CAN PLACEMENT OF ADOLESCENT BOYS IN FOSTER CARE BE HARMFUL?

AN ANALYSIS OF HEALTH, EDUCATION, WELFARE AND CORRECTIONS OUTCOMES

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Abstract

This paper uses anonymized linked administrative data from health, education, welfare, corrections and child protection to estimate the impact of placing 16 to 18 year old boys in foster care on a range of outcomes. Both propensity score matching and instrumental variables are used. Workers' propensity to place children in care and policy changes are used as instruments. The paper finds that, at the margin, for this group, foster care reduces high school graduation, increases welfare use, increases the likelihood of contact with Corrections and increases the likelihood of being treated for a medical disorder related to substance abuse.

Introduction

Child welfare is a critical function of government and a major component of social programming in North America. In 2005, nearly 800,000 children in the United States came into contact with the child protection system [AFCARS 2006b]. Roughly one percent of children receive child protection services. Scarcella et al. [2006] estimate total expenditure on child welfare services by national, state and local government in the United States at $23 billion in state fiscal year 2004. To put this in context[1], McGuire & Merriman [2006] estimate total expenditure on Temporary Assistance to Needy Families (TANF) by national, state and local government in the United States at about $13 billion in 2002.

The main tool of child protection is the removal of children who are at risk for abuse and/or neglect from their families and placing them with foster families.[2] It is clear this is a drastic intervention as it is well established that separating a child from his or her family can have severe consequences [See e.g. Corak 2001]. On the other hand, substantial harm, even death, can result if children are left with parents who physically abuse or severely neglect them.

The decision to place a child in foster care is typically made by a judge on the recommendation of a social worker. The formulation of a recommendation by the social worker is difficult for two reasons. First, social workers often have imperfect information on the risks that the child will face if left with his or her family. Second, the

social worker must make recommendations that are consistent with policies that fluctuate between "family preservation" (fewer children taken into care) and "child protection" (more children taken into care). Periods favoring "family preservation" can end with a tragic child death when social workers learn that social standards have shifted[3] towards "child protection" through headlines such as, "Fired Social Worker Made Scapegoat For Baby's Death[4]" and "Senior officer suspended after baby's death.[5]"

Fluctuations in social standards and policies are reflected in variations in use of child protection services observed across regions and over time. For example, the proportion of children in foster care in the United States in 2002 was three times higher in some states (e.g., California, Alaska, Nebraska) than in others (e.g., Utah, New Hampshire, Virginia). Some states have experienced dramatic declines in reliance on foster care (e.g., 30% declines in Illinois, Delaware and New York from 1999 to 2003) while other states have experienced significant increases (e.g., 30% increases in Hawaii, West Virginia, and Idaho) over this same period.[6,7]

Wide variation in the use of foster care suggests sub-optimal outcomes for children served by the child protection system. Standard theory would suggest that the well-being of children would be maximized by taking children into care until the expected marginal benefit to the child from placement in foster care equals the expected marginal harm to the child. But unless the marginal benefits and harms vary greatly across states and across time, the level of placement may be optimal either in periods/states favoring "family preservation" or in periods/states favoring "child protection," but not in both.

Many investigators have compared the outcomes of children placed in foster care with other children (Eschelbach-Hansen [2006] provides a review.), but with two exceptions, they have not attempted to separate the effects of foster care from the conditions that led to foster care. For example, Viner and Taylor [2005] used the 1970 British birth cohort to compare outcomes of children who had and had not been placed in care. In this prospective study the authors were able to control for a wide range of characteristics of the children and their families with data collected at ages 5, 10 and 16. Information on outcomes was collected at age 30. The investigators concluded that "men with a history of public care were less likely to attain high social class and more likely to have been homeless, have a conviction, have psychological morbidity, and be in poor general health. … [They] were more likely to be unemployed and less likely to attain a higher degree." However, the authors are careful to say that they are reporting on an "association" and do not attempt to separate the impact of foster care from the abuse or neglect that led to placement in foster care.

In a similar study, Vinnerljung and colleagues [2005] linked parents' and children's education records to child protection records for all individuals born in Sweden between 1972 and 1979. They found that, after controlling for gender, age, mother's birth country and mother's education, being a child welfare client was associated with a three-fold increase in the risk of having no more than a basic education. The authors acknowledge that they have "little or no data on characteristics of parents, children and care

environments" and take pains to point out that the relationships that they report are not necessarily causal.

Lawrence and her colleagues [2006] moved substantially closer to isolating the impact of foster care. They compared outcomes experienced by a group of children placed in foster care to those experienced by a group of children who were at risk of entering care, but who were left with abusive parents. Pre-placement assessments using the Teacher Report Form (TRF) available for both groups provided a baseline measure of factors affecting adaptation and development. By subtracting the pre-assessment from the post-assessment results, pre-existing differences were at least partially netted out, and the researchers were better able to discern the impact of the intervention.

They concluded:

"Analysis of children placed into care after kindergarten permitted the examination of pre and post placement change in behavior problems assessed with the same measure (TRF). In these analyses, the foster and maltreated groups did not differ prior to placement. However, immediately following placement, children in foster care exhibited an increase in behavior problems. The increase in problematic behavior following departure from foster care significantly exceeded change in behavior problems among those reared by maltreating parental figures, suggesting an exacerbation of problem behavior in the context of out of home care."

While this study provides strong evidence it is not conclusive. It is possible that some event or change occurred between the pre-assessment and coming into care, for example an egregious episode of abuse or a parent entering hospital. The event, rather than coming into care itself could account for changes in the assessed level of behavior problems.

Finally Doyle [2006] uses instrumental variables to estimate the impact of placement in foster care on three important outcomes: delinquency, teen child bearing and employment. He finds that placing children into care decreases the likelihood that they will be employed in 2002 (not statistically significant in the IV estimates), reduces their earnings in 2002, increases the likelihood that they will become teen parents (not statistically significant in the IV estimates) and increases the likelihood that they will be classified as delinquent. Doyle's paper is undoubtedly the best evidence on the impact of foster care to date.

However, even small correlations between the instrument and the outcome of interest can cause substantial bias in IV estimates [Bound, Jaeger, and Baker 1995] and it seems likely that Doyle's instrument will be correlated with outcomes of interest. His instrument is the average within year difference between each caseworkers' tendency to place children in foster care and their co-workers' average tendency to place children in foster care. We expect that the combination of hysteresis in professional judgments and worker turnover will combine to cause a correlation between this instrument and the overall rates of placing children in foster care. Hysteresis in professional judgments (well

documented in other contexts [Woolf 2000]) means that workers hired in times of "child protection" will tend to keep their high tendency to place children in foster care into periods of "family preservation" and consequently have higher within year placement rates than newly hired coworkers. Turnover among workers means that average placement rates can change as "child protection" workers are replaced by "family preservation" workers. For these reasons, workers hired when "child protection" is in vogue will tend to have higher values of Doyle's instrument than workers hired when "family preservation" is in vogue[8].

This is significant in the Doyle study because dramatic social changes occurred in Illinois in the 1990's. The number of children in foster care in Illinois declined from 51,331 in 1997 to 17,415 in 2006 [DCFS 2006] so changes in placement rates undoubtedly occurred. The percentage of boys classified as delinquent in Cook County Illinois decreased by 64% between 1993 and 2003 [Hughes 2006] and youth unemployment (16 to 19) declined from 21.3% in 1992 to 12.5% in 1998 [Reinhold 1999]. Both the instrument and the outcomes changed in the 1990's. Correlation between the two may have introduced bias.

While the recent work of Doyle and Lawrence and her colleagues represents important progress, clearly not enough is known about the effects of this important social policy. This paper provides strong evidence on the impact of placing children into foster care on a range of long term outcomes. Estimates are made using a matched comparison group and with instrumental variables, using two instruments. The paper proceeds in five

sections. First we present a simple model of the challenge that we face in making estimates of the impact of placement in foster care. Second we describe the data used. Third, we describe the methods that we use to make our estimates, and fourth, we present our results. We offer some conclusions in the final section.

The Model

We begin with a standard model in which the outcome for individual i is Y_i, X_i is a vector of characteristics describing individual i, β is a vector of coefficients that relate the characteristics to the outcome, P_i is a dummy variable that takes the value 1 if the individual is placed in foster care, 0 otherwise, δ_i is the impact that the foster care has on outcome Y for individual i and ε_i (the error term) is the part of the outcome that is unexplained by the characteristics in the model or by foster care.

(1) $Y_i = X_i\beta + P_i\delta_i + \varepsilon_i$

Although δ_i is unknowable, our goal is to find out as much about it and its distribution as possible.

Without the benefit of random assignment to make our estimates, we face three problems that could bias our estimates: selection bias, random effects and non-overlapping support, and one problem that could bias the statistical tests of our findings, clustered error terms. We discuss each of these in turn.

Without random assignment, children are selected for foster care on the basis of characteristics such as abuse and neglect. Many empirical studies have found that

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characteristics that are associated with coming into care are also associated with poor

outcomes for children [Berger & Waldfogel 2004]. Children who come into care are

more likely to be poor, more likely to have parents who are sick or to have had contact

with the criminal justice system, and of course have worse relationships with their

parents. All these factors are also associated with worse outcomes for the children in

terms of their own educational attainment, contact with the criminal justice system, health

and poverty.

What's more, it is very difficult for researchers to control for the differences between

children who do and do not come into care. Social workers gather information from

discussions with parents, teachers, police, siblings, neighbors and the child; information

on the state of the house, and information on circumstances surrounding the allegations of

abuse and/or neglect when preparing a recommendation regarding placement. Little of

this information is available to researchers in any form and much of the information is

not quantifiable. So even if a researcher were to control for all measured differences

between children in care and children who were not placed in care, there could be

additional unmeasured differences between the two groups of children that could account

for differences in the outcomes between the two groups.

In terms of equation (1), unmeasured characteristics included in ε_i are correlated with

coming into care P_i and this will introduce bias into the coefficient $\bar{\delta}$ equal to

$$Bias = \hat{\beta}_\varepsilon \hat{\beta}_{P\varepsilon}$$

Where $\hat{\beta}_{P\varepsilon}$ is the regression coefficient from a regression of the true but unknown error term ε on coming into care P and $\hat{\beta}_\varepsilon$ is the coefficient from a regression of the true but unknown error term ε on the outcome of interest. All other regressors (X_i) are included in both of these hypothetical regressions.

The second problem, random effects, relates to the observation that coming into care may be correlated with δ_i, the individual specific impact of coming into care. This will occur if social workers are successful in placing in foster care, the children who are most likely to benefit from foster care. To show this, re-write (1) in terms of average effects.

(2) $$Y_i = X_i\beta + P_i\bar{\delta} + P_i(\delta_i - \bar{\delta}) + \varepsilon_i$$

In (2) δ_i becomes part of the error term, and so, as was the case for selection bias, the error term is correlated with placement in foster care and in a manner analogous to the selection issue, biases the estimates. In this case, the bias will be

$$Bias = \hat{\beta}_\varphi \hat{\beta}_{P\varphi}$$

Where the β's are defined as above, except that φ is $P_i(\delta_i - \bar{\delta})$. The extent to which the average effect returned by OLS differs from the true average effect will depend on the extent to which returns to foster care vary ($\hat{\beta}_\varphi$) and the extent to which social workers are successful in identifying and placing into care the children who will benefit most ($\hat{\beta}_{P\varphi}$).

The third problem, non overlapping support, arises from the unique attributes of children in and out of foster care and difficulties that arise in finding appropriate matches when

creating groups for comparison. Non-linearities in the relationships between the

explanatory variables (X_i) and the outcome that are not manifest in the part of the sample

in which there are both participants and non participants will be picked up by the

coefficient on program participation. Empirically, this is an important issue. In their

analysis of selection bias, Heckman, Ichimura, Smith and Todd (1996) conclude that the

largest part of selection bias arises from "differences in the support[9]" and "differences in

densities over the region of common support."

Estimates of the standard deviations of the coefficients in regression models are based on

the assumption that the observations are identically independently distributed. This

assumption is violated in our data set. The error term, ε_i is the part of the outcome for

observation i that is unexplained by the characteristics in the model or by foster care.

Some of the factors that affect the outcome, that are not captured by the model could be

characteristics of the individual, the social worker on the file or the neighbourhood that

the individual lives in. When individuals contact the ministry twice, they generate two

observations. Their characteristics will be different at each contact (for example they will

be older and have had more prior contact in the second contact) and most outcomes will

be different (except for the outcomes that were created for a specific age, they will refer

to different time periods). However, the error terms for the two observations will be

clearly related. Similarly, observations will be related because they refer to the same case

worker or the same geographical area.

To deal with the bias in the standard errors, we bootstrap the confidence intervals, clustering on individual, caseload number and office code. We have three strategies to address the bias issues. First we conduct our analysis using a large (anonymized) data set with many explanatory variables. Second, we draw a matched comparison group to ensure that our treatment and comparison groups have similar distributions over the region of common support. And third we use instrumental variables methods with two instruments to address selection bias issues. The use of two instruments provides the opportunity to test the independence of the instruments from the error term. In addition, consistency between the instrumental variables and matched comparison group estimates provides some reassurance that the remaining selection bias in the matched comparison groups is small and that the instrumental variables estimates are not biased by spurious correlations or inappropriate functional form.

Data

Following Heckman, LaLonde, and Smith's famous dictum, "better data helps a lot," [1999] we expended considerable effort in developing a data set for this analysis. This has an obvious benefit in that the more complete the X_i the smaller will be ε_i and the less likely it will be that our results are confounded by an uncontrolled variable that is correlated with placement in foster care and an outcome of interest. However, a carefully constructed data set can also help address the issue of selection bias due to unmeasurable variables.

