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Family Assessment Response in Washington's Child Protective Services: *Effects on Child Safety and Out-of-Home Placement*

The 2012 Washington State Legislature changed the way the Department of Social and Health Services (DSHS) responds to reports of child abuse and neglect.

Previously, all accepted reports of child abuse and neglect were subject to an investigation where a caseworker determined whether abuse or neglect had occurred.[1]

The new law created a "differential response" where low-to-moderate risk cases receive an assessment of family needs, strengths, and risks—the Family Assessment Response (FAR). Investigations are completed only for high-risk cases.

The 2012 Legislature directed the Washington State Institute for Public Policy (WSIPP) to evaluate the implementation of FAR.[2] In this final report, we describe the effect of FAR on child welfare outcomes and costs.

Sections I and II provide background information on differential response, our study assignment, and the history of FAR in Washington State. Our evaluation approach and findings are described in Sections III and IV. Section V provides a summary and notes limitations of this report.

Summary

The 2012 Washington State Legislature made changes to the way the Department of Social and Health Services (DSHS) responds to reports of child abuse and neglect. Reports are received by the office of Child Protective Services (CPS). Previously, all accepted reports of child abuse and neglect were subject to an investigation where a caseworker determined whether abuse or neglect had occurred.

The new law created a "differential response" system where only high-risk cases will be investigated. In Washington, the differential response is called the Family Assessment Response (FAR). Low-to-moderate risk cases receive an assessment of the families' strengths and may receive services and concrete goods to reduce the likelihood of future maltreatment. The Washington State Institute for Public Policy was directed by the legislature to evaluate FAR.

We estimate that after full implementation, 55% of reports will be assigned to FAR with the rest receiving investigations. Compared to families eligible for FAR but who are served in offices where FAR had not been implemented, we found that families receiving FAR are:

- No less likely to have a new report to CPS,
- Less likely to have a child removed from home,
- Slightly less likely to have a dependency filed,
- More likely to receive paid in-home services, and
- No more likely to receive an evidence-based practice.

We found no significant effect of FAR on the average cost per family of paid in-home services.

[1] Accepted reports are those allegations that meet criteria for abuse or neglect and where there is sufficient information to follow-up on the report.

[2] Engrossed Substitute Senate Bill 6555, Chapter 259, Laws of 2012. Note: The final report was originally due December 1, 2016 but was delayed until data inconsistencies could be resolved.

I. Background

Historically, when reports (also called referrals or intakes) of possible child abuse or neglect are made to Child Protective Services (CPS), the state must decide whether the allegations are serious enough to warrant a forensic-style investigation. The investigation determines whether child abuse or neglect occurred and if further actions—including services for families, possible involvement of dependency court, and removal of children to foster care—are necessary to ensure child safety.

The differential response model was first implemented in seven states in 1998.[3] Under differential response, only high-risk cases receive investigations. The remaining low-to-moderate risk cases receive an assessment of the family's needs, strengths, and risks.

Legislative Assignment
ESSB 6555, Laws of 2012

The Washington state institute for public policy shall conduct an evaluation of the implementation of the family assessment response. The institute shall define the data to be gathered and maintained. At a minimum, the evaluations must address child safety measures, out-of-home placement rates, re-referral rates, and caseload sizes and demographics. The institute shall deliver its first report no later than December 1, 2014, and its final report by December 1, 2016.

As of 2014, 26 states and the District of Columbia have adopted this differential response approach for CPS cases.[4] An additional five states had adopted and then discontinued differential response and returned to investigations only. States have implemented differential response for low-to-moderate risk families in a variety of ways and with varying criteria for assignment to either assessment or investigation. Central to the model, however, are the following:

- The families receive assessments rather than investigations;
- No findings are made regarding whether child abuse and neglect occurred; and
- Families may receive additional services and concrete goods, when necessary, to reduce the likelihood of new reports to CPS.

The differential response model has been rigorously evaluated in seven locations. In 2016, WSIPP reviewed these studies and found that in the states studied, on average, this approach resulted in small reductions in new reports to CPS but had no reliable effect on out-of-home placements.[5]

[3] National Quality Improvement Center on Differential Response in Child Protective Services. (2014). *Final report: QIC-DR cross-site evaluation.*

[4] Ibid.

[5] See current results from the WSIPP analysis of Alternative Response. Using the weighted average effect size (-0.056) from our 2016 meta-analysis, we would predict the differential response model would result in a reduction in CPS reports of 1.8 percentage points. This is based on our observation of a baseline 18.1% chance of an accepted CPS report with 180 days in the absence of FAR. Our meta-analysis would predict a rate of 16.3% accepted reports for families receiving FAR. Results from our meta-analysis would predict no discernable change in out-of-home placements.

II. Family Assessment Response in Washington

A family assessment is defined in statute as:

> *A comprehensive assessment of child safety, risk of subsequent child abuse or neglect, and family strengths and needs that is applied to a child abuse or neglect report. Unlike investigations, the assessment does not include a determination as to whether child abuse or neglect occurred but does determine the need for services to address the safety of the child and the risk of subsequent maltreatment.*[6]

Under the new system, Washington families that are reported to CPS receive FAR unless:

- The allegations include sexual abuse/exploitation;
- The allegations include serious physical abuse;
- The allegations involve a child in out-of-home care where the caregiver is an unlicensed relative;
- The family has been the subject of three or more assessments in the past year;[7] or
- The allegations involve physical abuse of a child under age three (as of July 2014).[8]

If any of the above criteria apply, then the family is investigated by CPS.

By law, FAR cases must be closed within 45 days. Cases may be extended to 90 days if parents agree to the extension of their case and are actively engaged in services. Some staff have expressed concern that even 90 days may not "provide adequate time for them to provide services to significantly reduce the risk of future maltreatment."[9]

Title IV-E Waiver

The implementation of FAR is the central element in the state's title IV-E waiver, described below.

Foster care is paid for with a blend of federal and state funds. In Washington, the federal government provides a dollar-for-dollar match of state funds spent on foster care for eligible[10] youth. That is, as eligible foster care caseloads rise or fall, the federal funds change proportionately. Thus, if states reduce the number of eligible children in foster care, the federal support is reduced.

In September 2012, Washington State received a five-year title IV-E waiver. Under the waiver, if eligible foster care caseloads are reduced, the waiver allows DSHS to reinvest the federal savings in services to

[6] RCW 74.13.020, Section 8.
[7] Washington Children's Administration. (2013). *Screening and response assessment: Policy and procedures manual.* Olympia, WA.
[8] Washington Children's Administration. (2015) *Semi-annual progress report: January – June 2015*.

[9] Washington Department of Social and Health Services, Children's Administration. (2014). *Washington State Title IV-E Demonstration Project. Semi-annual progress report: January – June 2014*.
[10] Eligibility for title IV-E funding is determined by a formula including family income, demonstration that staying in the home is contrary to their welfare, whether the placement is a licensed foster home. Currently, Children's Administration estimates that 74% of children in foster care are IV-E eligible. Jenny Heddin, Director of Finance and Performance evaluation at CA (personal communication, November 2, 2017).

families. FAR is the primary way the state proposed to reduce the number of children in foster care in its waiver application. DSHS estimated that, over the life of the waiver, 2,430 fewer children would be placed in out-of-home care, saving an estimated $10.6 million in federal funds.[11]

A state receiving a waiver "cannot be reimbursed for more title IV-E funds for children served by the demonstration than it would have received without the demonstration."[12] That is, the program must be cost-neutral over the life of the waiver. For Washington's waiver, foster care caseloads will be compared to those observed in 2009.

The waivers require that states engage a third party to evaluate the IV-E demonstrations. Washington State contracted with TriWest Group in Boulder, Colorado to conduct an overall system-wide performance evaluation, a process evaluation, an outcome evaluation, and a cost analysis.[13]

Phase-In of FAR

In accordance with the law, DSHS phased-in the implementation of FAR. The intent of this phase-in was to provide time for staff training and, if necessary, fine-tuning. Further, the late-implementing offices served as the comparison group in outcome evaluations.

In January 2014, DSHS began implementing FAR in three of its 47 offices: Aberdeen, Lynnwood, and two zip codes in Spokane. These offices represent rural, urban, and suburban catchment areas. Over the next two and a half years, the program was phased in several offices at a time. By June 1, 2017, all 49 DSHS Children's Administration offices were implementing the FAR model.[14]

[11] Arnold-Williams, R. (2012). *Child Welfare Title IV-E Waiver Demonstration Project proposal for fiscal year 2012*. Olympia, WA: Department of Social and Health Services.

