

Technical Report for Evaluating CCDBG in Oregon: Impact of the 2014 Act on Children, Families, and Providers Final Report

Phase II: Implementation Grant

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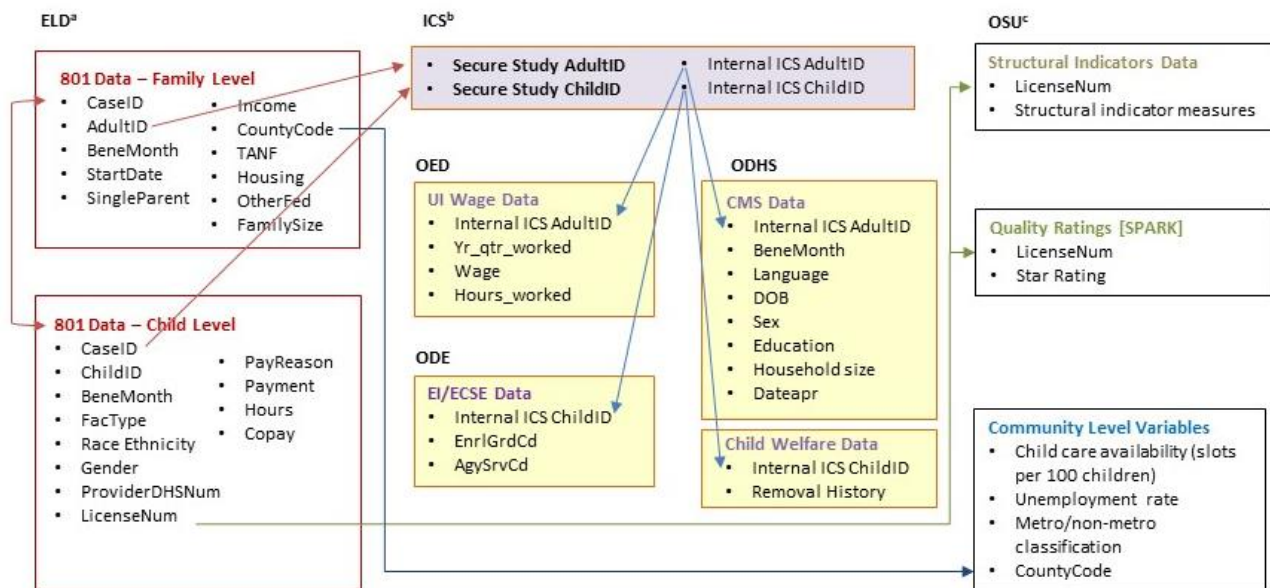
Report Purpose

This technical report is to serve as a companion to the report titled: *Evaluating CCDBG in Oregon: Impact of the 2014 Act on Children, Families, and Providers Final Report*. This report describes additional analytic details that were not included in the main report. For additional information about this study, please reach out to the corresponding author, Megan Pratt, megan.pratt@oregonstate.edu, 541-737-5373.

Data Sources

Longitudinal administrative 801 subsidy data was linked with data from several administrative data sources. Through an agreement with Oregon’s Integrated Client Services (ICS), the research team obtained and merged data from multiple State agencies and units, including the Oregon Early Learning Division (ELD, now known as the Department of Early Learning and Care, DELC), Oregon Department of Human Services’ Client Maintenance System (CMS), the Oregon Employment Division’s Unemployment Insurance (UI) wage data, and the Oregon Department of Education (ODE). Figure 1 illustrates each of the data sources and the nature of data obtained from each. Arrows represent the unique identifier used to merge each dataset together. The yellow boxes indicate datasets that were merged using the Internal ICS identifiers. The Internal ICS identifiers were then replaced by secure study IDs before sharing with the Oregon State University (OSU) research team.

Figure 1. Diagram of Data Sources and Variables for CCDBG in Oregon Project



^a ELD provides OSU with 801 data that served as the base dataset for the study. 801 data is based on billing month and includes information about child and adult demographics and provider(s) needed to run the program.