It is very difficult to measure ambition, motivation and enthusiasm in a way that predicts labor market behavior, yet some researchers have argued that these are the variables that

are most important to include in our models. Analogously, it would be difficult to define, let alone measure the love that parents feel for their children and yet parental love may be the most important factor that keeps a child out of care and leads to desired outcomes in the child's life. Fortunately, past values of the outcome of interest provide us with a partial solution. If we are interested in the impact of taking children into care on their contact with the criminal justice system and we believe that parental love (however defined) affects the likelihood of contact with the criminal justice system, then it will have affected contact in the past. By controlling for previous contact with the criminal justice system we are indirectly controlling for all of the unobserved characteristics that affect contact, including parental love, as long as those characteristics don't change.

Unfortunately the solution is only a partial one for three reasons. The first is that many factors do change. Divorce, job loss, hospitalization of parents, or other dramatic events can change the relationship between pre-existing characteristics and historical values of outcome variables.[10] Second, we are looking at children and the way in which early insults are expressed changes over time. For example, very few children will have had contact with the criminal justice system, dropped out of school, become pregnant, or been unemployed before the age of 15, so controlling for historical values of these variables may have limited value. Third, the historical variables will only measure the underlying characteristics with an error which can introduce bias when dealing with a disadvantaged population (see e.g. Morton & Torgerson 2003). For these reasons, when we control for past values of the outcomes that we are interested in, we are indirectly controlling for

unmeasured or unmeasureable characteristics of the boys, although the control is incomplete.

Our data are anonymized linked administrative records from British Columbia[11] (BC), Canada. The percentage of children in foster care in British Columbia[12] is comparable to the percentage in the United States, although the characteristics of those children differ in that almost half of the children in care in BC are Aboriginal [CYO, PHO 2006].

We limit our study of the impact of foster care placement to 16 to 18 year old boys. We picked this subgroup for analysis for three reasons. First, we suspected that the impact of being placed in care would vary by age and sex and so we wanted to look at a relatively homogeneous group. Second, as we will show, policy changes were particularly dramatic for this group, making the instrumental variables estimates stronger. Third, restricting our analysis to a narrow age group allows us to measure outcomes consistently across our sample.

Data from five BC ministries were linked for this study[13]:

1. The Ministry of Children and Family Development;

2. The Ministry of Health;

3. The Ministry of Employment and Income Assistance;

4. The Ministry of Education; and

5. The Ministry of Public Safety and Solicitor General.

While these files contained identifying information, identifiers were removed as soon as the cleaning/unduplicating/linking had been completed. All work was done on a secure machine in controlled premises of the Child and Youth Officer for BC.

The linked data allowed us to identify and construct more than 80 variables describing the boys, their families and their interaction with government services. In addition, we were able to construct outcome variables relating to interaction with the health care system, receipt of income assistance, high school graduation and contact with Corrections Branch. Table A1 in Appendix 1 provides a list of these variables, their means and a brief description of each, both in the raw data and in the matched comparison groups. Brief descriptions of the variables are provided in Table A3. The following sections provide more a general description of the sources.

The Ministry of Children and Family Development (MCFD)
The Ministry of Children and Family Development is responsible for child welfare in BC. Ministry employees, mostly trained social workers, investigate allegations of abuse and neglect and make recommendations about whether children should be placed in foster care. Monthly backup files from MCFD's information system from February 1989 to April 2003 formed the backbone of this project. From these files we created variables describing the boys (age and birth month), their families (mother and/or father present) and their prior interactions with MCFD (number of months in open child services, family services or special needs files separately for each of the previous three years for the boy and the family).

Adolescents were said to have come to the attention of the Ministry if they were identified in any child protection file. The open or re-open date of the file was taken to be the date at which they came to the attention of the ministry. For the purposes of this study, children were said to have been placed in foster care when a child services file was opened because this definition could be applied consistently throughout the study period[14].

Ministry of Health

The BC Ministry of Health keeps all hospital discharge records and records of payments made to physicians for medical services provided. Almost all BC residents (94%) are covered under BC's Medical Service Plan (MSP) (Warburton, 2005). Recipients of MSP services and hospital discharge records are identified by a Personal Health Number (PHN). These records were provided to the Child and Youth Officer for the purposes of this project with identifiers removed and PHN's encrypted. A key was also provided so that the encrypted records could be linked to MCFD records.

MSP fee-for-service records covered about 90% of payments for physician-based services in 2004-2005 (British Columbia, 2005). The remainder, payments for salaried physicians and sessional services, may be over represented in rural and aboriginal communities (See e.g. BC Ministry of Health, undated). For the purposes of this study, we were provided with the date of services, diagnostic code[15] and fee item[16] for records for the period January 1990 to September 2006. From this file we created variables

reflecting the interaction that the boys and their families had had with physicians in BC, both before coming into care to be used as explanatory variables and after coming into care and after turning 19, to be used as outcomes. Some of the variables created included number of months in which treatment was received for ADHD, neuroses, psychoses, and issues related to substance abuse.

The Ministry of Health's files containing hospital discharge records are generally regarded as being complete and accurate. For the purposes of this study we were provided dates of hospital admission and discharge and E-codes, indicating external causes of injury. The data set covered hospital discharges from April 1990 to March 2005. We used this data to identify hospitalizations for accidents and injury before contact with MCFD (to be used as explanatory variables) and after contact with MCFD (to be used as outcome variables).

The Ministry of Education

In British Columbia all schools (public, private, home schooling and distance education) are required to report information on their students to the Ministry of Education. The Ministry provided us with records containing graduation status and grade point average for the school years 1991/1992 to 2004/2005.

The Ministry of Employment and Income Assistance

For the purposes of this project the Ministry of Employment and Income Assistance (MEIA) made available records of all income assistance recipients by month from

October 1990 to December 2005. The file also identified the program under which the benefits had been paid. We used that to distinguish payments made under the "Child in the Home of a Relative" program from all other payments. We used this data to construct variables reflecting the income assistance paid to the boy/family before contact with MCFD as explanatory variables, and after contact and after turning 19 as outcome variables.

MEIA and MCFD were a single social services ministry before 1996. They continue to share a registry of clients with a common identifier. This identifier was used to link records.

The Ministry of Public Safety and Solicitor General

The Corrections Branch of the BC Ministry of Public Safety and Solicitor General has maintained records of incarceration in BC jails since April 1, 1975. For the purpose of this project they provided us with an extract of the admissions and discharges from each institution in their data set, together with information on the sentence and an offence code. Because the number of remand and pre-trial centers included in the data set changed over time, these dispositions were excluded from the analysis. Individuals sentenced to federal institutions[17] pass through the provincial jails so the records of contact, offence codes and sentences are complete.

These data were used to construct variables reflecting the boys' and their parents' contact with Corrections Branch before (as explanatory variables) and after (as outcome variables) contact with MCFD.

Methods

Comparison group

Propensity score matching is a class of techniques for constructing a comparison group based on the observable characteristics of participants and non-participants. Unlike random assignment, where unobserved differences between participants and non-participants are balanced, a comparison group created through propensity score matching may differ in unmeasured characteristics. Bias will occur to the extent that unobserved characteristics are both correlated with placement in foster care and affect the outcome of interest. If such correlations exist in our data, then the difference in outcomes between the boys who were placed in foster care and the matched comparison group will be partly due to those differences and partly due to foster care.

Nonetheless, matched comparison groups have four significant benefits. First, once a comparison group has been drawn, it can be demonstrated that the comparison group is in fact equal to the treatment group on average, for all measured characteristics. Second, matched comparison groups solve the problem of non overlapping support, comparison group members are selected from boys who were not placed in care, but who have propensity scores that are very similar to boys who were placed in foster care. Third, no functional form assumptions are needed. Estimating the impact of placement in foster care on an outcome is as simple as finding the difference between the average outcome

for the boys placed in foster care and the average outcome of the comparison group. And

fourth, the difference in outcomes between each boy placed in foster care and his

comparison boy yields an estimate of the impact of foster care on that boy. Although

each estimate is not useful by itself, (the variance is undefined) the estimates can be

aggregated along a number of dimensions to provide information on the distribution of

the impacts.

The first step in drawing a propensity score matched comparison group is to estimate the

propensity for coming into care. Table A2 shows the coefficients from this regression.

Having been in care previously, having had prior contact with MCFD, family structure,

contact with the criminal justice system, and treatment for mental health issues are very

important predictors of coming into care.

*** Figure 1 goes about here

Figure 1 shows the distribution of "propensities" to come into care for boys who

subsequently came into care and boys who did not subsequently come into care. As

expected the boys who were placed in foster care had higher calculated propensities to

come into care. Although the frequency of boys not coming into care in the higher

probability ranges was low, only 4 boys who were placed in foster care had higher

propensity scores than the highest probability among boys who did not come into care

(.94) and only 12 boys who did not come into care had probabilities below the lowest

probability among boys who were placed in foster care (.01).

Simple matching on propensity score with a large number of explanatory variables and finite sample sizes does not automatically generate a comparison group that is comparable in all variables [Dehejia 2005]. To generate a comparable comparison group, we forced exact matches on the important explanatory variables until we achieved a satisfactory outcome. These variables have been marked with an * in Table A1.

Because, as Smith and Todd [2005] point out, "multiple versions of the balancing test exist in the literature, with little known about the statistical properties of each," we report two tests of the similarity of the treatment and comparison groups.

First, we do simple t-tests. The right hand side of Table A1 shows that in our matched comparison group, none of the 82 pre-existing variables is statistically significantly different between the treatment group and matched comparison group. In addition, we divided our sample into four, based on propensity score and repeated the tests. Six out of the 328 tests yielded a statistically significant difference at conventional levels (t > 1.96), but if a Bonferroni adjustment is made, none is statistically significant. Repeating the process using 10 groups, 17 of the 820 tests were statistically significant, although again, none is statistically significant if a Bonferroni adjustment is made.

Second, following Kamionka and Lacroix [2003], we jointly test the significance of the variables by regressing them on the variable indicating that the boy subsequently came into foster care. The hypothesis that all coefficients are zero is not rejected by an F-test.

Although the difference between the two groups is not statistically significant for any specific variable, there are small residual differences that could affect our estimates. For example, boys who were placed in foster care had spent more time in care before contact than the comparison group; among those with young mothers, their mothers were younger and among those with older mothers, their mothers were older. For this reason, we supplement the simple differences by regression analyses of the matched sample (one regression for each outcome of interest) using all matching variables as explanatory variables and recover the coefficient on the variable reflecting placement in care. These results are discussed below.

Instrumental variables

The second strategy that we employed is instrumental variables. The advantage of instrumental variables techniques is that they will, under favorable conditions, control for both measured and unmeasured differences between boys who were placed in foster care and boys who were not. If a variable exists that is correlated with being placed in care and uncorrelated with the error term ε_i, and if the impact of placement in foster care is constant ($\delta_i = \bar{\delta}$), then (constant) average treatment effect $\bar{\delta}$ can be recovered by instrumental variables techniques. However, even when the impact is not constant the interpretation of instrumental variables estimates is generally well understood [Angrist and Imbens 1994].

Two potential problems can bias instrumental variables estimates: invalid instruments [Angrist and Krueger 2001] and weak instruments [Bound, Jaeger, and Baker 1995]. Fortunately tests for each of these problems are readily available [Baum 2007].

The instruments

We use two instruments that we believed *a priori* would affect the likelihood that boys would be placed in foster care but would not be correlated with the unmeasured characteristics of the boys. The first instrument is the changes over time in the province-wide policy regarding placement of adolescent boys in foster care. The second instrument is the variation in workers' attitudes regarding placement in foster care in a geographic region within each year.

*** Figure 2 goes about here

Figure 2 shows the percentage of contacts that are placed in care by month and by single year of age. Clearly there was a dramatic shift in the percentage of boys who were taken into care. This would not be independent of the unmeasured characteristics of the boys if, for example, the Ministry began dealing with much more needy boys.

*** Figure 3 goes about here

Figure 3 shows that the average number of boys in this age group was relatively constant between 1993 and 2000, especially compared with the percentage coming into care. While validity of the instrument is assessed by the tests, Figure 3 suggests that the dramatic changes in the percentage of boys contacting MCFD who subsequently were

placed in foster care are more likely to be related to a shift from "family preservation" policies to "child protection" policies and back again than to changes in the nature of the boys contacting the Ministry[18].

The instrument that we use to reflect these policy changes was calculated separately for each boy so that the boy's own experience was not included in the instrument. It is the percentage of contacts by all other boys that were placed in care by month and by single year of age.

We also developed an instrument based on variation in workers' attitudes towards placement in foster care. While the decision to place a child in foster care is made by a judge, it is strongly influenced by the recommendation of a social worker and there is a long literature documenting the challenges that social workers face in making these decisions and the variability that results. For an introduction to that literature see Saunders and Goddard[19] [1998 p. 30] who report, "Ultimately, decisions rest with workers." But regardless of the reasons for this variability, for our purposes, it is sufficient that the variability exists and is uncorrelated with the unmeasured characteristics of the boys.

To construct the instrument, we used office codes and caseload numbers. We first found the number of contacts (the denominator) and the number of contacts that were placed in foster care (the numerator) for each caseload number, for each year. Following the lead of Greene [2001] we restricted the analysis to caseload numbers that had had more than

eight contacts (of any age) in a year. This yielded 12,243 distinct caseload-year

combinations over the period 1989 to 2003. We also found the number of contacts and

the number of contacts that were placed in foster care for each office, for each year.   This

yielded 2,876 distinct office-year combinations. Then for each boy in our sample we

eliminated the boy from the relevant caseload numerator and denominator to calculate a

caseload placement rate. We similarly removed the caseload numerator and denominator

from the office values to calculate an office placement rate, net of the relevant caseload.

Finally, we subtracted the caseload placement rate from the net office placement rate to

generate a measure of the difference in placement rates between the caseload affecting

the boy and the rest of the office.

The resulting variable has a mean of .005 (recall that this mean is not constrained to be

zero because the means for the workers and the offices are calculated across all ages and

the differences are only adjusted for boys in the 16 to 18 age range) and a standard

deviation of .10.