[12] Child Welfare Waiver Demonstrations Commonly Asked Questions About Cost Neutrality. Washington D.C. Administration for Children and Families, Children's Bureau.

[13] A list of TriWest reports to DSHS thus far can be found at the DSHS Children's Administration website.

[14] See Exhibit A13 in Appendix III for the full implementation schedule.

III. Evaluation Methods

The legislature directed WSIPP to evaluate the effect of FAR on child safety measures, out-of-home placement rates, re-referral rates, and caseload sizes and demographics.

For this evaluation, we compare outcomes for families receiving FAR services with outcomes for families eligible for FAR but who were served in offices where FAR had not yet been implemented and, thus, received an investigation.

Ideally, we would estimate effects of the program using an experimental research design where FAR-eligible families are randomly assigned to either receive FAR (the treatment group) or to receive an investigation (the comparison group). In a well-implemented experimental design, assignment of eligible families to the treated and comparison groups occurs only by chance. Thus any differences in later outcomes could be confidently attributed to FAR and not to other factors like seasonal variations in out-of-home placements, differences between DSHS offices, or unobservable differences in the families themselves.

Because FAR was phased in by offices throughout the state, we were unable to use a random assignment approach. Instead, we relied on administrative data and used an advanced statistical technique called propensity score matching. This technique allows us to closely match treatment and comparison families on a set of key observable factors related to outcomes for children. Propensity score matching allows us to approximate the comparability between groups that might have been achieved with random assignment. We recognize, however, that propensity score matching may not eliminate all differences in unobservable characteristics of families and offices.

The following subsections provide additional detail about our data, the selection of the study groups in the analytical sample, outcome measures, and our research methods.

Data and Study Groups

We used administrative data obtained from the DSHS Children's Administration case files to evaluate the program. We first identified all families assigned to FAR or eligible for FAR with an accepted report[15] between January 1, 2014 (when the first offices began implementing FAR) and July 1, 2015.[16] Eligible families could include those with no previous reports or those with one or more previous reports. Next, we selected the family's first report occurring on or after January 1, 2014 and designated that as the "reference report". The follow-up period for all outcomes in our analysis is measured from the reference report.

To identify a "FAR-eligible" comparison group, we matched FAR families served in early implementing offices to eligible families served in later-implementing offices. We created the matches between

[15] "Accepted reports" refers to those reports where the behavior described meets criteria for child maltreatment and sufficient information is available to follow up with the family. Reports are also referred to as "intakes" or "referrals."

[16] We received data on reports through February 1, 2016. To allow for a six month follow-up, we limited the sample to reports through June 30, 2015.

FAR and FAR-eligible families based on characteristics that are known to influence the chances of re-reports to CPS and out-of-home placements, such as age and race of youngest child, type of alleged abuse, history of prior reports to CPS, and previous out-of-home placements for any children in the family.[17] We also matched on two characteristics of the local office: the urban/rural nature of the catchment area and the percent of accepted reports where of out-of-home placements occurred.[18]

We were able to control somewhat for seasonality in reports and out-of-home placements by creating matched samples for each calendar quarter between January 1, 2014 and July 1, 2015.

Early in the analysis period, there were considerably more FAR-eligible families than FAR families. However, in the last three quarters, the FAR sample was nearly as large or larger than the pool of comparison families. For each of those quarters, we first drew a random sample of FAR families half the size of the comparison pool. This ensured we had two potential matches for each member of the FAR group in those time periods.

After this sampling and matching process, our treatment and comparison groups were similar. In our analysis sample, the FAR and FAR-eligible groups each contained 4,215 families. Details on the group characteristics and family demographics are available in Exhibit A1 of the Appendix.

Outcome Measures

First, to examine the question of how FAR impacts caseload, we used reports from calendar year 2015 to estimate the percentage of cases that would be assigned to FAR after full implementation.

The bulk of our analyses focus on three outcomes for families:

- Subsequent reports to CPS within 90 and 180 days of the first report;
- Removal of children from home within 90, 180, and 365 days from the date of the first report; and
- New dependency cases filed with the courts within 90 and 180 days of the first report.

We also examined the potential to compare the cost-per-case for FAR families to the cost for FAR-eligible families who received an investigation. While we were unable to assess the cost of casework and administration to DSHS on a per-case basis, we were able to examine whether or not families received paid in-home services and the costs associated with those services. Paid in-home services can include a wide range of potential goods and/or services, which have varying levels of associated costs.[19]

[17] A full list of covariates used in matching is available in Exhibit A4 of the Appendix. All characteristics were used in the matching process.

[18] Using information from 2013, the year before FAR implementation, for each office, we calculated percentage of families with accepted reports where at least one child was removed from home. The percent removal ranged from 1% to 22% of families.

[19] Paid in-home services are goods, services, and interventions intended to keep children safely at home. They include concrete goods, such as furniture or appliances; evidence-based practices, such as Triple-P and Incredible Years;

We did not include costs associated with payments to foster parents or other caregivers when the child was removed from the home because our interest was only in the costs associated with implementing FAR and investigations. All other paid services related to reports are included in our outcome measures.

Finally, we examine the receipt of a subset of paid in-home services identified as evidence-based practices (EBP) by the Children's Administration. These programs are Functional Family Therapy, Intensive Family Preservation Services, Incredible Years, Parent-Child Interaction Therapy, Safecare, Triple P, and Promoting First Relationships. In our analysis, we examine the likelihood of a family receiving any EBP.

Analysis Methods

For yes/no outcomes such as whether a family received a new report to CPS, we used logistic regression, controlling for the same characteristics used in the propensity score match. While the matching and analysis controlled for two office characteristics, we also used a specialized logistic regression that controlled for the possibility that outcomes for families might vary systematically depending on the office serving the families.[20]

Receipt of paid in-home services was uncommon in our sample. For this reason, to calculate the average cost per family, we used a statistical approach referred to as a "two-part model." The first part of the model estimates the likelihood that a family will receive any paid services. The second part calculates the average cost per family, accounting for the likelihood of services.

For context, we provide comparable statistics for high-risk cases not eligible for FAR. Additional detail on these methods are available in the Appendix.

psychotherapy; and child care. Paid in-home services do not include the cost of caseworker time or administration.

[20] We use the SAS program, Surveylogistic, specifying that cases were clustered by office.

IV. Findings

Cases Assigned to FAR

Between January 1, 2015 and January 1, 2016, approximately 55% of accepted reports were either assigned to FAR or eligible for FAR. This is similar to percentages observed more recently by DSHS[21] and in the middle of the range of 7% to 69% that was reported in studies from other states.[22]

Percentages reported in the following exhibits have been adjusted based on results of regression analysis.[23]

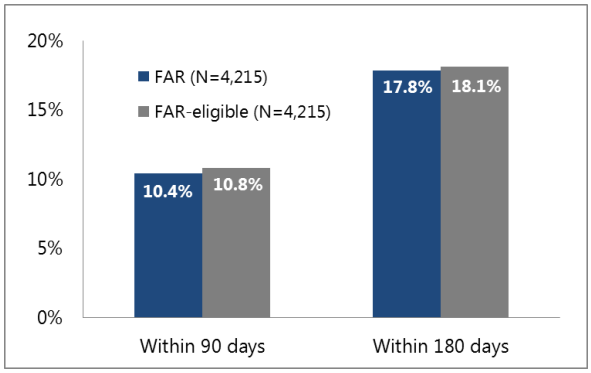
New Reports to CPS

We analyzed the likelihood of a new report to CPS following the first report in our study period. As displayed in Exhibit 1, we found no significant difference in percentages of families with a new report within 90 days or within 180 days of the report.

In cases where children were removed from home following a CPS report, the likelihood of a new report is low. For that reason we re-ran the analysis omitting families who had a child removed within 90 days of the report. Again we found no effect of FAR on the rates of new reports to CPS, either at 90 days or 180 days.

Exhibit 1

Regression-Adjusted Percent of Families with At Least One New Report



Out-of-Home Placements

We looked at the rate of removal of children. In this low-risk population, removals from home are infrequent. FAR cases, however, had statistically significantly[24] lower rates of out-of-home placements than similar families receiving investigations at 90, 180, and 365 days after the report.