^b ICS created study specific secure ids for children and families and supported coordination with other agencies represented by yellow boxes for data sharing. OSU researchers worked only with ICS secure IDs to protect identities of families and children.

^c OSU houses the Oregon Child Care Research Partnership, which conducts yearly or biannual studies on child care workforce and availability. Thus, the partnership manages and houses cleaned long-term administrative data and publicly available county characteristics.

Family Study Methods

Defining the Sample

The monthly records from Employment-Related Day Care (ERDC) child care subsidy 801 administrative data were linked to create a five-year longitudinal analysis sample. To define the family units, individual children from the 801 child dataset were matched to those with valid Adult IDs in the 801 family dataset using the Case ID variable. Study variables were aggregated based upon the child data associated with each adult, leaving the study team with 29,414 unique family units representing all the families and children with valid IDs receiving subsidy benefits from fiscal years 2015-2019. This base dataset was then sent to Oregon's ICS who created secure study IDs and facilitated the data use agreement process. This allowed the OSU researchers to access and merge administrative data from other agencies. The secure study IDs were used to protect the identities of participants. Not all individuals in the original 801 dataset were able to be identified by the ICS system, so they were excluded. Excluding those with no secure ID, the team received data on 26,460 families, which represented 91% of all the adults in the subsidy system during this timeframe.

Once OSU received all of the data for the study, the sample was restricted to those who were new entrants to the study during the PRE or POST study period years. The PRE period includes two years prior to CCDF Rule implementation (federal fiscal years (FFYs) 2015-2016) and POST period covers two years after implementation (FFYs 2018-2019). The team expected that new entrants' behaviors were less likely to be biased from prior program experience and thus their behavior would be more representative of true policy impact. Further, during the study period, Child Care and Development Fund (CCDF) rules did not apply to families receiving subsidy due to participation in the Temporary Assistance to Needy Families (TANF) program. Therefore, families for whom all months of subsidy receipt were due to participation in TANF were excluded. After exclusion, the analytic dataset consisted of 11,312 families in the PRE period and 5,628 in the POST period.

Variable Details

Variables expected to change over time were aggregated at the monthly level for all the children on subsidy in the household to create a set of family-level variables. When more than one provider was providing care to the household, a primary provider was defined. This primary provider was defined as the provider with the most hours of care for the month, followed by highest payment in the case of ties.

The following list describes each of the variables in used in the family study analytic models:

- *Spell length* is the length of continuous participation in months (spell) for a family during the study period. This was defined as the first observed spell unless that spell started prior to the study period (left truncation). Left truncated spells were not used as it was not possible to know the length of participation time prior to the start of the study. For families with a left truncated spell, the next continuous spell was used in the analysis. Any family with a continuous spell in the last month of the study period was right-censored as the spell length could not be determined.
- *PRE/POST*. The PRE period was defined as families with at least one billed month in the subsidy program between October 2014 and September 2016 (FFYs 2015 or 2016). The POST period consists of new entrants that had at least one billed month from October 2017 to September 2019 (FFYs 2018 or 2019) and no prior billed months in the earlier years of the study.
- *Provider type* is based on a unique identifier assigned to a provider by the Oregon Department of Human Services (ODHS). The following types of care categories were used to define provider type: Certified Center, Certified Family child care, Registered Family child care, License-Exempt Nonrelatives, License-Exempt Relatives, and License-Exempt Centers.
- *Subsidy value* is the total payment distributed to the primary provider by the state for a family in any given month, in US dollars.
- *Income* is the monthly reported family income, scaled in hundreds of US dollars. This variable was strongly associated with family copay, so both could not be included in any statistical models at the same time.
- *Age of oldest child* is the age in years of the oldest subsidy child in the household in any given month.
- *Education* is the head of household's highest formal education level in years of schooling. A numerical value representing formal years of schooling was used; 0 for no formal schooling, 1 to 11 for grade completed in school, 12 for high school diploma or GED, 13-16 for post-secondary education, up to 17 for post graduate education level. Parent education was missing for some families. In these cases, we imputed the missing data using the intact data values via the MICE (Multivariate Imputation via Chained Equations) package. Post imputation histograms confirmed that imputed data had the same distribution as the intact data, minimizing any chances that the imputed data could alter the true observations.
- *Language spoken at home* is the primary language spoken at home by the subsidy family, obtained from Client Maintenance System (CMS).
- *County employment growth rate* is the year over year percent change in employment based on a three-month running average of employment growth rate; provided by the State of Oregon Office of Economic Analysis and measured by county of residence.