Results

Descriptive statistics

The means of 82 explanatory and 32 outcome variables that we constructed describing

the boys who contacted MCFD are listed in Table A1. The picture that they paint of boys

in care is consistent with the literature on characteristics and outcomes of children who

are placed in foster care. The pre-existing characteristics of boys who had been placed in

care were worse than the boys who contacted the Ministry but had not been placed in

care. The boys who had been placed in care had worse outcomes than the boys who had

not been placed in care. Whether the worse outcomes were caused by the disadvantage

the boys faced at the time they came into care or by placement in foster care is the subject

of this paper. We begin by looking at descriptive statistics.

Boys who were placed in foster care subsequent to their contact with MCFD were more

likely to have had prior contact with MCFD than boys who had not been placed in foster

care. Boys who were placed in foster care had been in foster care an average of 1.9

months in the previous year, 1.6 months 2 years prior to contact and 1.2 months 3 years

prior to contact, compared with .5 months in each of the prior three years for the boys

who were not placed in foster care. In addition they were more likely to have had a

sibling in care. 39.5% of the boys who were placed in foster care came from families

associated with another child in care in the previous 12 months compared with 14% for

the boys who did not subsequently come into care. 69% of boys who subsequently came

into care came from families that had had prior contact with MCFD, compared with 55%

of the boys who contacted the Ministry but did not subsequently come into care.

Health

*** Figure 4 goes about here

Boys who were placed in foster care were also different in their contact with the health

care system from boys who contacted MCFD but who were not placed in foster care.

Figure 4 shows the percentage of boys for whom a physician billed at least one service

during the month for each month in the two years before contact with MCFD and the five

years following contact. The boys who were placed in foster care were given more

service both before and after coming into care. The higher percentage with a visit in the

month of contact and the months following for the boys who were placed in foster care

probably reflect the statutory requirement for services for children in care (e.g.

checkups). The higher levels for the months before coming into care may reflect the fact

that a higher percentage of these boys had been in care before the month of contact, or it

may reflect a higher need for medical services.

*** Figure 5 goes about here

Figure 5 provides the same information, but in this case uses the 19th birthday as the

reference month. (The age of majority is 19 in BC.) The boys in care continue to receive

more services after leaving care but the difference is diminished substantially at age 19.

Table A1 provides some information on the types of service received. 10% of the boys

who were placed in foster care had been treated for a disorder related to substance abuse

prior to their contact with MCFD, compared with 5% of boys who were not placed in

foster care. 10% were treated for a conduct disorder, and 27% for other neuroses

compared with 4% and 16% respectively for boys not placed in foster care.

Table A1 shows that hospitalizations are rather rare for the 16 to 18 year old boys who

contacted MCFD. With that caveat, we note that boys who were placed in foster care had

been hospitalized more prior to contact, with the largest relative difference in

hospitalizations for attempted suicide. (18 hospitalizations per thousand boys who were placed in foster care compared with 6 per thousand boys who were not placed in foster care.)

Income Assistance

The income assistance (welfare) patterns are clearly related to contact with MCFD and being placed in foster care. About one-quarter of the boys who contacted MCFD received provincial income assistance benefits in each of the months leading up to the month of contact with MCFD, with a slightly lower percentage of the boys who were placed in foster care receiving benefits. This difference may be due to the very high proportion of aboriginal people who are placed in foster care, and the fact that welfare paid on reserve is not paid through the provincial welfare system (and therefore not in our data). For all boys, the month of contact is associated with a spike in income assistance receipt. This spike may signal a change that triggered both a loss of income and child protection concerns (e.g. job loss or divorce) or it may signal referral by either agency to the other. (In some rural communities child protection and welfare offices co-locate.)
*** Figure 6 goes about here

After the month of contact with MCFD, welfare use changes dramatically for the two groups. For the boys who come into care, the percentage receiving income assistance immediately drops as the child protection system takes financial responsibility for the boy. (The percentage does not fall to zero because boys may not stay in care and because the welfare system has provisions for keeping foster children in their parents' files, for

example where the child will visit the family.) The percentage then grows as the boys turn 19 and financial responsibility reverts from the child protection system to the income assistance system. For the boys who have not been placed in foster care, the percentage receiving income assistance declines steadily over time.

*** Figure 7 goes about here

The difference that occurs at age 19 can be seen more easily in Figure 7, which provides the same information but aggregated over months relative to the month in which they turn 19. The percentage of boys who were not placed in foster care increases by about 8 percentage points from the month before their 19th birthday to the month following their 19th birthday. In contrast the percentage of boys who were not placed in foster care increases by a percentage point in the month that they turn 19, but except for that month, the percentage receiving benefits continues its decline.

Corrections

*** Figure 8 goes about here

Figure 8 shows the percentage of boys that had contact with Corrections Branch in each month for the two years before and five years after contact with MCFD. This is a graphical presentation of the raw data. Each individual may have several recorded contacts as they are admitted to jail, transferred between institutions, released on parole, etc. The percentage of contacts declines to the left because the boys are younger. The

decline in numbers of contacts to the right may come about either as a result of committing crimes that resulted in sentencing to a federal institution or going straight.

Table A1 reports that 27% of the boys who were placed in foster care had had contact with Corrections before their contact with MCFD, 10% had been in jail and 7% had been sentenced for a serious violent offence. This compares with 17%, 4% and 4% for boys who contacted MCFD, but did not come into care. In addition, the boys who were placed in foster care received their first sentence at a slightly younger age than the boys who were not placed in foster care.

Table A1 also reports that boys who were placed in foster care had more contact with Corrections, were convicted of more serious violent crimes and were more likely to be sentenced to jail after contact with MCFD than boys who contacted MCFD but did not come into care. The increase in percentage (measured in percentage points) contacting Corrections, going to jail and being convicted of a violent crime was higher for boys who were placed in foster care than for boys who contacted MCFD but did not come into care. However, the *proportionate* increase was *lower* for violent crimes and going to jail for boys who came into care. The impact of taking boys into care on their subsequent contact with Corrections is not so dramatic that it is apparent in the raw data.

Matched comparison group

Our first step in distinguishing the effects of pre-existing differences between boys placed in foster care and the effect of placement in foster care itself on the outcomes is to

compare outcomes for boys placed in foster care with boys who are similar in all measured characteristics, but who were not placed in foster care. The first column of Table 1 reports the difference in mean outcome between boys placed in foster care and their matched comparison group. Although the boys who were placed in foster care are not statistically significantly different from their matched comparison group in any of the 82 pre-existing variables that we were able to measure, they were statistically significantly different (P < .05, two tailed t-test, equal variances) in eight outcome measures. (These differences have been bolded.) The boys who were placed in foster care were less likely to go to a physician for issues not related to mental health after turning 19, but were more likely to be treated for health issues related to substance abuse after being placed in care. They were less likely to receive income assistance before they turned 19 (while in care) but were more likely to receive income assistance at age 19 and 20. They were more likely to have contact with Corrections Branch and to be jailed. And finally, they were less likely to graduate from high school.

We used regression analysis to control for remaining differences between the boys placed in foster care and the comparison group. The second column of Table 1 reports the coefficients on the variable indicating that the boy had been placed in foster care from regressions (OLS for the continuous variables and probit—marginal effects reported—for the discrete variables, standard errors bootstrapped with clusters for office and caseload number) with all the pre-determined variables as explanatory variables and the indicated variable as the dependent variable. The picture is not changed by the adjustments although two t statistics moved across the 1.96 threshold. The t statistic for treatment for

neuroses after placement in foster care moved from 1.65 to 2.0, and the t statistic for physician visits for issues not related to mental health after turning 19 fell from 2.16 to 1.88.

While these estimates of the average impact of placement in foster care are interesting in their own right, it would also be interesting to know about the distribution of impacts. If some boys are helped by foster care and some hurt by foster care it would be interesting to know that as a guide to policy.

The difference between each of the boys who were placed in foster care and his matched comparison group boy is an estimate of the impact of placement in foster care on that boy, but it is an estimate with an undefined variance. To smooth the estimates and to enable the calculation of confidence intervals, we group the observations by propensity score (probability of coming into care) and regress the outcome variable on a dummy variable indicating placement in care and a quadratic in the propensity score. The use of propensity score and propensity score squared as the only regressors increases the degrees of freedom and is justified by the literature on local linear regressions. See e.g. Fan [1992].

We present estimates of marginal impacts for four key outcomes: high school graduation, treatment for substance abuse related disorders, income assistance dependence at age 19, and contact with Corrections Branch. Figure 8 shows that the impact of coming into care on the likelihood of graduating from high school clearly declines with the probability of

coming into care, although it is negative (reduces the probability of graduating) for all groups. This suggests that reducing the number of children who come into care will increase the graduation rate for children who no longer come into care.

*** Figure 9 goes about here

Figure 9 shows that the impact of being placed in care on the likelihood of being treated for a disorder related to substance abuse after age 19 increases slightly with the probability of coming into care. It is always positive. This suggests that reducing the number of children who come into care will decrease the likelihood of being treated for a disorder related to substance abuse after age 19 for children who no longer come into care.

*** Figure 10 goes about here

 Figure 10 shows that the impact of being placed in care on income assistance receipt at age 19 declines with the likelihood of coming into care.

*** Figure 11 goes about here

Figure 11 shows that the impact of being placed in care on contact with Corrections Branch is relatively constant across the likelihood of coming into care.

Instrumental variables estimates

There are two main concerns with instrumental variables estimates. The first is that the instruments may be weak. The second is that the estimates may be biased due to correlation with the error term. Fortunately, Stata's IVREG2 routinely reports tests for both possible problems. The F statistic for excluding the two instruments described above in the first stage regression was 117.29. This is substantially higher than 10, the rule of thumb proposed by Stock and Yogo [2003] and so we don't consider the issue of weak instruments further. The correlation with the error term will, of course, change with each dependent variable and for this reason Table 1 reports the Sargan statistic and its P value for each outcome. P values less than or equal to .10, (suggesting concern about the instruments in that equation) are in boldface.

In addition to the issues specific to instrumental variables, standard errors may be biased when the assumption of independence of the observations is violated as it is in this case. To correct for this, we bootstrapped the standard errors with 1000 repetitions, clustering for individual, caseload number and office code.

The IV estimates confirm the conclusions from the matched comparison group with three major exceptions: 1) the magnitude of the effects from the IV estimates are substantially larger for treatment for substance abuse and for other mental health disorders than the matched comparison group would suggest; 2) the IV method did not detect the reduction in income assistance in the 12 months following contact with MCFD that shows up in the raw data and the matched comparison groups; and 3) the IV method did not find an increase in jail. There were also several minor differences. The coefficients relating to

contact with Corrections Branch and physician visits for issues not related to mental health after turning 19 were unchanged, but the t statistics fell to 1.87 and 1.38 respectively. The t statistics on the coefficients relating to substance abuse and neuroses after age 19 are greater than 1.96 in the IV estimates and the magnitude of the coefficients is substantially higher than the differences from the matched comparison group. By contrast, the estimates from the IV estimates are remarkably similar to the estimates from the matched comparison group for the probability of graduating from high school before age 20, income assistance receipt after age 19 and contact with Correction Branch.

Summary

We have compared the outcomes of adolescent boys placed in foster care with boys who contacted MCFD, but who were not placed in foster care. We looked at outcomes in five areas: education, income assistance, contact with Corrections Branch, hospitalizations and physician visits. We controlled for differences between boys placed in foster care and boys not placed in foster care in three ways:

➢ We looked at the way in which trends in the raw data changed following placement in foster care and turning 19;

➢ We identified a comparison group of boys who were on average similar to the boys placed in foster care; and

➢ We estimated the impacts using instrumental variables.

While there is no reason a priori to expect the estimates to be the same from all three methods (since the estimates from each is across a different margin), in a separate

analysis, we found marginal impacts of placement in foster care to be qualitatively similar across the range of propensities to come into care that we observed in our comparison group. For this reason, we expect the broad conclusions to be similar from the three methods.

Hospitalizations

The raw data indicated that hospitalizations were rare among this age group. No statistically significant differences were detected.

Physician visits

Physician visits must be interpreted with caution. While it is unambiguously bad to have a disease, it is worse to have the disease and to leave it untreated. A visit to a physician with an associated diagnostic code indicates both the presence of the disease and the treatment[20]. With that caveat, we note that both the comparison group analysis and the instrumental variables analysis find statistically significant increases in diagnoses relating to substance abuse in the 24 months following placement in foster care. However, the IV estimate is outside the range of marginal impacts produced by the comparison group. There is some suggestion that boys placed in foster care are generally less likely to see a physician after turning 19 (coefficients similar in IV and comparison group and statistically significant in the comparison group) and yet are more likely to be treated for substance abuse (IV coefficients statistically significant).

Income assistance

The impacts on income assistance show up clearly in the raw data and in the matched comparison group: placement in foster care reduces income assistance in the short run but increases it following the 19th birthday. This is consistent with the mechanics of

placement in foster care: financial responsibility for the boys is assumed when the boys are placed in care but ends at age 19. The decrease in welfare dependence following placement is not detected by instrumental variables but the increase following the 19th birthday are detected and the IV estimate is very similar to the comparison group estimate: placement in foster care increases income assistance receipt by about a month in the year following their 19th birthdays and by about ¾ of a month in the year following their 20th birthday.

Education

The impacts of placement in foster care from the comparison group and instrumental variables are very similar. Placement in foster care reduces the percentage graduating from high school by around ten percentage points.

Contact with Corrections Branch

While the raw data did not provide a clear picture, the comparison group estimate indicated that placement in foster care increased the likelihood of contact with Corrections Branch by 4.6 percentage points. IV produced the same magnitude of estimate, but the t statistic on the IV coefficient was 1.87.

Conclusion

Removing children from their homes and placing them in foster care is a major component of social policy in North America. In terms of budget it is substantially bigger than either TANF or Head Start. This paper has shown that, at the margin, placing 16 to 18 year old boys in foster care has serious negative consequences. Boys taken into

care at that age do worse in terms of welfare dependence, contact with the criminal justice system, education, and treatment related to substance abuse than they would have if they had not come into care.

