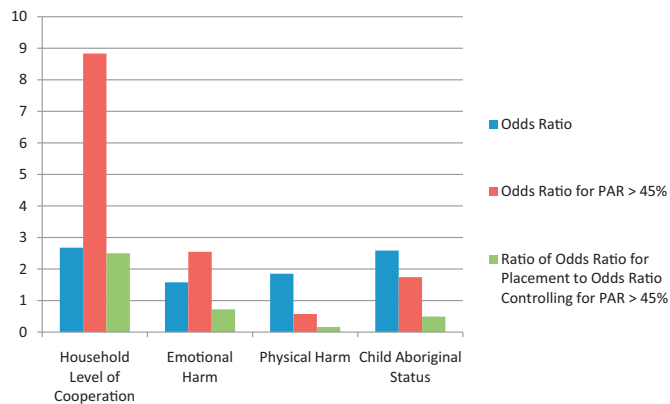


Fig. 5.3. Odds ratio for first level controlling for proportion of Aboriginal reports (>45%).

placement for each variable to the odds ratio of their respective PAR45 group (For interpretation of the references to color in this sentence, the reader is referred to the web version of the article.).

It is evident from these figures that there are complex interactions between the first level variables and the primary second-level variable *Proportion of Aboriginal reports* (45% cut point). The level of cooperation during the investigation in particular shows diverging behavior across groups: it is more important for the *Proportion of Aboriginal reports* for the less than 45% *Proportion of Aboriginal reports* group, while this relationship is reversed for the more than 45% *Proportion of Aboriginal reports* group.

Discussion

This paper's objective was to explore the finding from two previous studies which indicated that the *Proportion of Aboriginal reports* in agencies contributed to the placement of children in out-of-home care at the conclusion of the investigation. It undertook a series of converging methodological analyses to investigate the nature, strength and generalizability of the finding.

First, a set of site level variables available for the 2003 cycle of the CIS was used to re-specify the final model of the 2003 paper (Fallon et al., 2013). The goal was to investigate the nature of the strong second-level effect of *Proportion of Aboriginal reports* on a decision to place a child in out-of-home care, which was a finding that was similar in both the 1998 and 2003 cycles. By including two new agency level variables that can reasonably be thought to reflect resource limitations to examine the impact on the *Proportion of Aboriginal reports* in the same regression, it provides further support for the role of underfunding in higher rates of formal placements in the Canadian child welfare system, and indicates possible avenues for further research. An agency with access to more workers with a formal social work education may reduce the likelihood that a child will be placed in out-of-home care at the conclusion of the investigation. Similarly, a centralized intake model which is likely an indicator of a standardized approach to investigating child maltreatment-related concerns may also reduce the likelihood of out-of-home placement in the presence of large Aboriginal caseloads.

Ideally, direct measures of the funding for agencies should also be used to estimate these relationships. In the CIS, these data were not collected because of the size and complexity of the study. Demonstrating the interaction between education and degree of centralization with the *Proportion of Aboriginal Reports* provided some clarification, it also revealed the complexity of interaction effects between predictors, and the associated difficulty of applying findings in the field.

The second issue investigated, also focused on the effect of *Proportion of Aboriginal reports* on the placement decision, was the comparability of model results between the 1998 and 2003 cycles of the CIS. By using a unified database including both cycles and various specifications of models, it found the comparability to be robust, in addition to clarifying the precise contribution of a multi-level specification.

A final goal was to establish that the fit of the final model from the CIS-2003 data (Table 2) was not overly dependent on the specific sample obtained. The final model maintains the findings even under the most restrictive resampling scheme of 25% of the sample. As it is highly problematic to incorporate the weighting of data in complex models for a complex sampling structure such as that of the CIS, such resampling analyses offer a simple if partial way to guard against the ever present danger of a limited ability to generalize results.

Limitations

Although the CIS is a rich source of data for understanding families and children referred to the Canadian child welfare system, there are several limitations to the design of this study that should be considered. Quebec investigations are not included. The data are cross sectional and can only describe the placement decision at the end of the child maltreatment investigation. How long a child remains in out-of-home care or the clinical appropriateness of the decision are considerations that cannot be addressed using these data. We did not control for the non-independence of siblings in the sample, although the robustness of the findings using the resampling technique is a strong indication that this is not an issue.

A number of variables are constructed from ratings reported by the investigating workers which are not independently verified. Cases included in the CIS represent only children reported to a child welfare authority for a maltreatment concern and not children who may be maltreated and identified only to the police or known to a community member who does not report. The study is carefully designed to measure key aspects of a child maltreatment investigation, but not organizational measures. Therefore the organization measures used in this analysis are limited.

Implications

Recent empirical evidence, as a result of increasingly sophisticated multi-level statistical analysis systems that can account for organizational differences, has demonstrated that the characteristics of organizations do impact service dispositions (Fallon & Trocmé, 2011; Fluke et al., 2010; Fallon, 2005; Glisson & Green, 2006; Glisson, 2010; Littell & Tajima, 2000; Ryan et al., 2006; Yoo & Brooks, 2005). Multi-level or hierarchical linear modeling requires the researcher to hypothesize mediating mechanisms at one level that influence a change to a variable at another level (Raudenbush & Bryk, 2002). However, current statistical models accounting for organizational variance tend to reflect the availability of certain organizational measures rather than a deliberate strategy to test the importance of organizational characteristics and the direction of that influence. Better specification of the organizational level variables in accord with a decision making framework for hypotheses formation (Baumann, Dalglish, Fluke, & Kern, 2011) is likely to yield more explanatory results.