- *Child care slots per population of 100 children* in a county is a benchmark variable that estimates the availability of child care resources in Oregon counties. OCCRP researchers at Oregon State University use Child Care Resource and Referral (CCR&R) data to estimate child care supply and combine that data with population estimates of children under age 13 produced by the Population Research Center at Portland State University. Measures are created at county and state levels. This measure of child care supply has been used as a measure of child care accessibility since the 1990s.
- *Metro or non-metro* is whether the family household location is in a metropolitan area or a non-metropolitan area, as defined by the US Office of Management and Budget, 2020).
- To capture *parent employment characteristics*, Unemployment Insurance wage data was used to create the following variables:
 - *Number of employed quarters* counts quarters with earning greater than zero out of a maximum of 8 possible quarters.
 - *Quarterly hours worked* is the sum of hours worked for any employer in a quarter.
 - *Job change* is true when the primary employer for the parent differs from the one in the previous fiscal quarter, used as a measure of employment stability.
 - *Employment loss or gain* (defined as a reduction or gain of hours by 33% when comparing hours from previous to current quarter and from current to next quarter), and
 - *Change in quarterly earnings from previous quarter to current quarter* compares the total earnings of the parent during the current billing period's fiscal quarter to the previous fiscal quarter's earnings; an earnings increase of greater than 33% from the previous quarter to the current quarter is designated as an earnings gain, while a decrease in earnings of 33% or more was designated as an earnings loss. Earnings within this range were designated as no change. This was implemented in both forward and backward-looking measures.

Analysis Details for Predicting Subsidy Exit

A main research question was, what factors predict a family's exit from the subsidy program? To answer this question, an Accelerated Failure Time (AFT) regression analyses approach was used. This allowed us to test the unique influence of the array of factors thought to be related to exiting the subsidy program. The AFT model with a log-normal distribution was used to estimate predictors of a shorter or longer subsidy spell.

In the past, researchers in Oregon have used a Cox proportional hazards model to model predictors of subsidy exit. For this study, the study team first ran a Cox regression. A test of the univariate model using the `cox.zph` function in the survival package in R suggested the assumption of proportional hazards was violated ($p < .001$), necessitating a parametric model. To select the most appropriate

parametric model, model fit was assessed graphically using Cox-Snell residual plots. This allowed for a visual comparison of different parametric distributions (i.e., Exponential, Weibull, Gaussian, Log-logistic, and Log-normal distributions). The Log-normal model appeared to have the best fit graphically, and had the lowest score as measured by Akaike Information Criterion (AIC). Thus, the model was respecified as an accelerated failure time (AFT) model with a Log-normal distribution.

The Log-normal AFT model is a well-documented approach for survival analysis and provides a relatively straightforward interpretation of the fitted estimates in a multivariate model. AFT models produce estimates that are time ratios or relative time (RT). An RT in this analysis is the rate in which a particular characteristic influences the likelihood of exit.

Family Study Analysis Results

The AFT Regression analysis allowed the research team to model which factors (family, parent employment, policy, and community characteristics) predicted that a family exited their participation in the subsidy program. Statistically significant findings are summarized in the list below. It is important to remember that results reflected the significance and effect size of each factor when controlling for all other factors included in the model. The full model, including all covariates, are also presented in Table 1.