While Doyle [2006] looks that the impact of placement in foster care on employment, earnings, teen pregnancy and classification as a delinquent, this paper is the first study that looks at the impact of placing children in foster care on health outcomes, income assistance dependence, high school graduation and contact with Corrections. It is also the first study to test the independence of the instruments used to make the estimates. Both studies look at the North American model of child protection, placing children in foster care, and despite using different data sets and looking at different jurisdictions, both come up with similar findings. Placement in foster care is, on average, at the margin, harmful to adolescents.

We believe that these studies also address a fundamental problem with the evaluation of child protection programs, namely the reluctance to use random assignment. While in most developed countries new devices and drugs must be evaluated using random assignment, child protection programs have not been subject to this kind of scrutiny, perhaps due to concern regarding ethical issues. The American National Research Council's Committee on Youth Employment Programs, commenting on the ethical issues in using random assignment to evaluate training programs for youth concluded, "[I]n situations in which program resources are scarce and program effectiveness unproven, it [random assignment] is ethical" (Betsey, Hollister, and Papageorgiou 1985, 30). With

the addition of this paper, the literature is clear that program effectiveness is unproven, and random assignment at the margin to a child protection program is ethical. It also supports Stephenson and Imrie's [1998] position that "failure to tackle genuine uncertainty about treatments through randomised controlled trials can be considered unethical because it allows ineffective or harmful treatments to continue unchecked."

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Table 1. Estimates of the impact of placing boys in foster care

	Matched Comparison		Regression on matched comparison group		Instrumental variables		
	Difference[21]	t statistic[22]	Coefficient	t[23]	Coefficient	t[24]	P-value Sargan Statistic
Education							
Graduated high school before 20th birthday	**-9.5%**	**-6.53**	**-9.0%**	**-6.08**	**-12.1%**	**-4.78**	0.99
Income Assistance (welfare)							
Months of income assistance in the	**-0.48**	**-3.11**	**-0.60**	**-3.41**	0.35	1.51	0.79

month following contact with MCFD

Months of income assistance in 12

months beginning the month of their

19th birthday | **0.82** | **5.36** | **0.97** | **6.89** | **1.07** | **3.95** | 0.36

Months of income assistance in 12

months beginning the month of their

20th birthday | **0.72** | **4.87** | **0.86** | **5.99** | **0.71** | **2.78** | 0.83

Corrections

Any contact with Corrections branch in

30 months beginning the month

following contact with MCFD | **4.6%** | **3.17** | **4.3%** | **3.66** | 4.6% | 1.87 | 0.93

Contact with Corrections branch in 30

months beginning the month following

contact with MCFD with a disposition of | **1.9%** | **2.28** | **2.0%** | **2.26** | 0.0% | -0.02 | 0.71

jail

Any contact with Corrections branch in
30 months beginning the month
following contact with MCFD with an
offence code indicating a serious violent

offence	0.4%	0.52	0.3%	0.36	-1.1%	-0.72	0.58

Physician billing records

a) Relating to the 30 months following contact with MCFD

Number of months with at least one

diagnosis relating to substance abuse	**0.091**	**3.03**	**0.089**	**3.11**	**0.292**	**2.26**	0.81

Number of months with at least one
diagnosis relating to problems of

adolescence	-0.010	-0.49	-0.010	-0.52	0.004	0.27	0.20

Number of months with at least one	0.013	1.77	0.015	1.92	-0.005	-0.65	0.85

diagnosis relating to developmental

delay

Number of months with at least one diagnosis relating to disturbances of conduct	0.016	1.53	0.018	1.75	-0.021	-0.96	0.77
Number of months with at least one diagnosis relating to hyperactivity	0.004	0.19	0.000	-0.02	0.021	0.66	0.61
Number of months with at least one diagnosis relating to maltreatment	-0.003	-0.63	-0.004	-0.63	0.004	0.35	0.16
Number of months with at least one diagnosis relating to a sexually transmitted disease	0.010	1.56	0.009	1.33	0.009	0.83	0.93
Number of months with at least one	0.09	1.65	**0.11**	**2.00**	0.17	1.87	**0.07**

diagnosis relating to neuroses (but not included above)							
Number of months with at least one diagnosis relating to psychoses (but not included above)	-0.004	-0.08	0.018	0.38	0.133	1.21	0.27
Number of months with at least one physician billing not included above	0.222	1.25	0.286	1.88	-0.198	-0.72	0.68

a) Relating to the 24 months following the month of their 19th birthday

Any billing related to substance abuse	0.8%	0.83	0.7%	0.81	**7.6%**	**3.48**	**0.08**
Any billing related to a neurosis	1.9%	1.43	2.0%	1.44	**8.2%**	**3.16**	**0.06**
Any billing related to a psychosis	0.1%	0.09	0.3%	0.34	2.2%	1.52	**0.04**
Number of months with at least one	0.058	1.65	0.061	1.81	**0.271**	**1.97**	0.49

diagnosis relating to substance abuse

Number of months with at least one
diagnosis relating to problems of
adolescence   -0.004   -0.60   -0.004   -0.56   -0.008   -1.13   0.71

Number of months with at least one
diagnosis relating to developmental
delay   0.007   1.54   0.008   1.86   0.000   -0.02   **0.10**

Number of months with at least one
diagnosis relating to disturbances of
conduct   0.007   1.00   0.008   1.38   -0.018   -1.58   0.68

Number of months with at least one
diagnosis relating to hyperactivity   0.000   0.00   -0.003   -0.15   -0.023   -1.53   **0.08**

Number of months with at least one   0.003   0.69   0.004   0.77   -0.006   -0.77   0.99

diagnosis relating to maltreatment							
Number of months with at least one diagnosis relating to a sexually transmitted disease	0.011	1.88	0.010	1.80	0.008	0.70	0.99
Number of months with at least one diagnosis relating to neuroses (but not included above)	0.030	0.65	0.039	0.82	0.172	1.93	**0.02**
Number of months with at least one diagnosis relating to psychoses (but not included above)	-0.004	-0.09	0.022	0.55	0.098	1.02	0.40
Number of months with at least one physician billing not included above	**-0.32**	**-2.16**	-0.25	-1.88	-0.34	-1.38	0.84

Hospital discharge records

hospital admission with an E-code that indicated injury in a railway or traffic accident in the 30 months beginning the month following the month of contact with MCFD.	0.003	0.83	0.004	1.04	0.001	0.22	0.73
Number of months with hospital admission with an E-code that indicated accidental poisoning in the in the 30 months beginning the month following the month of contact with MCFD.	0.003	0.64	0.003	0.72	0.000	-0.04	0.44
Number of months with hospital admission with an E-code that indicated intentional injury by another person in the in the 30 months beginning the month following the month of contact with MCFD.	-0.001	-0.58	-0.001	-0.59	0.002	0.66	0.60