[21] The average percent of reports assigned to FAR or eligible for FAR between January 1, 2015 and May 1, 2017 was 53.3%. Stephanie Frazier, Children's Administration, (personal communication, May 31, 2017).

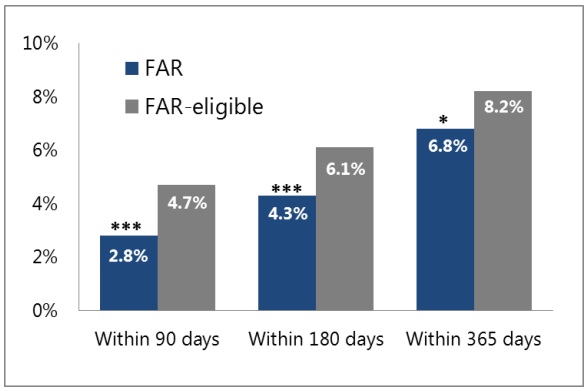
[22] Fuller, T., Nieto, M., Zhang, S. (2013). *Differential response in Illinois: Final evaluation report*. Urbana-Champaign: Children and Family Research Center, University of Illinois; Loman, L.A., & Siegel, G.L. (2014). *Ohio Alternative Response Evaluation extension: Final report to the Ohio Supreme Court.* St. Louis MO: Institute of Applied Research; Ruppel, J., Huang, Y., & Haulenbeek, G. (2011). *Differential response in Child Protective Services in New York State: Implementation, initial outcomes and impacts of pilot project*. Albany: New York State Office of Children and Family Services; Siegel, G.L., & Loman, T. (2006). *Extended follow-up study of Minnesota's Family Assessment Response: Final report.* St. Louis, MO: Institute of Applied Research; and Winokur, M., Ellis, R., Orsi, R., Holmquist-Johnson, H., Rogers, J., Gabel, G., Brenwald, S., . . . Evans, M. (2014). *Program evaluation of the Colorado Consortium on Differential Response: Final report.* Fort Collins, CO: Social Work Research Center, School of Social Work, Colorado State University.

[23] Unadjusted percentages can be found in Exhibit A9 of the Appendix.

[24] Statisticians often rely on a metric, the p-value, to determine whether an effect is significant. The p-value is a measure of the likelihood that the difference could occur by chance—values range from 0 (highly significant) to 1 (no significant difference). By convention, p-values less than 0.05 (a 5% likelihood that the difference could occur by chance) are considered statistically significant.

Exhibit 2

Regression-Adjusted Percent of Families with At Least One Child Removed from Home



Notes:
* p < 0.1, ** p < 0.05, and *** p < 0.01.
To allow for a full year after the report, the numbers of families in the sample used to calculate removal within 365 days was reduced to 2,565 per group.

Assuming the rates of FAR receipt and child removal in 2015 remain constant,[25] we might expect to see about 370 fewer children removed from home per year after full implementation.[26]

The effect we observed on out-of-home placement in Washington is greater than that reported in studies used in WSIPP's meta-analysis of Family Assessment Response in other states (see footnote 22 for the list of included studies). If our Washington sample produced the same effect size as the studies in our meta-analysis, we would expect to see 88 fewer children removed per year.

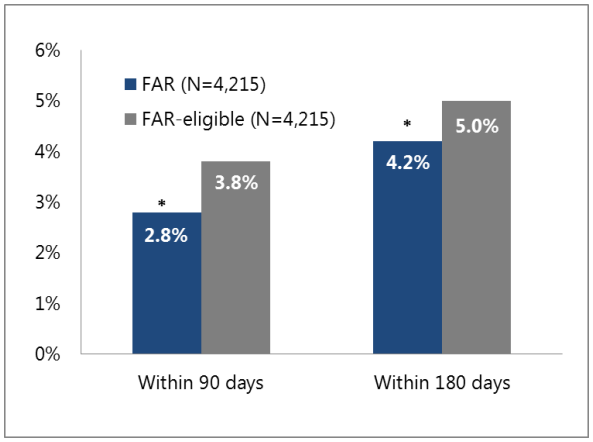
Dependency Case Filings

When the state intervenes with a family, DSHS may petition the court to declare the child dependent. By law, when DSHS removes a child from home, the state must file a petition within 72 hours of removal.[27]

Consistent with the lower removal rates that we observed, we find fewer dependency cases among FAR families. The difference is not quite statistically significant ($p < 0.10$).

Exhibit 3

Regression-Adjusted Percent of Families with a Dependency Case



Note:
* p < 0.1, ** p < 0.05, and *** p < 0.01.

[25] In 2015, 15,608 families received—or were eligible to receive— FAR. We found that when a decision was made to remove children, the average number of children removed was 1.7.

[26] Although fewer children were removed following FAR implementation, the foster care caseload has remained relatively constant since then. We observed, and Children's Administration has confirmed, that in the past several years, the average time in out-of-home care has increased. Thus, while fewer children are being removed, the overall caseload has remained stable. For caseload trends see the Washington State Caseload Forecast Council.

[27] RCW 13.34.060.

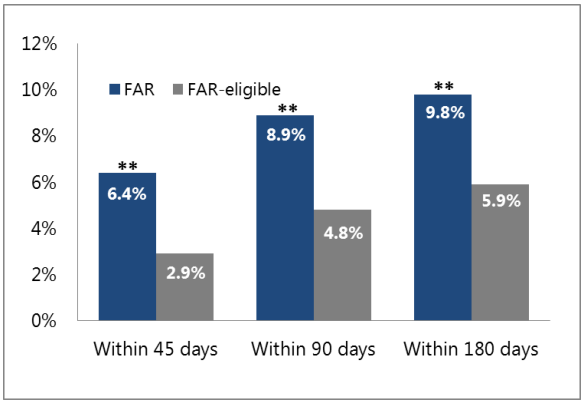
Paid In-Home Services

Paid-in home services include a wide range of goods and services, each of which has a different cost

While only a small fraction of cases received paid in-home services, significantly more FAR families received paid services than non-FAR families.

Exhibit 4

Regression-Adjusted Percent of Families Receiving Paid In-Home Services



Note:
* p < 0.1, ** p < 0.05, *** p < 0.010.

We applied a two-stage statistical model to account for the wide variability in cost of services given that such a small portion of the sample received any paid in home services. This approach allows us to more-accurately determine if the cost of services is different, on average, for the FAR and FAR-eligible groups.

Exhibit 5 displays the average cost per participant within 45, 90, and 180 days of the report. While at all time periods the average cost of paid services was greater for FAR families, the differences were never statistically significant.

Exhibit 5

Average Cost of Paid Services

	N	Within 45 days	Within 90 days	Within 180 days
FAR	4,215	$31.84	$61.82	$82.26
FAR-eligible	4,215	$22.62	$46.32	$83.59

Exhibit 6 displays the number of families actually receiving paid services and the range of costs per family.

Exhibit 6

Cost of Paid In-Home Services for Those Who Received Paid Services

	FAR families					FAR-eligible families				
Within	N#	Mean	Median	Min	Max	N	Mean	Median	Min	Max
45 days	268	$489.64	$263.00	$1.00	$3,820.60	123	$777.88	$306.05	$9.25	$4,568.81
90 days	377	$705.16	$442.77	$1.00	$3,820.60	201	$924.57	$470.46	$9.25	$6,152.60
180 days	411	$863.53	$580.52	$1.00	$5,728.85	244	$1,350.44	$944.62	$15.00	$7,886.64

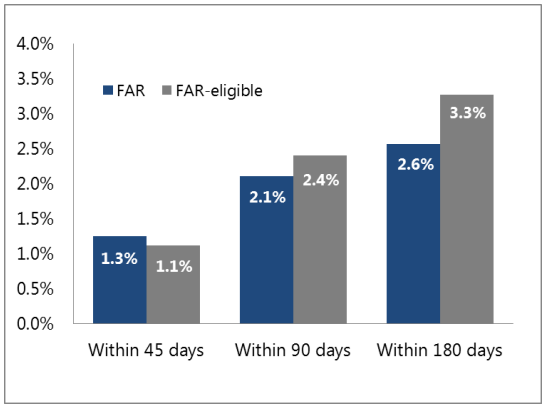
Note:
# Indicates the number of families actually receiving paid services.