- *PRE/POST*. Families in the subsidy program were 20% more likely to exit the program in the POST period than they were in the PRE period.
- *Age of oldest child*. The age of the oldest subsidy child in a family unit was a significant predictor. A one-year increase in age of the oldest child corresponding to a 1.6% higher likelihood of exit of the program.
- *Education*. The education level of the primary parent in the family had a mild effect on determining length of spell, with a one-year increase in education of the head of household corresponding to a 1.1% lower likelihood of exit of the program.
- *Income*. Family income was also found to be a factor strongly predicting the length of subsidy spell, with higher income associated with longer stay in the subsidy program. Families were 2.0% less likely to exit the program for every \$100 of reported income.
- *Job change*. Families that experienced a job change were 6.8% more likely to exit the program than families without a job change, holding all other factors constant, within a particular month.
- *Change in quarterly earnings*. Families that experienced a gain in earnings were 38.3% more likely to exit the program than families not experiencing a gain in earnings during the same quarter, holding all other factors constant. Families with a loss in earnings were 23.0% more likely to exit the program than families

without a loss in earnings during the same quarter, holding all other factors constant.

- *Subsidy value.* In the form of claim payments made to providers, a family's monthly subsidy amount was found to be a factor strongly predicting the length of subsidy spell, with higher subsidy value associated with longer stay in the subsidy program. Families were 5.7% less likely to exit the program for every \$100 they received in monthly subsidy value.
- *Child care slots per county population.* Data reports the number of slots for every 100 children under age 13 in the county. Families living in counties with less availability of child care options based upon estimates of available child care slots stayed in the program longer than families in counties with greater availability.
- *County employment growth rate.* Families living in counties with a high growth rate exited the program sooner than those in counties with a slower growth rate. For each 1% increase in a county growth rate, a family's likelihood of exit increased by 7.4%, holding all other factors constant.
- *Metro or non-metro.* Families living in metropolitan areas had a 17% lower likelihood of exit than families living in non-metropolitan areas, with all other factors controlled in the model.
- *Provider type.* In the provider analysis, large differences in length of care based upon provider type were detected. Thus, provider type was included in family subsidy spell model to control for any confounding effects that this variable might have on families.

Table 1. Predictors of Family Exit from Subsidy Program – Full Model

Variables	Relative Time ¹
Study period	
PRE period (REF)	
POST period	0.802***
Subsidy value (in hundreds of dollars)	1.057***
Age of oldest child	0.984***
Education	1.011**
County employment growth rate	0.926***
Family income (in hundreds of dollars)	1.020***
Language spoken at home	
English (REF)	
Spanish	1.027
Others	0.954
Child care slots per county population	0.988***
Metro or non-metro	
Metro (REF)	
Non-metro	0.830***
Job change	
No change (REF)	
Change from previous quarter’s employer	0.932**
Change in quarterly earnings from previous qtr. to current qtr.	
No or minimal changes	
Earnings loss of 33% or greater	0.770***
Earnings gain of 33% or greater	0.617***
Covariate	
Provider type	
Certified Centers (REF)	
Registered Family	1.251***
Certified Family	1.265***
Exempt NonRelative	1.051
Exempt Relative	1.224***
Exempt Centers	0.779**

** $p < .01$, *** $p < .001$; REF = reference group.

Child Study Methods

Defining the Sample

Children were the primary focus of the second study. The original data set included 53,401 children. Any child that was missing the unique study ID provided by Integrated Client Services was excluded. After exclusion, the dataset included 49,170 children, which represents 92% of all the children in the subsidy system during this timeframe.

¹ The AFT model estimates are in Relative Time (RT), which is the rate in which a particular characteristic influences the likelihood of exit. The results for groups are RT comparisons of a group member compared to the reference group, with results >1 indicating a decreased exit likelihood compared to the reference group, and results <1 indicating an increased likelihood of exit compared to the reference group. For continuous variables the RT of >1 indicates a decreased likelihood of exit for each unit increase in the variable, and a RT of <1 indicates an increased likelihood of exit for each unit increase in the variable.