Number of months with hospital admission with an E-code that indicated injuries that might have been purposefully inflicted in the in the 30 months beginning the month following the month of contact with MCFD.	-0.002	-0.63	-0.003	-0.86	0.002	1.06	0.52
Number of months with hospital admission with an E-code that indicated self-inflicted injuries in the in the 30 months beginning the month following the month of contact with MCFD.	0.003	0.65	0.002	0.42	-0.012	-1.90	0.66
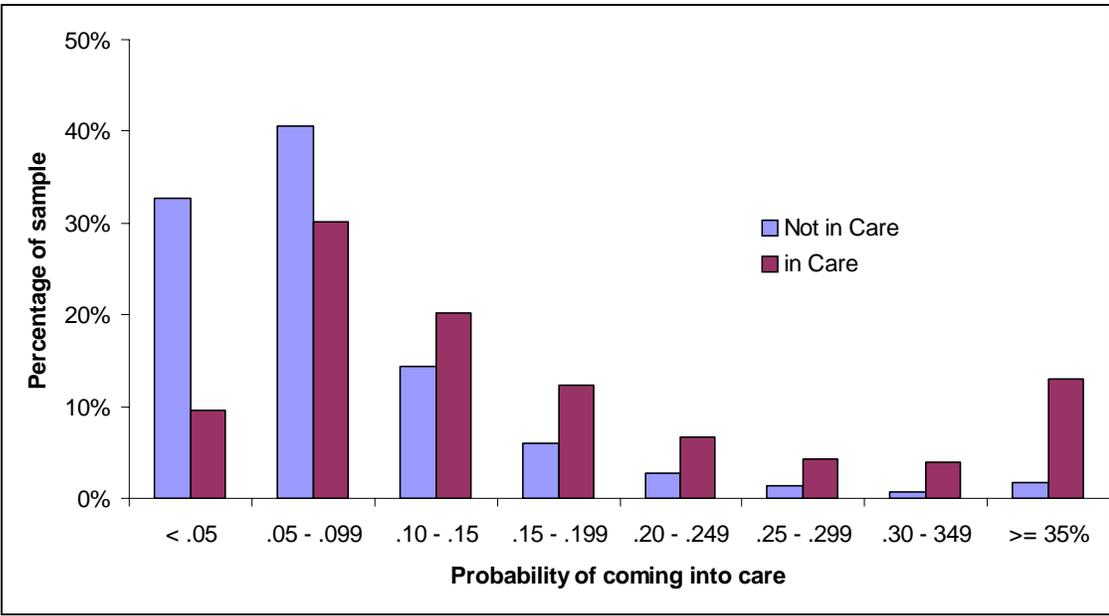
Figure 1: Histogram of propensity scores
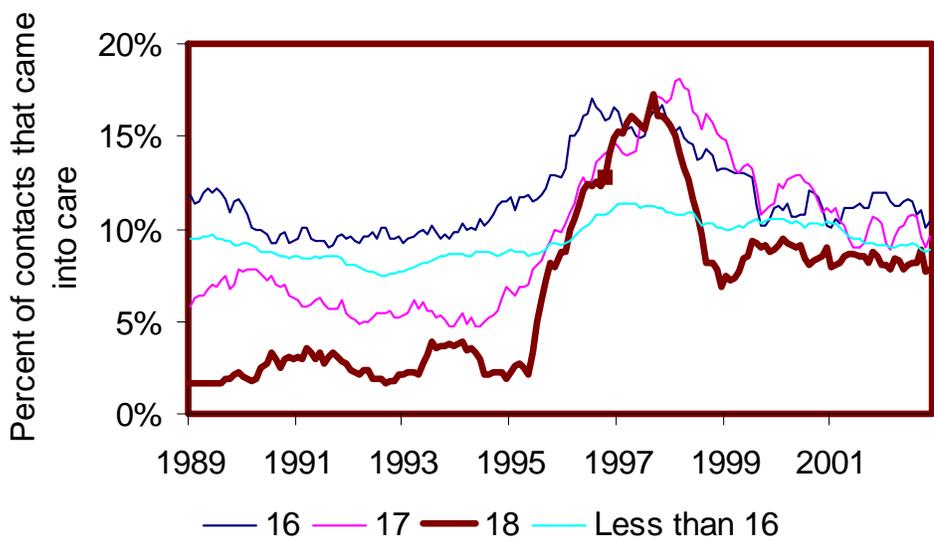
Figure 2: Percentage of contacts that are placed into care
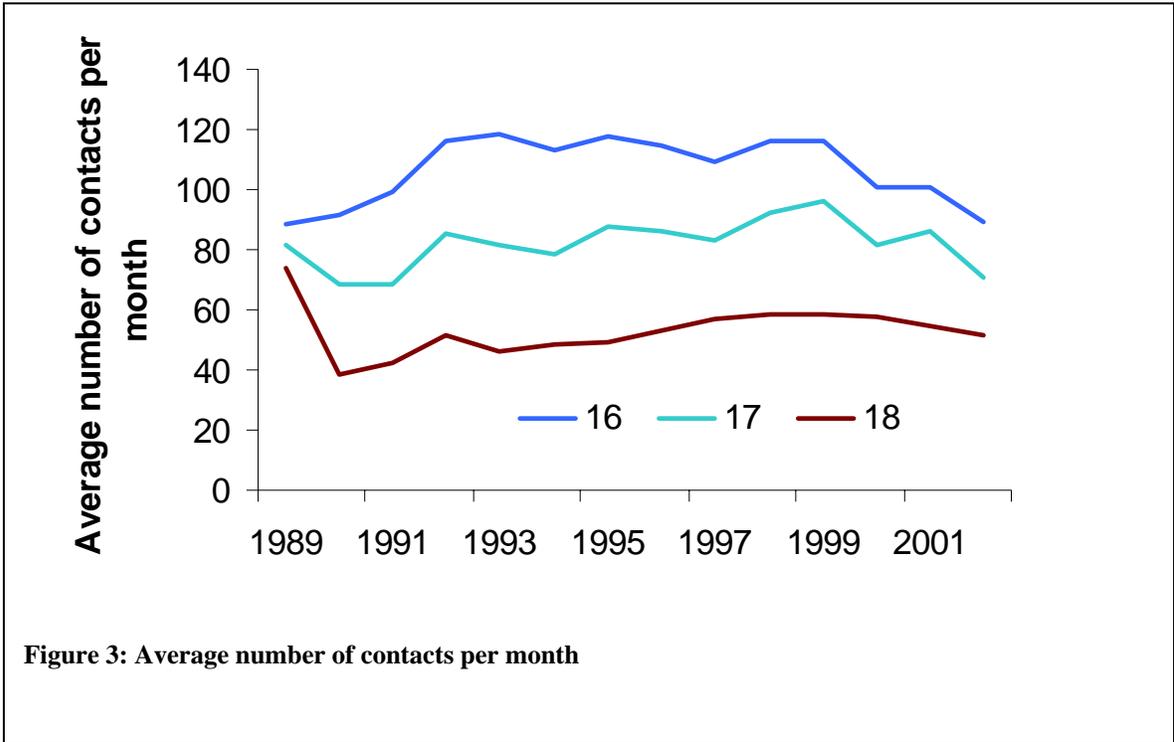
Figure 3: Average number of contacts per month
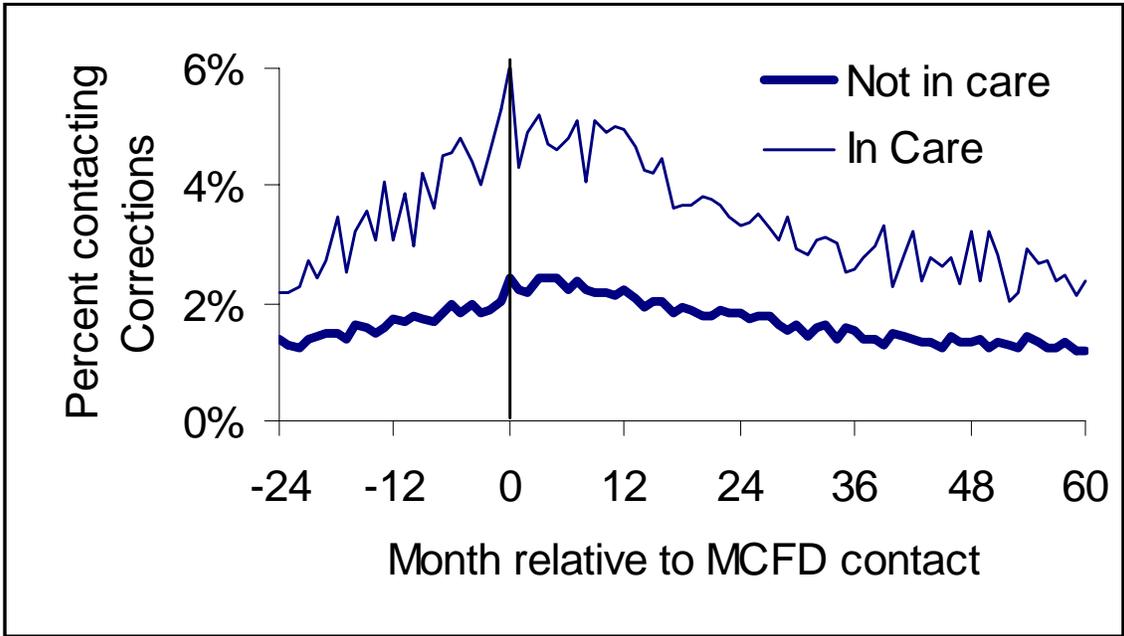
Figure 4: Percent contacting Corrections by month relative to contact with MCFD
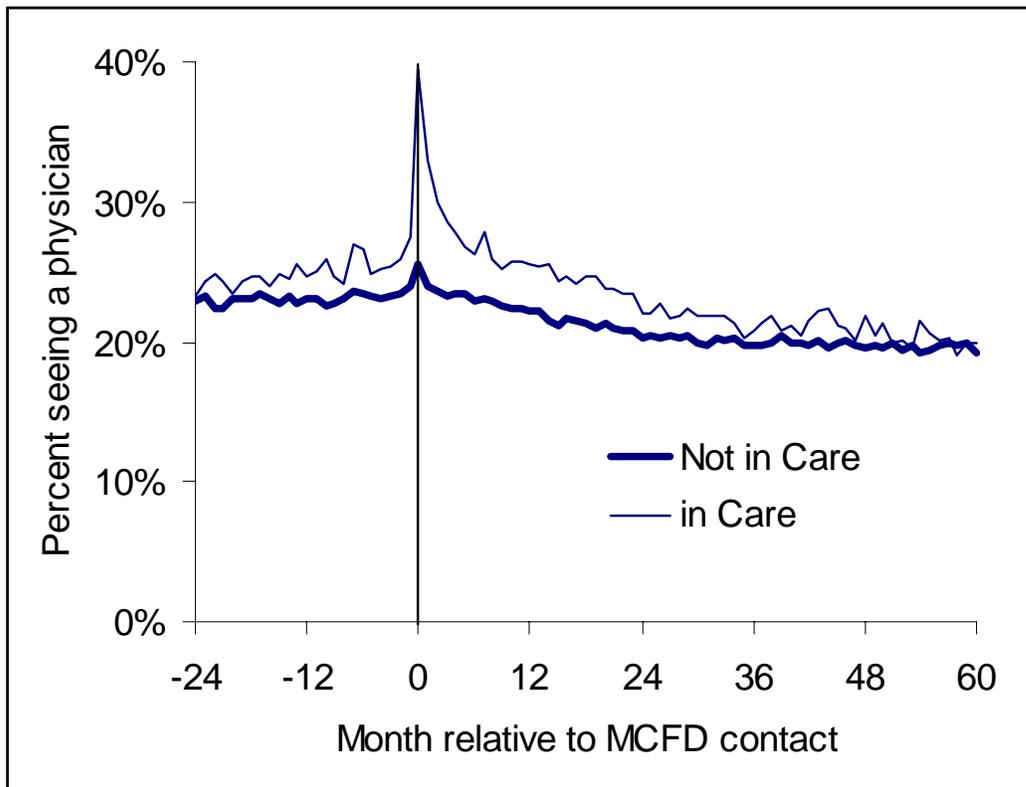
Figure 5: Percent seeing a physician by month relative to MCFD contact
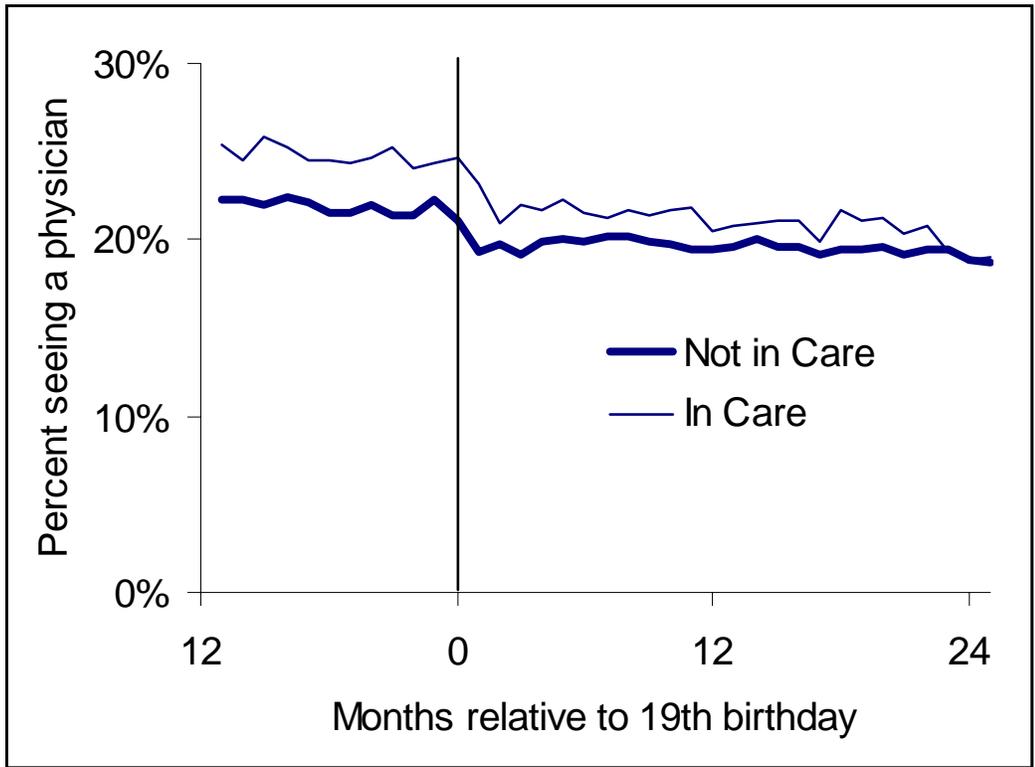
Figure 6: Percent seeing a physician
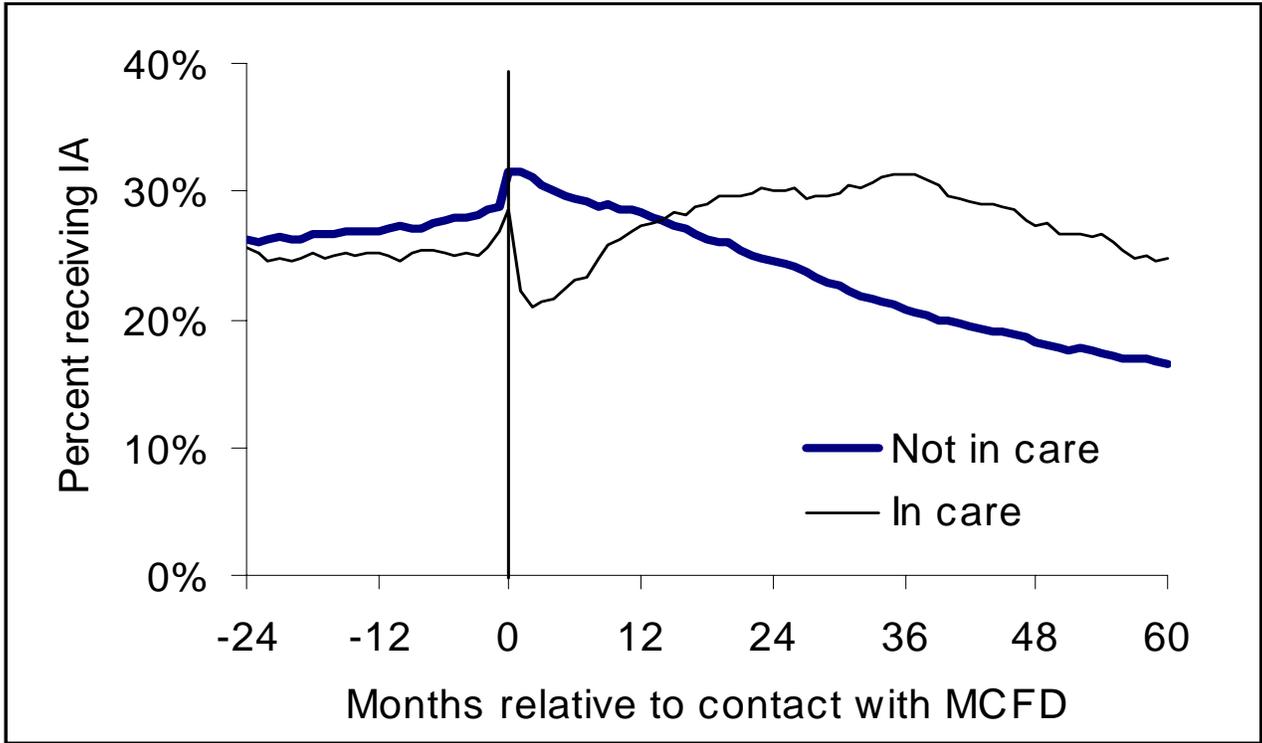
Figure 7: Percent receiving IA by month relative to month of MCFD contact