It is important to contextualize the findings of this study not only for the implications of Aboriginal status and its role at the individual level and organizational level in North American child welfare systems but also as a reminder of an important question that remains unaddressed in the field of child welfare: what are the important organizational theoretical domains to consider when understanding the influence of organizations? What are the measures that can be used to best characterize these domains? There is a need for complex, standardized measures of organizations representing each of the theoretical perspectives. As the empirical analytical techniques become available, the importance of understanding the exact nature

of organizational influences is increasingly apparent. In a fiscally constrained service environment, decisions regarding the targeting and deployment of scarce resources need to be better understood particularly with respect to over-represented groups such as Indigenous children (Blackstock, 2009).

Conflict of interest

There is no conflict of interest to declare.

Appendix A.

See Table A.1.

Table A.1
Variable definitions.

Outcome variable	Measurement	Description
Placement	Dichotomous variable Placement (1) No placement (0)	Placement: formal kinship care, other family foster care, group home and residential/secure treatment No placement: no placement, considering placement and informal kinship care.
Level one variable Child age	Dichotomous variable Child \geq 6 years of age (1) Child < 6 years of age (0)	Children 15 years of age and under.
Type of maltreatment	Four dichotomous variables Physical abuse; sexual abuse; neglect and emotional maltreatment	Primary form of maltreatment.
Physical harm	Dichotomous variable Harm (1) No harm (0)	Defined as bruises/cuts/scrapes, burns and scalds, broken bones, head trauma, other health conditions.
Mental or emotional harm	Dichotomous variable Emotional harm (1) No emotional harm (0)	Defined as the degree to which the child has been harmed by the action or inaction of the caregiver.
Child functioning	Two dichotomous variables One child functioning concern (1) No concerns or two or more concerns (0); Two or more child functioning concerns (1) No concerns and one concern (0)	Functioning concerns include: depression/anxiety, ADD/ADHD, negative peer involvement, alcohol abuse, drug/solvent abuse, self-harming behavior, violence toward others, running (one incident and multiple incidents), inappropriate sexual behavior, other behavioral/emotional problems, learning disability, special education services, irregular school attendance, developmental delay, physical disability, substance abuse related birth defects, positive toxicology at birth, other health conditions, psychiatric disorder, Youth Criminal Justice Act involvement and other functioning issues.
Previous case opening	Dichotomous variable Yes (1) No (0)	Previous case opening for any caregiver in the family.
Caregiver functioning	Three dichotomous variables One caregiver concern (1) No caregiver concerns and two or more concerns (0); Two caregiver concerns (1) No concern and one concern and three or more concerns (0); Three or more caregiver concerns (1) No concerns and one concern or two concerns (0)	Functioning concerns include: alcohol abuse, drug/solvent abuse, criminal activity, cognitive impairment, mental health issues, physical health issues, few social supports, maltreated as a child, victim of domestic violence, perpetrator of domestic violence.

Table A.1 (Continued)

Outcome variable	Measurement	Description
Income source	Two dichotomous variables Part time employment (1) All other situations (0); Benefits (including social assistance) (1) All other types of employment (0)	Primary sources of income included: full time employment, part time employment, multiple jobs, seasonal, employment insurance, social assistance, other benefits, no reliable source of income and unknown income source. Caregiver sources of income were combined to reflect the primary income source for the household.
Number of moves	Two dichotomous variables One move (1) No moves or two or more moves (0); Two or more moves (1) One move or no moves (0)	Number of moves reflects the number of moves the household had experienced in the past 12 months.
Household level of cooperation	Dichotomous variable Cooperative (1) Not cooperative (0)	Household level of cooperation reflects the level of cooperation with the investigation by the caregivers. If one caregiver was deemed not cooperative then the household level of cooperation was not cooperative.
Aboriginal status of child	Dichotomous variable Aboriginal (First Nations Status, First Nations non status, Metis, Inuit or other) (1) Not Aboriginal (0)	Worker indicated if the child was not Aboriginal, First Nations status, First Nations non status, Métis, Inuit or other Aboriginal
Level 2 variable		
Worker position	Majority of investigations in the sample conducted by intake workers (51%) (1); Majority of investigations in the sample were conducted by other than intake workers (0)	Worker position refers to a worker who performs only an intake function; other workers perform investigation functions in addition to ongoing family and/or child cases or other responsibilities.
Location of organization	Investigations from Metropolitan agencies (1) Mixed urban rural and rural agencies (0)	Location of the organization responsible for conducting the investigation.
Staffing vacancies	Investigations with no unfilled staffing positions (1) Unfilled staffing positions (0)	Agencies reported whether there were any unfilled staffing positions.
Proportion of Aboriginal reports	Agencies with forty-five percent or more investigations involving Aboriginal caregivers (1) Agencies with less than twenty percent of investigations involving Aboriginal caregivers (0)	The number of investigations involving Aboriginal children from each agency was determined. The choice of cut-off point for <i>proportion of Aboriginal reports</i> was arrived in the following manner. Ten individual models were fitted for the 1998 and 2003 datasets, with <i>Aboriginal status</i> as the only first level variable, and 10 different <i>proportion of Aboriginal reports (PAR)</i> , from 10% (PAR10) to 100% (PAR100), as sole second level variable. Fig. 2 displays regression parameters for <i>Aboriginal status</i> and <i>proportion of Aboriginal reports</i> ; by inspection of the figure, PAR45 appears as optimal value for both the 1998 and 2003 cycles.

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