Receipt of Evidence-Based Services (EBPs)

We compared rates of use of evidence-based practices between FAR and the comparison group. Exhibit 7 displays the percent of FAR and FAR-eligible cases receiving any EBP. We found that receipt of EBPs is very uncommon, and there is no significant difference in their use between groups at 45, 90, or 180 days after the report. That is, although FAR families were more likely to receive any paid in-home services, they were no more likely to receive an EBP than the families in the comparison group.

Exhibit 7

Regression-Adjusted Percent of Families Receiving Any EBP



Among those families who received any paid services within 180 days, a significantly smaller percentage of FAR families received an EBP than FAR-eligible families (27% of FAR families compared to 56% of FAR-eligible families). Thus, while FAR families are more likely to receive paid services, among those receiving paid services they are just as likely to receive an EBP as FAR-eligible families.

Families Not Eligible for FAR

We also examined some of the same outcomes for high-risk families who were ineligible for FAR during the same sampling period, January 1, 2014 through June 2015. We found much higher rates of child removal and dependency petitions than among the families eligible for FAR. Rates of new reports to CPS, however were lower than in the FAR-eligible group. These families were also less likely to receive paid in-home services than families assigned to FAR. However, the average costs per family were not different from what we observed for the eligible families.

Exhibit 8

Comparison of 180-Day Outcomes for FAR, FAR-Eligible, And High-Risk Families Not Eligible for FAR

Outcome	Families eligible for FAR		
	FAR	FAR-eligible	Not eligible
New report	18.1%	18.1%	10.2%***
Child removed	4.5%	6.1%**	18.1%***
Dependency filed	4.3%	5.1%*	13.8%***
Any paid in-home services	9.8%	4.8%***	5.9%***
Any EBP services	2.7%	3.3%	3.0%
Average cost of in-home services per family	$82.26	$83.59	$81.94
Number of families	4,215	4,215	9,828

Notes:
* p < 0.1, ** p < 0.05, and *** p < 0.01.
Raw percentages, not adjusted based on regression results.

As we did with the FAR and FAR-eligible families, we repeated the analysis for new reports and costs, omitting families where a child had been removed within 90 days. In this smaller sample, rates of new reports to CPS were still lower than in the FAR and FAR-eligible samples, and the likelihood of receiving paid in-home services remained lower than observed for FAR cases.

V. Summary

Summary of Findings

In Washington, 55% of accepted reports in FAR-implementing offices during our study period were eligible for FAR. The remaining 45% were ineligible and received a traditional investigation. These rates are similar to statewide rates after full implementation of FAR.

FAR families were significantly less likely to have children removed to foster care and slightly less likely to have a dependency petition filed in the courts than a similar comparison group.

We saw no reduction in the rates of new reports to CPS for FAR families compared to FAR-eligible families.

FAR families were more likely than FAR-eligible families to receive paid in-home services, although the average family service costs did not vary between groups. Similarly, we found no significant difference in receipt of evidence-based programs.

Limitations

The main limitation of this study is the inability to randomly assign eligible families to receive FAR or investigation. This would have allowed us to compare outcomes for FAR and FAR-eligible families who were served in the same offices at the same time. Random assignment would have increased our confidence that the differences observed were due to FAR and not because of characteristics of the local offices, trends in implementation FAR, and unobserved family characteristics.

A second limitation is the period for which we had data. Ideally, we would have allowed offices at least a 6-month FAR phase-in period. However, given the data available to us (reports from January 1, 2014 through January 2016), such an approach would have greatly reduced our sample size and our conclusions would have been less generalizable.

Acknowledgements:

The authors would like to thank staff at the Administrative Office of the Courts for linking CPS data to dependency court filings, staff at DSHS Research and Data Analysis for providing the child welfare data and identifying families eligible for TANF at the time of the report, DSHS Children's Administration staff for information on FAR implementation, and TriWest Group for collaboration on data quality issues.

Appendices

Appendix

I. Study Group Selection & Matching Procedures

In an ideal research design, families eligible for FAR would be randomly assigned to receive either FAR or CPS investigations as usual. With a successfully implemented random assignment, any observed differences in outcomes could be attributed to the effect of FAR. Unfortunately, as is the case in many real world settings, random assignment was not possible for this evaluation.

Instead, we use observational data and rely on a quasi-experimental research design. To infer causality from this quasi-experimental study, selection bias must be minimized. To do so, we implement a variety of research design methods and statistical techniques that provide the ability to test the sensitivity of our findings. In this section of the Technical Appendix, we describe the study groups and statistical methods we use to arrive at estimates of the effects of FAR.

Data

The design for this study was approved by the Washington State Institutional Review Board.

The Research and Data Analysis Division (RDA) at DSHS provided data files from the Children's Administration (CA) case files. Files included all cases between July 1, 2009 and February 1, 2016. We received separate files for reports to CPS (family level data), information on victim demographics, parent demographics, out-of-home placements, and service costs. The report file also contained a variable indicating whether a family was eligible for FAR, actually assigned to FAR, or ineligible for FAR (and therefore would always receive an investigation). RDA also flagged TANF eligibility at the time of the report. Personal information (names, addresses, social security numbers, and case numbers) were removed and replaced with alias identifiers that allowed us to link cases and children across the records.

For each family, we created indicators for the number of prior reports a family had received since July 2009. Similarly, we counted the number of occasions when one or more children were removed from home. These variables allowed us to account for the family's prior history with the child welfare system.

The service cost table, provided by RDA, contained information that included payments to foster parents and other caregivers when children had been removed from home. Because our interest was in the costs associated only with FAR and investigations, we did not include such payments in our analysis. For some programs, costs are paid using a voucher method. Such payments are not included in the cost table,

although the actual services and dates are listed. To calculate those costs, we used the reimbursement rates for each program listed on the CA website.[28]

Paid in-home services for the families in our sample included such things as concrete goods (e.g., home appliances), child care, psychotherapy, and programs identified by CA as evidence-based practice.

The demographic data for children include up to five races and an indicator of Latino heritage. For children with multiple races, we used the approach suggested by the Washington State Racial Disproportionality Advisory Committee to create a single race for the youngest child in each family.[29] In this approach, racial and ethnic minorities were given priority. In this hierarchy, a child with any American-Indian background would be considered American-Indian. Non-American-Indian children with any race category of black were considered black. Non-black or American-Indian children with indication of Asian/Pacific Islander were so classified. Then, children with a Latino flag were classified as Latino and white; non-Latino children were classified as white.

Study groups

We identified the first report between January 1, 2014 and July 1, 2015 for all families eligible for FAR. Sometimes, more than one report was made on a single day, which might occur if two different people report. In those cases, if an "eligible" family received another report on the same day requiring an emergent response and making the family ineligible for FAR, those families were dropped from the analysis. Because it was necessary to control for office characteristics, we also dropped cases where the office indicated was clearly an error. For instance, an office listed as central intake or an office of Division of Licensed Resources was clearly not the office where the case was managed. We also excluded a small percentage of cases where at least one child was in an out-of-home placement at the time of the report. Before matching, we had 7,681 FAR families and 19,724 FAR-eligible families.

Because there is seasonal variation in reports to CPS and removals of children, and in order to capture some of the policy changes that occurred over the period of FAR implementation, we further divided the sample into the six calendar quarters of our study period. For each quarter, we used propensity score matching (see page 19) to identify a comparison group of FAR-eligible families. In the final three quarters, the fourth quarter of 2014, and the first two quarters of 2015, the pool of FAR-eligible families was nearly as large or larger than the sample of FAR families. For those time periods, we randomly sampled from the FAR families so that the comparison pool was about twice the size of the FAR sample, ensuring that all FAR cases had at least two potential matches in the comparison group. Thus, our final FAR sample was 4,215 families.

[28] https://www.dshs.wa.gov/CA/contracted-providers/combined-in-home-services.
[29] Miller, M. (2008). *Racial disproportionality in Washington State's child welfare system* Doc. No. 08-06-3901. Olympia: Washington State Institute for Public Policy.