Figure 8 Income Assistance receipt by age relative to 19th birthday
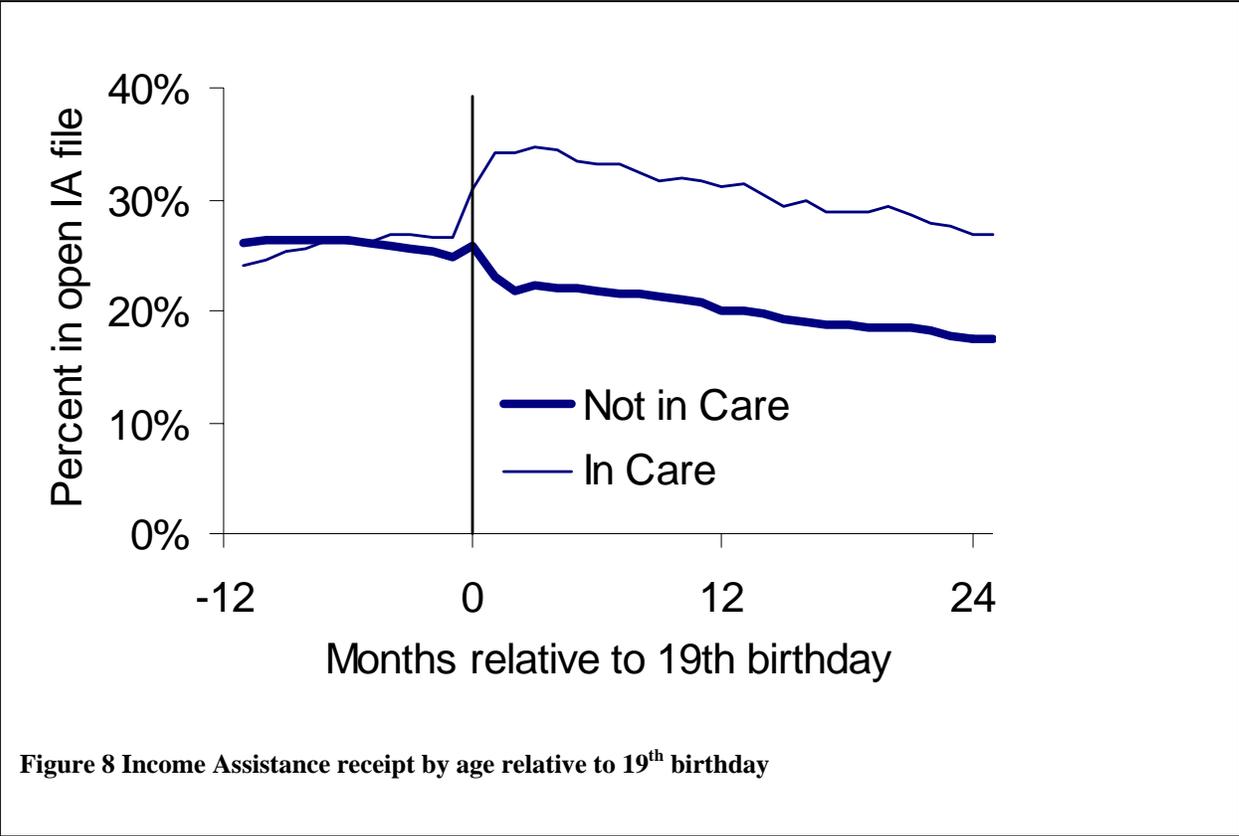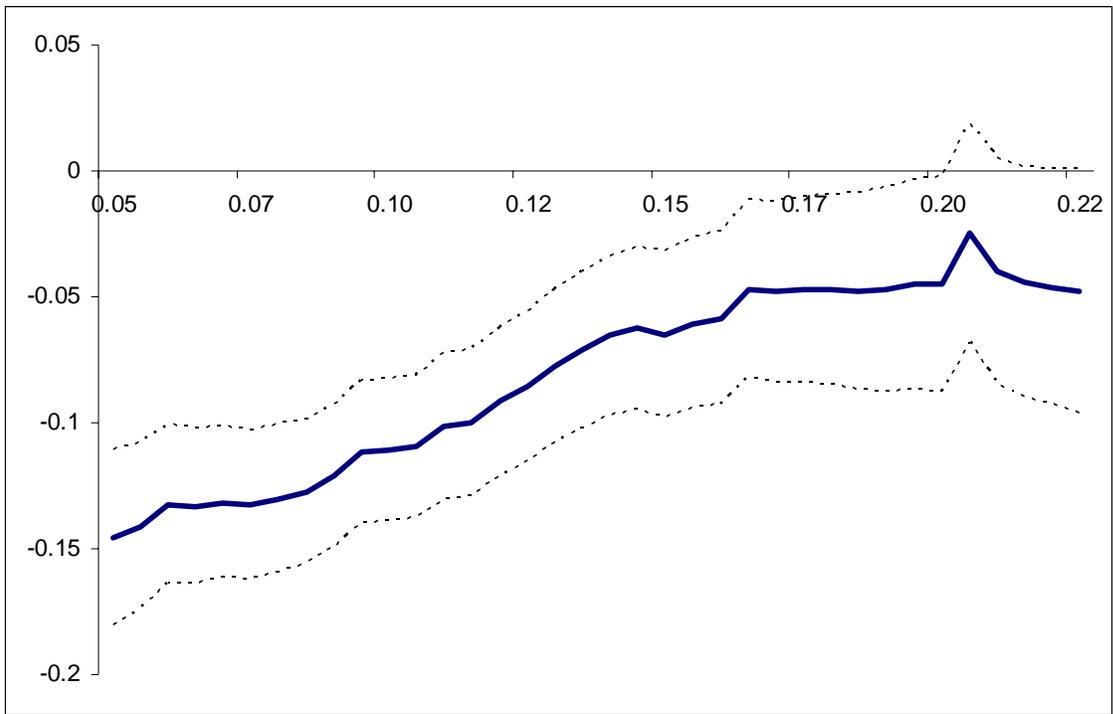
Figure 9: Impact on high school graduation by propensity score
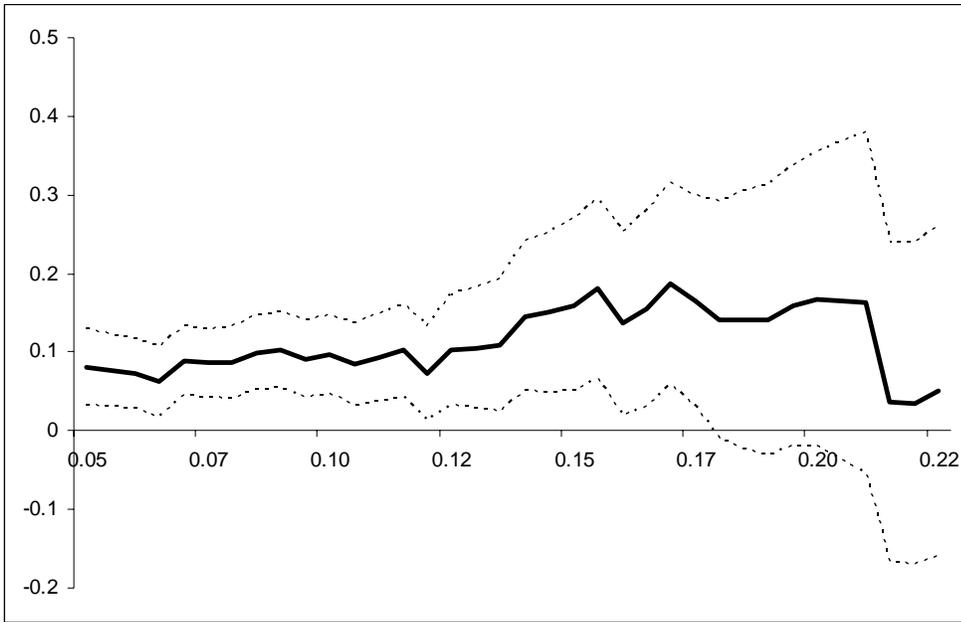
Figure 10: Impact on likelihood of being treated for a disorder related to substance abuse after age 19
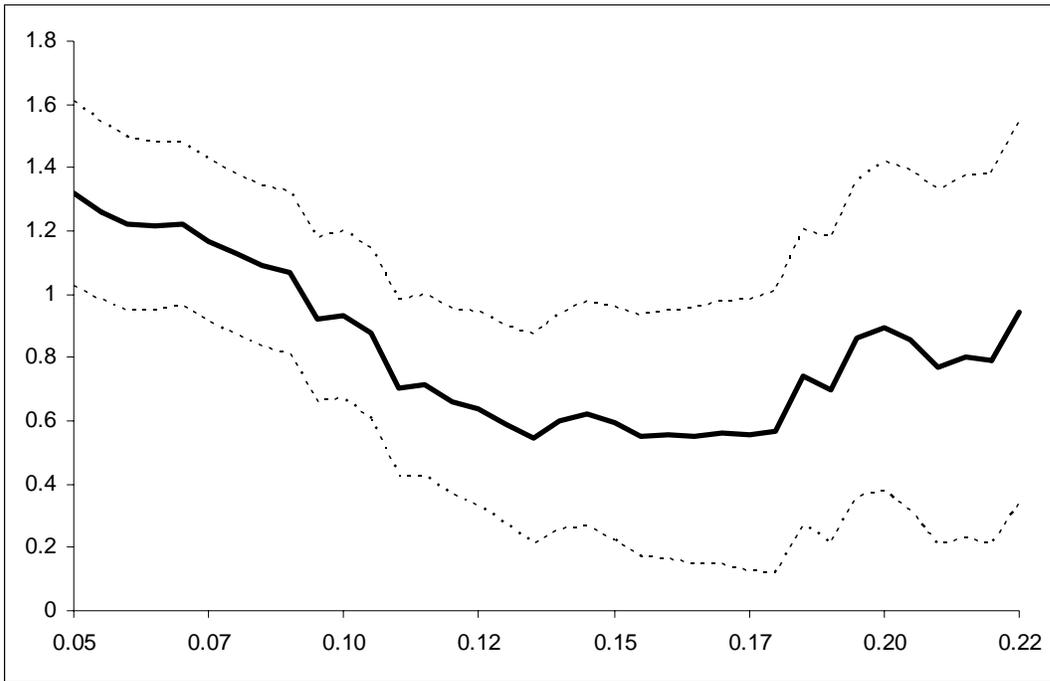
Figure 11: Impact on income assistance at age 19 by probability of coming into care
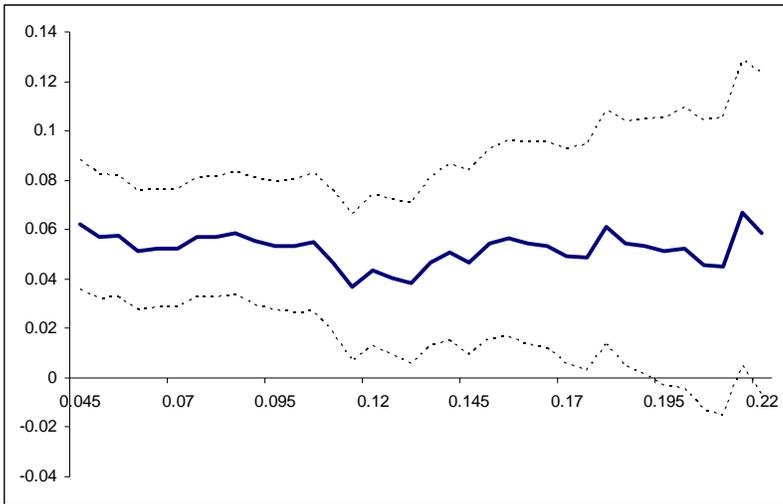
Figure 12: Impact of coming into care on contact with Corrections Branch by likelihood of coming into care

Table A1: Means of variables, raw and matched samples

	Raw Data (contacts)			Matched (individuals)		
	Mean		t[xxv]	Mean		t[1]
				Not in		
	Not in Care	In Care		Care	In Care	
Number of observations	25823	3119		1565	1565	
Characteristic						
Child Welfare characteristics						
agemo	207.8	206.3	8.6	207.5	207.0	1.5
bmon	5.6	5.7	-1.5	5.6	5.5	0.9
fsind1	55.0%	68.8%	-14.7	57.9%	58.3%	-0.3
fsind2	45.8%	57.9%	-12.9	46.5%	45.6%	0.5
fsind3	41.0%	50.1%	-9.8	38.8%	39.2%	-0.2
opencc	3.7%	14.2%	-26.3	0.0%	0.0%	.
owncc1	0.49	1.93	-33.4	0.17	0.22	-1.4
owncc2	0.51	1.56	-24.0	0.35	0.41	-1.0
owncc3	0.47	1.18	-17.6	0.28	0.29	-0.2
snind1	1.9%	2.3%	-1.5	1.3%	1.2%	0.3
snind2	1.8%	2.4%	-2.5	1.5%	1.3%	0.3
snind3	1.9%	2.5%	-2.6	1.6%	1.6%	0.0
stop	99.9%	99.5%	6.9	100.0%	99.9%	1.0
_lfamtype_0*	10.5%	21.4%	-17.9	18.4%	18.4%	0.0
_lfamtype_1*	8.6%	7.0%	3.0	5.5%	5.5%	0.0
_lfamtype_2*	38.7%	32.4%	6.8	34.2%	34.2%	0.0
_lfamtype_3*	42.2%	39.1%	3.2	41.9%	41.9%	0.0
famcc1*	14.0%	39.5%	-36.8	13.5%	13.5%	0.0

famcc2*	9.6%	25.9%	-27.5	8.8%	8.8%	0.0
famcc3*	8.7%	19.3%	-18.8	6.2%	6.2%	0.0
famstopcc	0.5%	2.1%	-9.8	0.4%	0.4%	0.0
momage2	412.5	393.1	5.4	372.6	370.6	0.3
momage3	16.1%	20.4%	-6.2	24.8%	24.4%	0.2
momage4	230.0	209.0	4.9	195.5	208.8	-1.6
_Imomind_0	8.8%	10.3%	-2.7	13.8%	13.2%	0.5
_Imomind_1	79.2%	68.8%	13.3	72.0%	72.1%	0.0
_Imomind_2	12.0%	20.9%	-14.0	14.2%	14.7%	-0.4
_Idadind_0	27.9%	25.8%	2.4	31.8%	29.6%	1.3
_Idadind_1	51.4%	47.3%	4.3	48.1%	48.4%	-0.2
_Idadind_2	20.7%	26.8%	-7.9	20.1%	21.9%	-1.2

Health characteristics

ind_a_d*	5.2%	10.2%	-11.6	3.5%	3.5%	0.0
ind_dist*	4.1%	10.3%	-15.4	3.7%	3.7%	0.0
ind_neur*	15.9%	26.9%	-15.5	18.0%	18.0%	0.0
ind_psyc*	2.2%	5.8%	-12.0	1.8%	1.8%	0.0
pre_adoles	0.04	0.10	-6.0	0.05	0.05	-0.2
pre_delay	0.02	0.03	-2.3	0.01	0.01	0.3
pre_hyper_	0.10	0.22	-7.5	0.12	0.13	-0.3
pre_maltre	0.02	0.02	0.4	0.01	0.02	-1.7
pre_psycho	0.05	0.17	-10.4	0.05	0.03	1.1
pre_std	0.01	0.01	-0.4	0.01	0.00	0.9
pre_other	5.38	5.56	-2.1	4.74	4.68	0.4
pre_accide	0.6%	1.1%	-3.0	0.7%	0.5%	0.7
pre_fight	0.5%	0.6%	-1.1	0.6%	0.6%	0.0

pre_poison	0.1%	0.1%	-0.9	0.2%	0.1%	1.0
pre_poss_s	0.0%	0.3%	-4.4	0.1%	0.0%	1.0
pre_sui	0.6%	1.9%	-6.9	0.4%	0.9%	-1.5
dad_ad_ind	5.2%	5.2%	-0.1	3.8%	4.7%	-1.0
dad_neur_ind	19.8%	21.8%	-2.3	18.5%	16.7%	1.1
dad_psych_ind	1.8%	2.0%	-0.7	1.3%	1.5%	-0.5
dadhosp	0.8%	1.0%	-1.2	0.8%	1.1%	-0.7
mom_ad_ind	15.0%	16.5%	-2.1	14.5%	15.6%	-0.8
mom_neur_ind	44.8%	45.1%	-0.3	43.1%	40.4%	1.5
mom_psych_ind	3.9%	3.8%	0.4	3.5%	3.5%	-0.1
momhosp	2.1%	2.3%	-0.7	1.5%	2.2%	-1.4
Health outcomes						
i19_a_d	7.0%	12.9%	-11.7	6.8%	7.6%	-0.8
i19_dist	1.3%	2.7%	-6.3	1.1%	1.7%	-1.4
i19_neur	15.4%	22.8%	-10.6	16.0%	18.0%	-1.4
i19_psyc	3.9%	8.0%	-10.7	4.3%	4.3%	-0.1
p19_adoles	0.00	0.00	0.0	0.01	0.00	0.6
p19_delay	0.01	0.02	-3.8	0.01	0.01	-1.5
p19_hyper_	0.02	0.03	-2.0	0.03	0.03	0.0
p19_maltre	0.02	0.01	0.8	0.01	0.02	-0.7
p19_other	4.34	4.41	-0.8	**4.18**	**3.85**	**2.2**
p19_std	0.02	0.03	-2.6	0.02	0.03	-1.9
post_adole	0.02	0.03	-3.2	0.04	0.03	0.5
post_alc_d	0.14	0.40	-13.5	**0.11**	**0.20**	**-3.0**
post_delay	0.01	0.03	-2.5	0.01	0.02	-1.8
post_distu	0.04	0.11	-9.4	0.04	0.05	-1.5

post_hyper	0.05	0.11	-4.9	0.06	0.07	-0.2
post_maltr	0.02	0.02	0.5	0.02	0.02	0.6
post_neuro	0.48	0.77	-9.2	0.48	0.57	-1.7
post_psych	0.17	0.39	-7.6	0.20	0.20	0.1
post_std	0.02	0.03	-3.4	0.01	0.02	-1.6
post_other	5.99	6.53	-5.5	5.54	5.77	-1.2
post_accid	0.01	0.01	-1.0	0.01	0.01	-0.8
post_fight	0.01	0.02	-3.0	0.01	0.01	-0.6
post_poiso	0.00	0.00	-1.6	0.00	0.00	0.6
post_poss_	0.00	0.00	-2.4	0.00	0.00	0.6
post_sui	0.01	0.01	-1.9	0.01	0.01	-0.7