Using the same logic as when defining the family dataset, the PRE cohort was composed of children who began under policies in place prior to implementation of the 2016 Child Care and Development Fund (CCDF) Rule. Children who began their first spell during the year of new rule implementation (October 2016 – September 2017) were excluded since policies were in transition during the year of their entry. Children whose first spell began after the transition year (October 2017 – September 2019) made up the POST cohort. The analysis dataset then contained a total cohort of 22,676 children in the PRE period and 10,855 children in the POST period.

Variable Details

The following describes each of the variables in the child study analytic models.

- *Child arrangement spell* is the length of time in months that a child stayed with the same primary provider. Any child with an observed arrangement that was ongoing at the start of each study period was left truncated. Left truncated spells were not used as it was not possible to know the length of participation time prior to the start of the study. Any child-caregiver arrangement that was ongoing at the end of the study period was right-censored as the spell length could not be determined.
- *PRE/POST*. The PRE period was defined as children with at least one billed month in the subsidy program between October 2014 and September 2016 (FFYs 2015 or 2016). The POST period consists of new entrants that had at least one billed month from October 2017 to September 2019 (FFYs 2018 or 2019) and no prior billed months in the earlier years of the study.
- *Race/ethnicity* was defined by a series of variables of racial and ethnic identities. A child was identified as a specific race or ethnicity if they were ever listed as belonging to a racial or ethnic group within the entire study period.
 - The data entry method for collecting racial and ethnic variables changed within the study period, so work was done by the study team to make the years as comparable as possible. Before fiscal year 2018 Oregon's subsidy data entry system was set up to only allow only one response for child race/ethnicity, with the options being: "A" for Asian; "B" for Black or African American; "H" for Hispanic; "I" for Native American or Alaska Native; "P" for Pacific Islander; "U" for unknown race; and "W" for White. Starting with fiscal year 2018, the data entry system was changed to allow for multiple race responses for a given child to capture children identifying with more than one race. Additionally, a new ethnicity question was created for "Hispanic or Latino" or "not Hispanic or Latino". To create a set of race and ethnicity variables that were comparable over time, the research team coded a child's race to a racial group if there was ever a 'yes' response to a racial or ethnic category throughout the five-year period. This approach uses the rationale that it would take additional effort to indicate that a child belongs to a particular race. Using this method, we were able to assign race data to 80.7% of the total population, with 3.3% listed as more than one race. Similarly, children

- were coded as “Hispanic or Latino” if the respondents ever identified the child as “Hispanic or Latino” in the five-year sample. The race and ethnicity variable used in the child study was not mutually exclusive; that is a child could be defined as belonging to more than one race/ethnicity category.
- *Gender* of the child was coded as either female or male. If the child had inconsistent gender responses (n = 105), they were coded as the earliest response in the dataset.
 - *Provider type* denotes the primary providers care type, types which are also grouped into Licensed and License-Exempt groups. Licensed provider types include: Certified Center, Certified Family, and Registered Family. License-exempt provider types include: License-Exempt Nonrelative, License-Exempt Relative, and License-Exempt Center. When a child had more than one provider in a given month, the primary provider was identified as having the most hours of care for the month, followed by highest payment in the case of ties.
 - *Child age* was computed at each month by comparing the benefit month to the child’s birth month. For 196 individuals, birth date variable was found to have discrepancies over time. Thus, inconsistent birth dates in the data were corrected by using the first date found in the system.
 - *Age Group* categories were defined based upon the child’s age at the month of a subsidy billing. Infants are all children under 12 months of age. Toddlers are children over 12 months of age and younger than 36 months of age. Three- and four-year-olds defines children over 36 months and younger than 60 months. five year-olds denotes children older than 5 and younger than 6 years old. School Age contains all children older than 6 years old.
 - *Early Intervention/Early Childhood Special Education (EI/ECSE)* denotes whether the child participated in the Early Intervention or Early Childhood Special Education provided by Oregon Department of Education during the study period.
 - *Subsidy value* denotes the total subsidy payment the primary provider received in a given month for child care services, in US dollars.
 - *Child care slots per population of 100 children* in a county estimates the availability of child care resources in Oregon counties. Oregon Child Care Research Partnership (OCCRP) researchers at Oregon State University use Child Care Resource and Referral (CCR&R) data to estimate child care supply and combine that data with population estimates of children under age 13 produced by the Population Research Center at Portland State University. Measures are created at county and state levels.
 - *Metro or non-metro* is whether the family household location is in a metropolitan area or a non-metropolitan area, as defined by the US Office of Management and Budget.
 - *Child welfare intervention* was defined as whether the child had at least one removal from their home by Oregon Department of Human Services Child Welfare.