Exhibit A1

Sample Sizes by Calendar Quarter

	All families		After random sampling and match	
	FAR	Comparison	FAR	Comparison
Q1_2014	343	5,346	343	343
Q2_2014	297	5,012	297	297
Q3_2014	725	3,452	725	725
Q4_2014	1,589	2,505	1,200	1,200
Q1_2015	2,026	2,103	1,000	1,000
Q2_2015	2,701	1,306	650	650
Total	7,681	19,724	4,215	4,215

We examined the properties of the quarterly FAR samples before and after random sampling. As can be seen in Exhibit A2, we found that with the exception of two characteristics—current or prior indicators of criminal activity and economic stress—the random sampling did not change the average characteristics of FAR families in Q4 2014, Q1 2015, and Q2 2015. To understand whether the random sampling biased the FAR samples, we compared the entire sample and random samples for these variables in each quarter. We found no significant differences between the entire sample and the random samples. Within each quarter, the samples did not differ on these variables (see Exhibit A3). However, the prevalence of these indicators varied from quarter to quarter. The differences in the final sample reflect the smaller samples in the later quarters.

Exhibit A2

Characteristics of FAR Sample in Q4_2014, Q1_2015, and Q2_2015 Before and After Random Sampling

Family and office characteristics	Before random sampling	After random sampling	p-value
Age of youngest child			
Under 12 months	7.3%	7.3%	0.614
1 to 2 years old	14.7%	15.1%	0.653
3 to 4 years old	12.5%	12.5%	0.998
5 to 10 years old	35.4%	36.1%	0.318
11 to 14 years old	18.9%	17.7%	0.194
Over 15 years old	11.3%	11.2%	0.917
Race of youngest child			
White/undetermined	67.1%	67.0%	0.929
American Indian	6.9%	7.1%	0.335
Asian/Pacific Islander	4.8%	4.6%	0.622
African American	10.7%	10.2%	0.554
Hispanic/Latino	10.9%	11.1%	0.779
Number of children	1.427	1.439	0.515
Number of times any child had been removed	0.063	0.068	0.511
Number of CPS reports in past year	0.314	0.324	0.644
Months since January 2014	13.517	12.400	< 0.001
Type of Abuse			
Physical	36.8%	37.6%	0.453
Neglect	63.20%	62.39%	0.453
Family eligible for TANF	58.5%	59.2%	0.495
Family has current or prior indicators of			
Domestic violence	8.2%	8.7%	0.454
Criminal activity	32.4%	34.4%	0.061
Substance abuse	25.8%	26.6%	0.437
Mental illness	33.6%	34.2%	0.544
Economic stress	28.6%	30.8%	0.029
Homelessness	6.0%	6.2%	0.693
Reporter was			
Law enforcement	11.6%	10.7%	0.206
Mental health professional	8.4%	8.6%	0.802
Medical professional	6.2%	6.2%	0.931
Social service professional	13.3%	13.1%	0.814
Friend/relative	20.1%	20.0%	0.964
Other	9.9%	10.1%	0.976
Educator/child care provider	30.5%	31.3%	0.440
Rate of removals in the office in 2013	11.1%	11.2%	0.866
Urban/rural indicator (1 to 6)	1.877	1.898	0.453
Number of families	6,316	2,850	

Exhibit A3

Variation of FAR Samples in Q4_2014, Q1_2015, and Q2_2015 for Two Family Indicators

Family has current or prior indicators of	Q4_2014			Q1_2015			Q2_2015		
	Before random sampling	After random sampling	p-value	Before random sampling	After random sampling	p-value	Before random sampling	After random sampling	p-value
Criminal activity	32.1%	33.3%	0.500	29.7%	29.3%	0.816	25.7%	35.4%	0.267
Economic stress	34.2%	34.3%	0.991	33.4%	35.4%	0.267	30.6%	33.1%	0.216
Number of families	1,589	1,200		2,026	1,000		2,701	650	

Propensity Score Matching

Propensity score matching allows us to match FAR families with similar FAR-eligible families to obtain balance on observed covariates. This method has many benefits over standard regression analysis, which is often used to control for differences between treated and comparison groups.

First, the match is based on characteristics before the treatment occurs. That is, the outcome plays no part in matching the treated and comparison groups. This emulates an experimental design by separating the research design stage—where we test various matching procedures to obtain a sufficiently matched sample—from the analysis stage—where we estimate the effect of the treatment using our matched sample. Second, matching can limit the importance of functional form in regression analysis.[30] Finally, by conducting a logistic regression on the matched sample using the covariates from the matching model, we further reduce any residual bias that may remain after matching and account for any correlation between matched pairs.

Our preferred matching procedure for the main analysis is 1:1 nearest neighbor matching without replacement. Using 1:1 matching can reduce the bias between the treated and comparison groups by only matching treated individuals with the most similar comparison group individual.

Exhibits A4 through A6 report the results from the coefficients from the first stage model estimating the likelihood of FAR assignment for each of the six calendar quarters. We control for race and age of the youngest child; number of children in the household; type of alleged abuse; history of prior reports to CPS and removal of children to foster care; the type of person making the CPS report (e.g., educator, law enforcement, medical professional); family risk factors (determined by the Structured Design Making risk assessment); family poverty (as determined by family eligibility for TANF at the time of the report); months since January 1, 2014 when FAR was first implemented; and characteristics of the local DSHS office. Office characteristics include the urban/rural code[31] and the rate of removal of children in the 2013, the year before FAR was implemented.[32] The table also provides the Area Under the Receiver Operating Characteristic Curve (AUC) for each model. AUC is a measure of how well the model predicts the outcome—in this case, whether a family would be assigned to FAR. Values of AUC can range from 0.05 to 1, with 1 indicating perfect prediction. AUCs of 0.7 or greater are considered good predictive models.

[30] Ho, D.E., Imai, K., King, G., & Stuart, E.A. (2007). Matching as nonparametric preprocessing for reducing model dependence in parametric causal inference. *Political analysis*, *15*(3), 199-236.

[31] We use a collapsed version of the U.S. Department of Agriculture Rural-Urban Commuting Area Codes ranging from one (densest population) to six (least dense population).

[32] For each office, we calculated the percent of families with an accepted report where at least one child was removed from home in the six months after the report.

Exhibit A4

Logit Model Estimating the Likelihood of FAR Participation, Q1_2014 and Q2_2014

	Q1_2014			Q2_2014		
Covariate	**Coefficient**		**SE**	**Coefficient**		**SE**
Age of youngest child (reference group is 5 to 10 years old)						
Under 12 months	-0.117		0.238	-0.104		0.246
1 to 2 years old	-0.013		0.181	-0.054		0.195
3 to 4 years old	0.041		0.189	0.114		0.192
11 to 14 years old	0.249		0.165	-0.085		0.189
Over 15 years old	0.307		0.210	0.303		0.214
Race of youngest child (reference group is white/undetermined)						
Indian	-0.141		0.199	-0.038		0.225
Asian or Pacific Islander	0.384		0.263	0.281		0.270
Black	-0.098		0.192	-0.173		0.214
Latino	-0.471	**	0.228	-0.167		0.213
Number of children	-0.049		0.072	-0.053		0.074
Number of times any child had been removed	-0.193		0.221	-0.383		0.265
Number of CPS reports in past year	-0.114	**	0.051	-0.223	***	0.068
Months since January 2014	0.041		0.069	-0.093		0.077
Physical abuse[ǂ]	-0.492	****	0.142	-0.004		0.141
Family is eligible for TANF	.0121		0.099	0.033		0.106
Family has current or prior indicators of						
Domestic violence	0.192		0.182	0.247		0.202
Criminal activity	0.143		0.130	0.521	****	0.137
Substance abuse	0.273	**	0.134	0.055		0.151
Mental illness	0.632	****	0.123	0.641	****	0.131
Economic stress	0.802	****	0.122	0.756	****	0.132
Homelessness	0.176		0.206	0.112		0.239
Reporter was (reference group is educator/child care provider)						
Law enforcement	-0.156		0.200	-0.044		0.219
Mental health professional	-0.333		0.257	-0.022		0.257
Medical professional	-0.461	*	0.253	-0.287		0.286
Social service professional	-0.531	***	0.194	-0.083		0.196
Friend/relative	-0.339	**	0.171	-0.256		0.190
Other	-0.160		0.211	-0.191		0.235
Urban/rural indicator (1 to 6)	0.078	*	0.046	0.096	**	0.049
Rate of removals in the office in 2013	0.088	****	0.018	0.096	****	0.019
Constant	-4.051	****	0.295	-4.092	****	0.428
N	5,689			5,309		
AUC	0.718			0.716		

Notes:

Stars indicate statistical significance * p < 0.1, ** p <0.05, *** p < 0.01, and **** p < 0.001.