Corrections characteristics

age_first_off2	179.5	177.1	2.3	181.9	181.9	0.0
curr_cntc2*	2.8%	6.7%	-12.0	1.7%	1.7%	0.0
pre_jail*	4.4%	9.9%	-13.3	2.9%	2.9%	0.0
pre_viol*	3.8%	7.3%	-9.0	1.7%	1.7%	0.0
precntct*	17.5%	27.6%	-13.7	13.9%	13.9%	0.0
_Idadeverja_0	10.0%	9.9%	0.3	8.6%	10.2%	-1.2
_Idadeverja_1	8.4%	8.7%	-0.6	7.7%	7.4%	0.2
_Idadeverja_2	81.6%	81.4%	0.2	83.7%	82.4%	0.8
_Imomeverja_0	6.9%	8.2%	-2.6	8.2%	8.3%	-0.1
_Imomeverja_1	1.5%	1.6%	-0.4	1.7%	1.8%	-0.1
_Imomeverja_2	91.6%	90.2%	2.5	90.1%	89.9%	0.1

Corrections outcomes

postcnt	21.2%	34.1%	-16.3	**18.7%**	**23.3%**	**-3.2**
postjail	6.6%	13.0%	-13.0	**4.9%**	**6.8%**	**-2.3**
postviol	5.6%	9.5%	-8.6	4.3%	4.7%	-0.5

Income Assistance characteristics

cihr	0.57	0.87	-5.2	0.75	0.78	-0.2
cihr_3	0.11	0.15	-3.0	0.13	0.16	-1.1
ia	6.27	5.45	4.8	4.88	5.29	-1.4
ia_3	1.07	0.91	5.0	0.82	0.90	-1.7

Income Assistance Outcomes

ownia_12	3.58	2.90	7.8	**3.19**	**2.71**	**3.1**
ownia_19	2.87	4.17	-15.7	**2.51**	**3.33**	**-5.4**
ownia_20	2.37	3.52	-14.5	**2.08**	**2.80**	**-4.9**

Neighbourhood characteristics

_lurb_rur_1	2.7%	3.3%	-1.9	3.6%	3.5%	0.2
_lurb_rur_2	65.2%	69.4%	-4.7	66.4%	68.0%	-1.0
_lurb_rur_3	2.6%	1.6%	3.2	2.0%	1.5%	1.1
_lurb_rur_4	11.8%	10.3%	2.6	11.0%	10.3%	0.6
_lurb_rur_5	17.7%	15.4%	3.2	17.0%	16.7%	0.2
abor	5.6%	5.6%	-0.3	5.3%	5.5%	-0.7
hs_grad	12.8%	12.4%	6.2	12.4%	12.5%	-0.9
lfpr	65.0	64.4	4.1	64.0	64.5	-1.5
lone_par	17.3%	17.4%	-0.4	17.3%	17.3%	-0.1

lt_gr9	7.3%	7.3%	0.0	7.2%	7.3%	-0.4
lt10	4.1%	4.2%	-1.5	4.3%	4.2%	0.4
no_eng_fr	2.1%	2.2%	-1.6	2.3%	2.3%	-0.4
u_rate	10.0	10.1	-1.8	10.2	10.0	1.6

Education outcome

grad19	27.6%	12.5%	18.2	**26.2%**	**16.7%**	**6.5**

Table A2: Factors affecting the probability of being placed in care

```
Probit regression                              Number of obs   =      27552

                                               LR chi2(73)     =     1893.28

                                               Prob > chi2     =      0.0000

Log likelihood = -7836.9775                    Pseudo R2       =      0.1078
```

incare	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
agemo	-.0115968	.0012037	-9.63	0.000	-.0139561	-.0092376
famcc1	.2666516	.0372579	7.16	0.000	.1936275	.3396758
famcc2	.1856998	.0522363	3.55	0.000	.0833185	.288081
famcc3	.02234	.0574558	0.39	0.697	-.0902712	.1349513
owncc1	.089834	.0089792	10.00	0.000	.072235	.1074329
owncc2	.0047086	.0087682	0.54	0.591	-.0124768	.021894
owncc3	.0151927	.0088587	1.72	0.086	-.00217	.0325553
famstopcc	.1918579	.1793317	1.07	0.285	-.1596258	.5433416
fsind1	.154634	.0260372	5.94	0.000	.1036019	.2056661
fsind2	.0312821	.0280467	1.12	0.265	-.0236883	.0862526
fsind3	.0030072	.0276333	0.11	0.913	-.051153	.0571674
snind1	-.2545374	.1257279	-2.02	0.043	-.5009595	-.0081153
snind2	.0861082	.1605851	0.54	0.592	-.2286329	.4008493
snind3	.0053089	.1279526	0.04	0.967	-.2454736	.2560914
precntct	-.0996177	.0595289	-1.67	0.094	-.2162922	.0170567
curr_cntct	.231828	.059122	3.92	0.000	.1159511	.3477049
pre_viol	-.0149072	.0568833	-0.26	0.793	-.1263965	.0965821
pre_jail	.0852641	.0560218	1.52	0.128	-.0245366	.1950647
stop	.5632239	.4828834	1.17	0.243	-.3832101	1.509658
cihr_3	-.0522443	.0260415	-2.01	0.045	-.1032847	-.0012039
ia_3	-.0562777	.0121889	-4.62	0.000	-.0801675	-.032388
ia2	.1122364	.0339797	3.30	0.001	.0456373	.1788354
ia	-.0003149	.0024335	-0.13	0.897	-.0050844	.0044547
agefirst	.0011312	.0002985	3.79	0.000	.0005462	.0017162
cihr	.0114456	.0053105	2.16	0.031	.0010373	.0218539
momhosp	.1346293	.0745493	1.81	0.071	-.0114847	.2807433

_Imomeverj~0	.0973636	.0447987	2.17	0.030	.0095598	.1851674
_Imomeverj~1	.0453566	.0945267	0.48	0.631	-.1399124	.2306255
_Idadeverj~0	-.026003	.0443832	-0.59	0.558	-.1129924	.0609864
_Idadeverj~1	-.033154	.0482252	-0.69	0.492	-.1276736	.0613656
_Ifamtype_0	.2062622	.1357259	1.52	0.129	-.0597557	.4722801
_Ifamtype_1	-.7076494	.0855443	-8.27	0.000	-.8753131	-.5399857
_Ifamtype_2	.2911943	.112875	2.58	0.010	.0699634	.5124253
_Imomind_0	.3618162	.0831201	4.35	0.000	.1989039	.5247285
_Imomind_2	.6106475	.0767805	7.95	0.000	.4601604	.7611346
_Idadind_0	-.4104616	.1147392	-3.58	0.000	-.6353463	-.1855769
_Idadind_2	-.3781802	.1142358	-3.31	0.001	-.6020782	-.1542822
_Iurb_rur_1	.094588	.0644134	1.47	0.142	-.0316599	.220836
_Iurb_rur_3	-.2565638	.0811549	-3.16	0.002	-.4156244	-.0975032
_Iurb_rur_4	-.1317089	.0398423	-3.31	0.001	-.2097983	-.0536195
_Iurb_rur_5	-.0847061	.0358891	-2.36	0.018	-.1550475	-.0143647
dadhosp	.1626371	.1118114	1.45	0.146	-.0565092	.3817834
pre_alc_dr	.1043185	.0247251	4.22	0.000	.0558581	.1527789
pre_psycho	.0781254	.0177068	4.41	0.000	.0434206	.1128301
pre_distur	.0942247	.0173504	5.43	0.000	.0602186	.1282308
pre_adoles	.0405144	.0213581	1.90	0.058	-.0013467	.0823755
pre_hyper_	.0482352	.011488	4.20	0.000	.0257192	.0707512
pre_delay	.0192243	.0338009	0.57	0.570	-.0470242	.0854728
pre_neuros	.050858	.0081168	6.27	0.000	.0349493	.0667667
pre_maltre	-.0762577	.0685429	-1.11	0.266	-.2105993	.0580839
pre_other	-.013779	.0027404	-5.03	0.000	-.0191501	-.0084079
dad_a_d	-.0034882	.0110497	-0.32	0.752	-.0251451	.0181688
dad_psych	-.0183563	.0216658	-0.85	0.397	-.0608205	.0241079
pre_sui	.1937782	.1039332	1.86	0.062	-.0099271	.3974835
pre_fight	.2594151	.1481057	1.75	0.080	-.0308668	.549697
pre_poss_s	.5753008	.3289783	1.75	0.080	-.0694848	1.220086
pre_accide	.3965586	.1196145	3.32	0.001	.1621186	.6309987
pre_poison	.3030914	.3230944	0.94	0.348	-.3301619	.9363447
dad_neur	-.0091205	.0073013	-1.25	0.212	-.0234308	.0051897
mom_a_d	.0036674	.0021161	1.73	0.083	-.00048	.0078148
momage2	.0004968	.0003672	1.35	0.176	-.0002228	.0012164
momage3	.4969929	.2041818	2.43	0.015	.0968038	.8971819

```
   momage4 |  -.0000162   .0000894   -0.18   0.856   -.0001915    .0001591
  mom_psych |  -.0120175   .0115535   -1.04   0.298    -.034662     .010627
   mom_neur |  -.0004931   .0037895   -0.13   0.896   -.0079205    .0069342
   lone_par |   -.019213   .2218731   -0.09   0.931   -.4540764    .4156504
   no_eng_fr |   .6632121   .4884565    1.36   0.175    -.294145    1.620569
       abor |  -.0789952    .165408   -0.48   0.633   -.4031889    .2451985
       lfpr |  -.0054589   .0016425   -3.32   0.001   -.0086782   -.0022395
     u_rate |   .0086395   .0037317    2.32   0.021    .0013255    .0159535
     lt_gr9 |  -.9391614   .4343578   -2.16   0.031   -1.790487   -.0878357
    hs_grad |  -2.063266   .4490926   -4.59   0.000   -2.943471    -1.18306
       lt10 |  -.4819813   .4781548   -1.01   0.313   -1.419147     .455185
      _cons |    1.19176    .333213    3.58   0.000    .5386746    1.844846
```

Table A3: Brief variable descriptions

Variable	Definition
Child Welfare characteristics	
agemo	Age in months at time of contact. Ranges from 193 (16 years 1 month) to 228 (19 years)
bmon	Month of birth.
fsind1	Takes the value 1 if the boy was in an open family services file in the year before the month of contact.
fsind2	Takes the value 1 if the boy was in an open family services file in the year ending one year before the month of contact.
fsind3	Takes the value 1 if the boy was in an open family services file in the year ending two years before the month of contact.
opencc	Takes the value 1 if the boy was key player in an open child in care case in the month preceding contact.
owncc1	a) OWNCC1 b) OWNCC2 and c) OWNCC3 take the
owncc2	value of the number of months the individual had been
owncc3	the key player in a child in care file in the 12 months a) ending the month before the month of contact, b) ending 13 months before the month of contact and c) ending 25 months before the month of contact.
snind1	Takes the value 1 if the boy was in an open special needs

	file in the year before the month of contact.
snind2	Takes the value 1 if the boy was in an open special needs file in the year ending one year before the month of contact.
snind3	Takes the value 1 if the boy was in an open special needs file in the year ending two years before the month of contact.
stop	Indicates whether the individual had been the key player in a child in care file that closed in the month of contact, and that had not opened in the same month.
_Ifamtype_0*	Neither mother nor father identified in the family file at the time of contact.
_Ifamtype_1*	Only father identified
_Ifamtype_2*	Only mother identified
_Ifamtype_3*	Both parents identified
famcc1*	All files associated with the individual in the month of contact were identified and all xid's associated with each of those files was identified. If any of those xids was in turn associated with a child in care file in the 12 months a) ending the month before the month of contact, b) ending 13 months before the month of contact and c) ending 25 months before the month of contact, the variables a) FAMCC1 b) FAMCC2 and c) FAMCC3 took
famcc2*	
famcc3*	

	the value 1.
famstopcc	Indicates whether the individual had been associated with a child in care file that closed in the month of contact, and that had not opened in the same month.
momage2	Mother's age in months
momage3	Indicates that the mothers age is unknown
momage4	Mother's age in months if mother's age < 500 months, 0 otherwise
_Imomind_0	Indicates that the mother was not known to the Ministry.
_Imomind_1	Indicates that the mother was identified in the file in the month of contact.
_Imomind_2	Indicates that the mother was known to the Ministry but not identified in the file in the month of contact.
_Idadind_0	Indicates that the father was not known to the Ministry.
_Idadind_1	Indicates that the father was identified in the file in the month of contact.
_Idadind_2	Indicates that the father was known to the Ministry but not identified in the file in the month of contact.