- *Family-level employment covariates* that were found to be strong predictors of family subsidy exits were also included in the child analyses. See Family Study Variable Details section above for more information on the employment variables.

Analysis Details for Predicting Child Arrangement Exit

A main research question was, what factors predict a child’s exit from a subsidized child care arrangement? To answer this question, an Accelerated Failure Time (AFT) regression analyses approach was used to test the unique influence of the array of factors thought to be related to exiting a child subsidy arrangement. The AFT model with a log-normal distribution was used to estimate predictors of a shorter or longer subsidy spell. AFT models produce estimates that are time ratios or relative time (RT). An RT in this analysis is the rate in which a particular characteristic influences the likelihood of exit. Since this was the same approach used for predicting family subsidy spells, see Family Study Methods subsection for additional details on the analytic approach.

Child Study Analysis Results

The AFT Regression analysis allows us to model which factors predict that a child exited their primary care arrangement. All statistically significant results are interpreted in the list below.

Also, see Table 2 for a full set of findings.

- *PRE/POST*. With all factors in the model controlled, a child entering the subsidy program in the POST was 5% more likely to exit their arrangement sooner than a child in the PRE period.
- *Age Group*. The age of the child was found to be a significant determinant when predicting arrangement length in the program. With infants as a reference group, all other groups were less likely to exit the program as quickly, controlling for other factors in the model. The likelihoods of exit, as compared to infants are as follows: toddlers 45% less likely; three- and four-year-olds were 38% less likely; five-year-olds were 27% less likely; and school age children were 21% less likely to exit the program than infants. Therefore, infants were more likely than any other age group to exit their child care arrangement.
- *Race/Ethnicity*. Black children were 16% more likely to exit their arrangement, when compared to White children. Children with more than one race or from another racial group showed no difference than White children, adjusting for other terms in the model. Children with undisclosed racial makeup (i.e. declined to answer) were predicted to be 2% less likely to exit.
- *Provider type*. Using Certified Centers as the reference group, all other provider types had statistically significant differences in arrangement exit, except for License-Exempt Nonrelative which had no difference from Certified Centers. Compared to Certified Centers, children attending Registered Family providers were 20% more likely to stay in the program, those with Certified Family providers were 19% more likely to stay in the program, and those with License-

Exempt Relatives were 46% more likely to stay in the program, controlling for all factors. License-Exempt Centers were 65% less likely to stay in the program than Certified Centers.

- *Metro or non-metro.* Children living in non-metropolitan counties were 6% more likely to exit their arrangement than children living in metropolitan counties.
- *Child welfare removals.* A child experiencing a removal during the study period were 12% more likely to exit from their child care arrangement, holding all other terms constant in the model.
- *Early Intervention/Early Childhood Special Education.* No measurable difference in exit were detected between children with or without EI/ESCE services.
- *Covariates.* In the family analysis, large differences in length of subsidy program participation based upon the family's employment experiences were detected, as well as significant differences by subsidy value, family income, and county characteristics. They are included in this model to control for any confounding effects that these variables might have on children.