[ǂ] in a small number of cases (0.17%), the alleged maltreatment was sexual abuse/exploitation. Those cases are included with the neglect cases.

Exhibit A5

Logit Model Estimating the Likelihood of FAR Participation, Q3_2014 and Q4_2014

	Q3_2014		Q4_2014	
Covariate	**Coefficient**	**SE**	**Coefficient**	**SE**
Age of youngest child (reference group is 5 to 10 years old)				
Under 12 months	0.113	0.157	-0.069	0.156
1 to 2 years old	-0.152	0.128	0.019	0.120
3 to 4 years old	0.008	0.130	0.041	0.123
11 to 14 years old	-0.002	0.139	0.176	0.110
Over 15 years old	-0.091	0.172	0.358 ***	0.127
Race of youngest child (reference group is white/undetermined)				
Indian	-0.351 **	0.172	-0.482 **	0.148
Asian or Pacific Islander	0.038	0.209	-0.166	0.174
Black	0.156	0.131	-0.245 *	0.127
Latino	-0.147	0.154	0.237 **	0.118
Number of children	0.056	0.047	-0.012	0.045
Number of times any child had been removed	-0.232	0.175	0.163	0.135
Number of CPS reports in past year	-0.158 ***	0.048	-0.180 ****	0.040
Months since January 2014	0.178 ***	0.054	0.028	0.045
Physical abuse[ǂ]	0.168 *	0.102	0.150 ***	0.084
Family is eligible for TANF	-0.142 *	0.075	0.151 **	0.068
Family has current or prior indicators of				
Domestic violence	-0.088	0.142	0.012	0.127
Criminal activity	0.218 **	0.099	0.242 ***	0.090
Substance abuse	0.171	0.106	0.183 *	0.097
Mental illness	0.123	0.096	0.176 **	0.084
Economic stress	1.002 ****	0.096	0.835 ****	0.085
Homelessness	-0.092	0.176	0.024	0.166
Reporter was (reference group is educator/child care provider)				
Law enforcement	0.643 ****	0.179	-0.044	0.136
Mental health professional	0.267	0.210	-0.145	0.141
Medical professional	0.241	0.234	0.022	0.161
Social service professional	0.113	0.181	-0.178	0.120
Friend/relative	0.257	0.164	-0.249 **	0.116
Other	0.210	0.190	-0.105	0.144
Urban/rural indicator (1 to 6)	-0.215 ****	0.039	0.075 **	0.032
Rate of removals in the office in 2013	0.181 ****	0.016	0.162	0.014
Constant	-5.017 ****	0.488	-3.281 ****	0.489
N	4,177		3,705	
AUC	0.715		0.690	

Notes:

Stars indicate statistical significance * p < 0.1, ** p < 0.05, *** p < 0.01, and **** p < 0.001.

[ǂ] In a small number of cases (0.17%), the alleged maltreatment was sexual abuse/exploitation. Those cases are included with the neglect cases.

Exhibit A6

Logit Model Estimating the Likelihood of FAR Participation, Q1_2015 and Q2_2015

	Q1_2015			Q2_2015		
Covariate	**Coefficient**		**SE**	**Coefficient**		**SE**
Age of youngest child (reference group is 5 to 10 years old)						
Under 12 months	-0.374	**	0.170	0.004		0.214
1 to 2 years old	-0.187		0.137	0.100		0.162
3 to 4 years old	-0.218		0.135	-0.102		0.170
11 to 14 years old	0.001		0.117	0.031		0.153
Over 15 years old	-0.002		0.146	0.138		0.187
Race of youngest child (reference group is white/undetermined)						
Indian	-0.258		0.163	-0.666	***	0.216
Asian or Pacific Islander	-0.149		0.191	-0.327		0.248
Black	-0.380	***	0.137	-0.244		0.162
Latino	-0.033		0.136	-0.291	*	0.173
Number of children	-0.190	***	0.056	-0.013		0.065
Number of times any child had been removed	0.088		0.126	0.122		0.202
Number of CPS reports in past year	-0.132	***	0.044	-0.037		0.062
Months since January 2014	0.148	***	0.050	0.021		0.064
Physical abuse[ǂ]	-0.007		0.092	0.035		0.119
Family is eligible for TANF	0.054		0.074	0.085		0.096
Family has current or prior indicators of						
Domestic violence	-0.027		0.157	0.056		0.193
Criminal activity	0.255	***	0.097	-0.006		0.124
Substance abuse	0.291	***	0.109	0.066		0.137
Mental illness	0.151		0.093	0.390	***	0.118
Economic stress	0.668	****	0.098	0.637	****	0.124
Homelessness	-0.023		0.184	0.098		0.231
Reporter was (reference group is educator/child care provider)						
Law enforcement	-0.089		0.152	-0.136		0.198
Mental health professional	-0.193		0.156	-0.048		0.202
Medical professional	0.011		0.191	-0.396	*	0.234
Social service professional	-0.386	****	0.140	-0.461	***	0.174
Friend/relative	0.124		0.123	-0.100		0.154
Other	0.072		0.152	0.105		0.198
Urban/rural indicator (1 to 6)	-0.124	***	0.038	-0.553	****	0.052
Rate of removals in the office in 2013	0.223	****	0.017	0.189	****	0.025
Constant	-4.641	****	0.694	-2.045	*	1.078
N	3,103			1,956		
AUC	0.721			0.0713		

Notes:

Stars indicate statistical significance; * p < 0.1, ** p < 0.05, *** p < 0.01, and **** p < 0.001.

[ǂ] In a small number of cases (0.17%), the alleged maltreatment was sexual abuse/exploitation. Those cases are included with the neglect cases.

Exhibit A7 shows the characteristics of families in the FAR and FAR-eligible samples before and after the match.

Exhibit A7

Matched Study Group Characteristics

	Before matching			After matching		
Family and office characteristics	**FAR**	**Comparison**	**p-value**	**FAR**	**Comparison**	**p-value**
Age of youngest child						
Under 12 months	8%	8%	0.666	8%	8%	0.711
1 to 2 years old	16%	16%	0.489	16%	15%	0.810
3 to 4 years old	14%	14%	0.864	14%	13%	0.979
5 to 10 years old	35%	35%	0.834	35%	36%	0.866
11 to 14 years old	17%	17%	0.970	17%	17%	0.580
Over 15 years old	11%	10%	0.181	11%	11%	0.654
Race of youngest child						
White/undetermined	67%	64%	0.001	67%	67%	0.815
American Indian	7%	8%	0.043	7%	8%	0.210
Asian/Pacific Islander	5%	5%	0.889	5%	5%	0.646
African American	11%	12%	0.105	11%	10%	0.395
Hispanic/Latino	10%	11%	0.197	10%	10%	0.940
Number of children	1.47	1.49	0.093	1.47	1.49	0.228
Number of times any child had been removed	0.06	0.06	0.093	0.06	0.06	0.400
Number of CPS reports in past year	0.36	0.54	0.881	0.36	0.35	0.664
Months since January 2014	9.96	6.19	0.001	9.96	9.95	0.926
Type of Abuse						
Physical	35%	36%	0.483	35%	34%	0.359
Neglect	65%	64%	0.483	65%	66%	0.359
Family eligible for TANF	58%	55%	0.006	58%	58%	0.867
Family has current or prior indicators of						
Domestic violence	9%	9%	0.343	9%	10%	0.299
Criminal activity	36%	30%	0.001	36%	37%	0.621
Substance abuse	29%	23%	0.001	29%	29%	0.816
Mental illness	36%	29%	0.001	36%	37%	0.391
Economic stress	33%	19%	0.000	33%	31%	0.052
Homelessness	7%	5%	0.001	7%	7%	0.971
Reporter was						
Law enforcement	13%	12%	0.069	13%	12%	0.978
Mental health professional	8%	8%	0.966	8%	9%	0.407
Medical professional	6%	7%	0.111	6%	6%	0.345
Social service professional	14%	16%	0.001	14%	14%	0.409
Friend/relative	22%	23%	0.255	22%	22%	0.894
Other	10%	10%	0.263	10%	10%	0.775
Educator/child care provider	27%	25%	0.001	27%	27%	0.749
Rate of removals in the office in 2013	11%	10%	0.092	11%	11%	0.793
Urban/rural indicator (1 to 6)	1.92	1.98	0.007	1.92	1.90	0.574
Number of families	4,215	19,724		4,215	4,215	