Health characteristics	
ind_a_d*	Indicates that the boy had been treated by a physician for a disorder related to substance abuse in the 25 months ending in the month of contact[xxvi].
ind_dist*	Indicates that the boy had been treated by a physician for a "disturbance of conduct" in the 25 months ending in the month of contact.
ind_neur*	Indicates that the boy had been treated by a physician for neuroses in the 25 months ending in the month of contact.
ind_psyc*	Indicates that the boy had been treated by a physician for psychosis in the 25 months ending in the month of contact.
pre_adoles	The number of months that the boy had been treated for "Disturbance Of Emotions Specific To Childhood And Adolescence" in the 25 months ending in the month of contact.
pre_delay	The number of months that the boy had been treated for developmental delay in the 25 months ending in the month of contact.
pre_hyper_	The number of months that the boy had been treated for ADHD in the 25 months ending in the month of contact.

pre_maltre	The number of months that the boy had been treated for maltreatment in the 25 months ending in the month of contact.
pre_psycho	The number of months that the boy had been treated for psychosis in the 25 months ending in the month of contact.
pre_std	The number of months that the boy had been treated for a sexually transmitted disease in the 25 months ending in the month of contact.
pre_other	The number of months that the boy had received any other treatment from a physician in the 25 months ending in the month of contact.
pre_accide	The number of months in which the boy had been admitted to a hospital in the 12 months ending in the month of contact and had an E-code that indicated that he had been in a railway or motor vehicle accident.
pre_fight	The number of months in which the boy had been admitted to a hospital in the 12 months ending in the month of contact and had an E-code that indicated that he had been purposely injured by another person.
pre_poison	The number of months in which the boy had been admitted to a hospital in the 12 months ending in the month of contact and had an E-code that indicated that he

	had been accidentally poisoned.
pre_poss_s	The number of months in which the boy had been admitted to a hospital in the 12 months ending in the month of contact and had an E-code that indicated his injuries might have been intentionally inflicted.
pre_sui	The number of months in which the boy had been admitted to a hospital in the 12 months ending in the month of contact and had an E-code that indicated that his injuries had been self inflicted.
dad_ad_ind	Takes the value 1 if the father had been treated for a disorder related to substance abuse in the 25 months ending in the month of contact.
dad_neur_ind	Takes the value 1 if the father had been treated for a neurosis in the 25 months ending in the month of contact.
dad_psych_ind	Takes the value 1 if the father had been treated for psychosis in the 25 months ending in the month of contact.
dadhosp	Indicates that the father was hospitalized in the month of contact.
mom_ad_ind	Takes the value 1 if the mother had been treated for a disorder related to substance abuse in the 25 months ending in the month of contact.
mom_neur_ind	Takes the value 1 if the mother had been treated for a

	neurosis in the 25 months ending in the month of contact.
mom_psych_ind	Takes the value 1 if the mother had been treated for psychosis in the 25 months ending in the month of contact.
momhosp	Indicates that the mother was hospitalized in the month of contact.

Health outcomes	
i19_a_d	Indicates treatment for a disorder related to substance abuse in the 24 months beginning the month following 19th birthday.
i19_dist	Indicates treatment for a disturbance of conduct in the 24 months beginning the month following 19th birthday.
i19_neur	Indicates treatment for a neurosis in the 24 months beginning the month following 19th birthday.
i19_psyc	Indicates treatment for a psychosis in the 24 months beginning the month following 19th birthday.
p19_adoles	The number of months in which the boy was treated for a disorder related to adolescence in the 24 months beginning the month following 19th birthday.
p19_delay	The number of months in which the boy was treated for developmental delay in the 24 months beginning the

	month following their 19th birthday.
p19_hyper_	The number of months in which the boy was treated for ADHD in the 24 months beginning the month following their 19th birthday.
p19_maltre	The number of months in which the boy was treated for maltreatment in the 24 months beginning the month following their 19th birthday.
p19_other	The number of months in which the boy received other treatment in the 24 months beginning the month following their 19th birthday.
p19_std	The number of months in which the boy was treated for a sexually transmitted disease in the 24 months beginning the month following their 19th birthday.
post_adole	The number of months in which the boy was treated for a disorder related to adolescence in the 30 months beginning the month following the month of contact.
post_alc_d	The number of months in which the boy was treated for a disorder related to substance abuse in the 30 months beginning the month following the month of contact.
post_delay	The number of months in which the boy was treated for developmental delay in the 30 months beginning the month following the month of contact.
post_distu	The number of months in which the boy was treated for

	disturbance of conduct in the 30 months beginning the month following the month of contact.
post_hyper	The number of months in which the boy was treated for ADHD in the 30 months beginning the month following the month of contact.
post_maltr	The number of months in which the boy was treated for maltreatment in the 30 months beginning the month following the month of contact.
post_neuro	The number of months in which the boy was treated for neuroses in the 30 months beginning the month following the month of contact.
post_psych	The number of months in which the boy was treated for psychoses in the 30 months beginning the month following the month of contact.
post_std	The number of months in which the boy was treated for sexually transmitted disease in the 30 months beginning the month following the month of contact.
post_other	The number of months in which the boy received other treatment from a physician in the 30 months beginning the month following the month of contact.
post_accid	The number of months in which the boy was admitted to hospital with an E code indicating that he had been in a railway or traffic accident in the 30 months beginning the

	month following the month of contact.
post_fight	The number of months in which the boy had been admitted to a hospital and had an E-code that indicated that he had been purposely injured by another person in the 30 months beginning the month following the month of contact.
post_poiso	The number of months in which the boy had been admitted to a hospital and had an E-code that indicated that he had been accidentally poisoned in the 30 months beginning the month following the month of contact.
post_poss_	The number of months in which the boy had been admitted to a hospital and had an E-code that indicated his injuries might have been intentionally inflicted in the 30 months beginning the month following the month of contact.
post_sui	The number of months in which the boy had been admitted to a hospital and had an E-code that indicated that his injuries had been self inflicted in the 30 months beginning the month following the month of contact.

Corrections characteristics	
age_first_off2	Age of first contact with Corrections Branch
curr_cntc2*	Indicates contact with Corrections Branch in the same month as contact with MCFD.
pre_jail*	Indicates that the boy had been sentenced to jail before contact with MCFD.
pre_viol*	Indicates that the boy had a conviction for a violent offence before contact with MCFD.
precntct*	Indicates contact with Corrections Branch before the month of contact with MCFD.
_Idadeverja_0	Indicates father known to Corrections Branch, but not in jail. In matching, takes the value "missing" if father not know to MCFD.
_Idadeverja_1	Indicates father had been in jail. In matching, takes the value "missing" if father not know to MCFD.
_Idadeverja_2	Indicates father not known to corrections. In matching, takes the value "missing" if father not know to MCFD.
_Imomeverja_0	Indicates mother known to Corrections Branch, but not in jail. In matching, takes the value "missing" if mother not know to MCFD.
_Imomeverja_1	Indicates mother had been in jail. In matching, takes the value "missing" if mother not know to MCFD.

_Imomeverja_2	Indicates mother not known to corrections. In matching, takes the value "missing" if mother not know to MCFD.

Corrections outcomes	
postcnt	Indicates that the boy had contact with Corrections Branch in the 30 months beginning the month after contact with MCFD.
Postjail	Indicates that the boy had been sentenced to jail in the 30 months beginning the month after contact with MCFD.
Postviol	Indicates that the boy had contact with Corrections Branch in the 30 months following contact with MCFD with an offence code that indicated a violent offence.

Income Assistance characteristics	
cihr	The number of months that the boy had received benefits through the Child in the Home of a Relative Program in the 25 months ending in the month of contact.
cihr_3	The number of months that the boy had received benefits through the Child in the Home of a Relative Program in the 3 months ending in the month of contact.
ia	The number of months that the boy had been in a family that received Income Assistance benefits in the 25 months ending in the month of contact.
ia_3	The number of months that the boy had been in a family that received Income Assistance benefits in the 3 months ending in the month of contact.

Income Assistance Outcomes	
ownia_12	The number of months that the boy had been in a family that received Income Assistance benefits in the 12 months following the month of contact.
Ownia_19	The number of months that the boy received Income Assistance benefits in the 12 months following the month in which the boy turned 19.

Ownia_20	The number of months that the boy received Income Assistance benefits in the 12 months following the month in which the boy turned 20.

Neighbourhood characteristics	
_Iurb_rur_1	An urban-rural indicator from Statistics Canada's Postal code Conversion File. Takes the value 1 if the postal code is classified as Urban core
_Iurb_rur_2	An urban-rural indicator from Statistics Canada's Postal code Conversion File. Takes the value 1 if the postal code is classified as Urban fringe
_Iurb_rur_3	An urban-rural indicator from Statistics Canada's Postal code Conversion File. Takes the value 1 if the postal code is classified as Rural fringe inside CMA/CAs
_Iurb_rur_4	An urban-rural indicator from Statistics Canada's Postal code Conversion File. Takes the value 1 if the postal code is classified as Urban areas outside CMA/CAs
_Iurb_rur_5	An urban-rural indicator from Statistics Canada's Postal code Conversion File. Takes the value 1 if the postal code is classified as Rural fringe outside CMA/CAs
abor	Percentage of population who declared aboriginal origin.
hs_grad	Percentage of 15+ population who declared at least high school graduation.
lfpr	Labour force participation rate
lone_par	Percentage of families headed by a single parent.
lt_gr9	Percentage of 15+ population who declared less than

	grade 9 education.
lt10	Percent of households with incomes below $10,000 in the CT/CSD in the 2001 census
no_eng_fr	Percent of population that did not speak English or French in the CT/CSD in the 2001 census
u_rate	Unemployment rate of the CT/CSD in the 2001 census

Education outcome	
grad19	Indicates that the boy had graduated from high school before turning 20

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[1] Scarcella et al. include some TANF expenditure in child welfare, which was not removed from the McGuire & Merriman estimates, so the difference may be greater than indicated by this comparison. Compared with Head Start, child protection has three times the expenditure, but serves fewer children: Head Start served 900,000 children in 2005 with a budget of $6.8 billion [Head Start Bureau 2006].

[2] Scarcella et al. [2006, page 3] report "the survey found that states were spending little on other services— that is, services to prevent abuse and neglect, services to prevent children from entering foster care, or services to reunify children with their families—relative to spending on children in out-of-home placements."

[3] Ted Hughes [2006] says, "Child welfare practice itself has been subject to cyclical patterns. Looking at statistics over the years on children being taken from their families and into care, we see the numbers decline for several years and then begin to climb, sometimes quite suddenly."

[4] http://www.theindychannel.com/news/9419182/detail.html

[5] http://thescotsman.scotsman.com/index.cfm?id=1135172003

[6] Numerators from AFCARS 2006b. Denominators from Census

[7] While we acknowledge that it is possible that three times more children need protection in some states than in others, and that the number of children at risk changes dramatically over time, we believe that the explanation that states have different and changing social standards is more plausible.

[8] There is also a mechanical mechanism that would introduce a correlation between the instrument and average removal rates. With declining rates of placing children in foster care, workers will have lower average rates than their peers for the year they start and higher average rates in the year that they quit, so workers in place in the beginning will have (very slightly) higher placement rates and workers in place at the end will have (very slightly) lower placement rates than average. The extent of the difference depends on the rate at which placement rates are falling and the extent of turnover. The resulting bias will depend on the extent to which the outcomes also changed over time.

[9] The area of common support is the area of overlapping propensity scores.

[10] The impact of these transitory shocks are well documented in the training literature where they are referred to as "Ashenfeter's Dip."

[11] BC is the westernmost province in Canada with a population of 4.3 million people, most of whom live in the lower mainland or Vancouver Island. In the early 1990's about 40,000 people left BC each year and almost 80,000 arrived. Around 2000 almost 60,000 were leaving each year, and about 45,000 arriving. http://www.bcstats.gov.bc.ca/pubs/mig/mig061fa.pdf Accessed February 6, 2007.

[12] MCFD [undated] reports that in the first half of fiscal 2002/2003, on average, at month end, 1.06% of the population was in care.

[13] What would be referred to as a department in the United States is generally referred to as a Ministry in British Columbia.

[14] This definition of placement in foster care is close to, but not identical to the official Ministry definition. For the period for which we had access to official lists of children in foster care at the end of the month, we found that 85% of child services files that opened were in the list. An additional 4% had entered care during the month but had left care again before the month end. The remaining 11% had a legal status that did not meet the official definition of being in care. (We did not have access to legal status information for the full study period.)

[15] These are essentially ICD-9 codes, but a few additional codes have been added. See http://www.healthservices.gov.bc.ca/msp/infoprac/diagcodes/index.html for a complete list.

[16] A full list of fee items is available at http://www.health.gov.bc.ca/msp/infoprac/physbilling/payschedule/index.html.

[17] In Canada all sentences for less than two years are served in provincial institutions. Those longer than two years are served in federal institutions.

[18] Discussions with people who had been Ministry employees at the time confirm explicit direction to take more children into care, backed up by high profile suspensions of social workers who did not.

[19] Lyons [1996] and Rubin [1992] also provide interesting introductions to the literature on variability in worker decisions.

[20] While the boys are in care regular check ups are mandated and for that reason, we would expect higher levels of detection and treatment in the period following placement in foster care. To deal with this issue, we included the month of contact with MCFD as part of the "pre" period. Recall from Figure 3 that boys placed in foster care are more likely to visit a physician in the month of contact. These visits increase the likelihood that underlying pre-existing problems will be diagnosed. If a mental health problem is diagnosed and recorded, that boy will, for the purposes of this study, have been identified as having had a mental health problem before being placed in care, and a comparison boy will be sought who also has a mental health problem. Subsequent differences will represent increased activity beyond the amount occurring in the first month.

[21] Difference in means between boys placed in care and matched comparison group of boys.

[22] Two-sample t test with equal variances

[23] Standard errors calculated allowing for clustering on caseload number and office code.

[24] Standard errors bootstrapped, 1000 repetitions, allowing for clustering at the level of the individual, caseload number and office.

[xxv] Two-sample t test of difference in means with equal variances

[xxvi] For sensitivity analysis we re-ran the analysis with the pre-contact variables defined to specifically exclude the month of contact. For coefficients with t's greater than 1.96 the largest change in coefficient was 4%. For coefficients with t's greater than 1.65 the largest change in coefficient was 9%.