We used various diagnostics to determine the extent to which the propensity score matching improved balance between the treated and comparison groups. A common measure of balance is the standardized difference (or bias) calculated as the difference in the mean/proportion for the treated and comparison groups, divided by the pooled standard deviation for each covariate prior to matching. This measure is preferred to traditional t-tests as the standardized difference is not influenced by the study's sample size. Additionally, t-tests are used for making inferences about a population based on a sample; balance, on the other hand, is an in-sample property. Standardized bias values greater than 0.10 usually indicate moderate imbalance while greater than 0.25 indicates severe imbalance.[33] Exhibit A8 displays the percent standardized bias for each covariate in the propensity score model before and after matching as well as the p-value as a reference. After matching, most differences were greatly reduced although some moderate bias remained. We control for the bias in the logistic regression. This last step is used to 'clean up' residual covariate imbalance between groups.[34]

Perhaps because FAR and FAR-eligible families were already similar on the criteria CA used to identify eligible families—even before matching—the two groups did not differ on most variables. After matching, we found no imbalance on any characteristic using Austin's criteria.[35]

[33] Austin, P.C. (2009). Balance diagnostics for comparing the distribution of baseline covariates between treatment groups in propensity-score matched samples. *Statistics in Medicine, 28*(25), 3083-3107 and Stuart, E.A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical Science: A Review Journal of the Institute of Mathematical Statistics*, *25*(1), 1–21.
[34] Stuart, E.A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical Science, 25*(2),1-21.
[35] Austin (2009).

Exhibit A8

Matched Study Group Characteristics

Variable	Means and proportions after matching			Absolute standardized difference (d)	
	FAR	Comparison	p-value	Before matching	After matching
Age of youngest child					
Under 12 months	8%	8%	0.71	0.01	0.01
1 to 2 years old	16%	15%	0.81	0.01	0.00
3 to 4 years old	14%	13%	0.98	0.00	0.00
1 to 14 years old	17%	17%	0.58	0.00	0.01
Over 15 years old	11%	11%	0.65	0.02	0.01
Race of youngest child					
White/undetermined	67%	67%	0.82	0.03	0.00
American Indian	7%	8%	0.21	0.03	0.04
Asian/Pacific Islander	5%	5%	0.65	0.00	0.01
African American	11%	10%	0.40	0.02	0.02
Hispanic/Latino	10%	10%	0.94	0.02	0.00
Number of children	1.47	1.49	0.23	0.03	0.03
Number of times any child had been removed	0.06	0.06	0.40	0.00	0.02
Number of CPS reports in past year	0.36	0.35	0.66	0.15#	0.01
Months since January 2014	9.96	9.95	0.93	0.81^	0.00
Type of Abuse					
Physical	35%	34%	0.36	0.01	0.01
Neglect	65%	66%	0.36	0.01	0.01
Family eligible for TANF	58%	58%	0.87	0.03	0.00
Family has current or prior indicators of [t]					
Domestic violence	9%	10%	0.30	0.01	0.02
Criminal activity	36%	37%	0.62	0.08	0.01
Substance abuse	29%	29%	0.82	0.07	0.00
Mental illness	36%	37%	0.39	0.09	0.01
Economic stress	33%	31%	0.05	0.19#	0.02
Homelessness	7%	7%	0.97	0.06	0.00
Reporter was					
Law enforcement	13%	12%	0.98	0.02	0.00
Mental health professional	8%	9%	0.41	0.00	0.02
Medical professional	6%	6%	0.35	0.03	0.02
Social service professional	14%	14%	0.41	0.06	0.01
Friend/relative	22%	22%	0.89	0.01	0.00
Other	10%	10%	0.77	0.02	0.01
Educator/child care provider	27%	27%	0.75	0.04	0.00
Rate of removals in the office in 2013	11%	11%	0.79	0.02	0.00
Urban/rural indicator (1 to 6)	1.92	1.9042	0.57	0.05	0.01
Number of families	4,215	4,215			

Notes:

# Indicates moderate imbalance, |d| > 0.10.

^ Indicates severe imbalance, |d| > 0.25.

[t] Family indicators determined by Children's Administration based on Structured Decision Making risk assessment.

II. Methods to Estimate the Effects of FAR

Dichotomous (Yes/No) Outcomes

For the dichotomous outcomes of interest (new reports to CPS, out-of-home placement, dependency filing, and receipt of paid services) we conducted logistic regression analysis controlling for the clustering of families within DSHS offices.

Logistic Regression Analysis on Full (Unmatched) Sample

We began our outcome analysis using traditional multivariate logistic regression analysis on the full (i.e. unmatched) sample. Regression analysis allowed us to control for observed covariates in estimating the treatment effect. However, regression analysis has several limitations. First, regression analysis can only control for observed factors. Second, if treated and comparison group covariate distributions do not overlap, then any causal inferences for regions with few treated or control group members must be based on extrapolation, leading to less precise estimates. Third, to approximate an experimental design, the research design stage of an evaluation should be separate from the outcome analysis stage. With standard regression analysis, the outcome of interest is necessarily part of the regression model and determining model fit requires repeatedly estimating the treatment effect.[36] This can lead to model selection based on the observed treatment effect and also suffers from the multiple comparisons problem, where the likelihood of finding a statistically significant result increases with the number of statistical tests performed. Finally, regression analysis requires making assumptions about functional form, which can increase bias if the wrong functional form is used.

While regression analysis has several limitations, it can outperform matching methods if important unobserved covariates are omitted from the analysis. In this case, regression analysis will produce a less biased estimate than propensity score matching. For this reason, we first estimated the relationship between FAR participation and the dichotomous outcomes using standard logistic regression. Exhibit A9 reports the regression-adjusted recidivism rates for the unmatched sample and allows comparison with results from the matched sample for each outcome. We found that conclusions on effects of FAR were not substantially changed by matching or the results of logistic regression.

[36] Rubin, D.B. (2007). The design versus the analysis of observational studies for causal effects: Parallels with the design of randomized trials. *Statistics in medicine*, *26*(1), 20-36.

Exhibit A9

Effects of FAR on Outcomes within Six Months of the Report, With and Without Matching

Matching method	New report to CPS				Any child removed				Dependency case filed				Received paid in-home services			
	FAR	Comp[#]	Percentage point difference[^]	SE[t]	FAR	Comp[#]	Percentage point difference[^]	SE[t]	FAR	Comp[#]	Percentage point difference[^]	SE[t]	FAR	Comp[#]	Percentage point difference[^]	SE[t]
Raw percentages																
(1) Unmatched	18.13%	18.23%	-0.10%	0.7	4.57%	6.13%	-1.56%***	0.3	4.29%	4.61%	-0.32%	0.3	9.82%	5.33%	4.49%	0.5
(2) Matched	18.10%	18.13%	-0.03%	1.0	4.46%	6.10%	-1.64%***	0.5	4.29%	5.05%	-0.76%**	0.3	9.82%	5.84%	3.98%	0.5
Regression adjusted percentages																
(3) Unmatched	17.96%	18.23%	-0.27%	0.7	4.54%	6.13%	-1.59%***	0.3	3.68%	4.61%	-0.93%**	0.3	7.91%	5.33%	2.58%	0.5
(4) Matched	17.77%	18.10%	-0.33%	4.1	4.31%	6.10%	-1.79%***	4.1	4.16%	5.05%	-0.89%*	0.5	9.74%	5.84%	3.90%	0.6

Notes:

Unweighted sample sizes are as follows: unmatched raw (FAR N = 4,215 comparison N = 19,724); unmatched regression adjusted (treated N = 4,215 comparison N = 19,724); and 1:1 nearest neighbor without replacement (both raw and regression adjusted treated N = 4,215 comparison N = 4,215).

[#] Comparison families.

[^] Stars indicate statistical significance * p < 0.1, ** p < 0.05, and *** p < 0.01.

[t] Standard errors are expressed as percent. Standard errors are calculated using the formula:

$$SE = \sqrt{\frac{p_1(1-p_1)}{N_1} + \frac{p_2(1-p_2)}{N_2}}$$

Raw recidivism rates are differences in mean percentages for FAR and comparison families without regression adjustment. Matching on covariates was still used to obtain matched raw percentages.

Outcome Analysis: Logistic Regression on Matched Sample

Our preferred analysis uses logistic regression on the matched sample to estimate the effect of FAR on new reports to CPS, the removal of children from homes, dependency petition filing, and receipt of paid services. Our outcome model uses most of the same covariates included in the matching model. Results of the analyses of six month outcomes for new reports to CPS, removal of any child, and filing of a dependency case are reported in Exhibit A10.

Exhibit A11 provides logistic regression results for the likelihood of receipt of paid in-home services and receipt of an evidence-based practice within 180 days.

Exhibit A10

Logistic Regression Estimating Effect of FAR Within Six Months of the Report
(FAR families N = 4,215 comparison families N = 4,215)

Covariate	New report to CPS		Any child removed		Dependency petition	
	Odds ratio	p-value	Odds ratio	p-value	Odds ratio	p-value
FAR	0.978	0.682	0.694	0.008	0.816	0.1
Age of youngest child (reference group is 5 to 10 years old)						
Under 12 months	1.052	0.636	1.752	0.001	1.911	0
1 to 2 years old	1.305	0.002	1.238	0.043	1.281	0.035
3 to 4 years old	1.148	0.109	1.241	0.059	1.353	0.012
11 to 14 years old	1.149	0.023	1.014	0.94	0.892	0.549
Over 15 years old	0.899	0.3	0.839	0.466	0.641	0.03
Race of youngest child (reference group is white/undermined)						
Indian	1.015	0.88	0.163	0.087	1.012	0.948
Asian or Pacific Islander	0.923	0.655	0.191	0.043	1.443	0.189
Black	1.142	0.167	0.137	0.57	1.358	0.089
Latino	1.498	< 0.0001	0.136	< 0.0001	1.382	0.054
Number of children	1.068	0.025	1.043	0.47	0.989	0.857
Number of times any child had been removed	1.06	0.49	1.557	0	1.479	0.002
Number of CPS reports in past year	1.225	< 0.0001	1.167	0	1.217	< 0.0001
Months since January 2014	0.998	0.647	1.014	0.252	0.994	0.605
Physical abuse[ǂ]	1.098	0.075	0.982	0.858	0.717	0.011
Family is eligible for TANF	1.197	0.001	0.907	0.161	0.86	0.065
Family has current or prior indicators of						
Domestic violence	1.083	0.351	1.128	0.486	1.08	0.669
Criminal activity	1.528	< 0.0001	1.355	0.015	1.401	0.019
Substance abuse	1.409	< 0.0001	2.742	< 0.0001	3.234	< 0.0001
Mental illness	1.418	< 0.0001	1.451	0.001	1.42	0.007
Economic stress	1.354	< 0.0001	0.837	0.11	0.812	0.054
Homelessness	1.572	< 0.0001	2.101	< 0.0001	1.99	< 0.0001
Reporter was (reference group is educator/child care provider)						
Law enforcement	0.827	0.06	1.031	0.862	1.148	0.426
Law enforcement	0.94	0.654	0.71	0.238	1.123	0.685
Medical professional	0.997	0.982	0.708	0.166	0.743	0.245
Social service professional	0.97	0.772	1.101	0.627	1.174	0.43
Friend/relative	0.918	0.453	0.957	0.781	1.008	0.955
Other	1.007	0.913	1.186	0.319	1.276	0.16
Urban/rural indicator (1 to 3)	0.966	0.098	1	0.997	1.023	0.656
Rate of removals in the office in 2013	1.021	0.059	1.053	< 0.0001	1.043	0.014
AUC	0.678		0.755		0.713	

Exhibit A11

Logistic Regression Estimating Effect of FAR Paid In-Home Services
(FAR families N = 4,215 comparison families N = 4,215)

Covariate	Odds ratio	p-value	Odds ratio	p-value
FAR	1.74	0.003	0.778	0.2949
Age of youngest child (reference group is 5 to 10 years old)				
Under 12 months	1.399	0.219	2.432	< 0.0001
1 to 2 years old	1.217	0.225	1.744	0.0011
3 to 4 years old	1.351	0.038	1.241	0.2774
11 to 14 years old	1.358	0.099	1.335	0.1683
Over 15 years old	1.205	0.341	0.864	0.631
Race of youngest child (reference group is white/undermined)				
Indian	1.155	0.402	1.097	0.7351
Asian or Pacific Islander	1.175	0.458	1.724	0.069
Black	0.922	0.497	1.051	0.8098
Latino	1.606	0.001	1.582	0.0601
Number of children	1.151	< 0.0001	1.127	0.0633
Number of times any child had been removed	1.001	0.996	0.953	0.7905
Number of CPS reports in past year	1.252	< 0.0001	1.214	< 0.0001
Months since January 2014	0.966	0.002	0.993	0.643
Physical abuse[‡]	1.326	0.016	1.756	< 0.0001
Family is eligible for TANF	1.034	0.657	1.051	0.7275
Family has current or prior indicators of				
Domestic violence	1.018	0.881	0.748	0.2404
Criminal activity	1.549	< 0.0001	1.326	0.041
Substance abuse	1.293	0.001	1.251	0.1085
Mental illness	2.166	< 0.0001	2.202	< 0.0001
Economic stress	1.955	< 0.0001	1.611	0.0001
Homelessness	1.607	0.016	0.767	0.3673
Reporter was (reference group is educator/child care provider)				
Law enforcement	0.739	0.059	0.574	0.0545
Law enforcement	1.205	0.299	1.008	0.9728
Medical professional	0.943	0.758	0.801	0.4729
Social service professional	0.931	0.616	0.922	0.6689
Friend/relative	0.876	0.362	0.674	0.0835
Other	0.97	0.817	0.88	0.6418
Urban/rural indicator (1 to 3)	1.161	0.021	1.167	0.9943
Rate of removals in the office in 2013	1.024	0.27	1	0.0988
AUC	0.754		0.726	

Calculating cost of paid services

Less than 10% of families receive paid services. For that reason we used a two-part model to calculate the average cost of services to families. The first part of the model uses logistic regression to estimate the likelihood that a family will receive any services. The second part calculates cost given the likelihood that of receipt of services. We used the Stata program, twopm,[37] which also permitted us to control for clustering of families within offices. We used the same covariates in the analysis that we used in the propensity score matching. Results of the analysis for the three time periods, 45, 90, and 180 days after the report, are summarized in Exhibit A12 below.

Exhibit A12

Cost of Paid Services

	FAR		Comparison		
Within	**Mean**	**SE**	**Mean**	**SE**	**p-value**
45 days	$31.84	$6.11	$22.62	$4.13	0.212
90 days	$61.82	$10.98	$46.32	$7.10	0.237
180 days	$82.26	$14.20	$83.59	$10.74	0.941

[37] Belotti, F., Deb, P., Manning, W.G., & Norton, E.C. (2015) twopm: Two-part models. *The Stata Journal, (15)*1, 3-20.

III. FAR Implementation Schedule

Exhibit A13
FAR Implementation Schedule

Implementation phase	Begin date	Region 1	Region 2	Region 3
1	January 1, 2014	Spokane (Part 1-25%)*	Lynnwood	Aberdeen
2	July 15, 2014	Spokane (Part 2-15% & Lincoln County)* Ellensburg	Martin Luther King** Mount Vernon	Puyallup Stevenson
3	Oct 1, 2014	Spokane (Part 3-30%)* Moses Lake Richland	Oak Harbor (Friday Harbor)	Peninsula (Forks, Port Angeles, Port Townsend) Vancouver - Cascade Vancouver - Columbia
4	January 20, 2015	Spokane (Part 4-30%)* Colville Newport Republic	Sky Valley Smokey Point	Long Beach/South Bend Tacoma
5	April 1, 2015	Sunnyside Walla Walla	King East**	Bremerton Lakewood
6	October 1, 2015	Colfax Clarkston		Kelso
7	July 25, 2016	Goldendale White Salmon Toppenish		Centralia Shelton Tumwater
8	October 24, 2016		King West** White Center**	
9	January 30, 2017	Omak Wenatchee	Bellingham Everett	
10	April 24, 2017	Yakima		
11	June 1, 2017		King Southwest** King Southeast**	

Notes:

* In the Spokane office, FAR was implemented in stages, based on zip code. Percentages refer to the proportion of cases where FAR was implemented. For example, in Phase 1, FAR was implemented with 25% of the eligible caseload and the programs was made available to an additional 15% in Phase 2.

** Connected to Office of Indian Child Welfare.

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