Table 2. Predictors of Exit from a Subsidized Child Care Arrangement – Full Model

Variables	Relative Time ¹
Study period	
PRE period (REF)	
POST period	0.953***
Provider type	
Certified Centers (REF)	
Registered Family	1.201****
Certified Family	1.192****
License-Exempt Nonrelative	0.919
License-Exempt Relative	1.457****
License-Exempt Centers	0.645****
Metro or non-metro	
Metro (REF)	
Non-metro	0.943***
Child care slots per county population	0.995***
Income (in hundreds of dollars)	1.016****
Subsidy value (in hundreds of dollars)	1.034****
Race of child	
White (REF)	
Black	0.836****
All other races	1.024
Declined to answer	0.856****
Hispanic or Latino	
Not Hispanic or Latino (REF)	
Hispanic or Latino	1.052
Gender	
Female (REF)	
Male	1.009
Age Group	
Infant (REF)	
Toddler	1.447****
Three- and Four-year olds	1.377****
Five-year-Olds	1.265****
School Age	1.209****
Child welfare intervention	
No intervention (REF)	
At least one removal	0.885***
Early Intervention/Early Childhood Special Education (EI/ECSE)	
No Early Intervention (REF)	
Early Intervention	0.975
Covariates	
Change in primary employer	
No change (REF)	
Change from previous quarter	0.912****
Change in quarterly earnings from previous qtr. to current qtr.	
No or minimal changes (REF)	
Earnings loss of 33% or greater	0.809****
Earnings gain of 33% or greater	0.649****

*** $p < 0.001$, **** $p < .0001$; REF = reference group. See footnote 1 for how to interpret Relative Time.

Provider Study Methods

Defining the Sample

The initial dataset included 11,514 unique providers who had participated in the Employment-Related Day Care (ERDC) subsidy program during the study period. The PRE period includes two years prior to CCDF Rule implementation (FFYs 2015-2016) and POST period covers two years after implementation (FFYs 2018-2019). The final analytic dataset for the descriptive comparisons included all providers who had at least one billing month in the PRE or POST period (8,768 in the PRE period, and 5,501 in the POST period).

To address the questions around stability of provider participation, the study sample was reduced to exclude providers who only had Temporary Assistance to Needy Families (TANF) child care billing months as this population of providers had shorter months of participation overall, and may interact with the program differently than those engaging with families experiencing the ERDC policies. The stability-focused analyses included 13,789 providers (8,386 in the PRE period and 5,403 in the POST). Of these, 2,751 (25%) were providers that appeared in both the PRE and the POST datasets.

Variable Details

To give equal weight to providers of all sizes and participation rates, the data were aggregated for each provider variable by using averages within the study period. For example, although 76% of providers cared for 1-10 subsidy children during the study period, 5% cared for over 100 subsidy children. In addition, some providers only appeared in the data for one month of billing, while others billed for all 24 months in each study period.

The following describes each of the variables in the provider analytic models.

- *Participation in the program* was defined as the number of months billed in each study period. Provider-level participation was between 1-24 months per study period. We chose to look at a provider's total monthly participation within the study period instead of continuous unbroken participation length. The resulting variable exhibited a degree of overdispersion, so was modeled as a truncated negative binomial distribution.
- *PRE/POST* was a dichotomous value defining the study period. The provider was identified as PRE if they had at least one billing within FFY 2015 and 2016 (October 2014 and September 2016), and POST if they had a at least one billing in FFY 2018 and 2019 (October 2017 to September 2019). Providers could appear in both PRE and POST periods.
- *Provider type* denotes the primary providers care type, types which are also grouped into licensed and license-exempt groups. Licensed provider types include: Certified Center, Certified Family, and Registered Family. License-exempt provider types include: License-Exempt Nonrelative, License-Exempt Relative, and License-Exempt Center.

- About 20% of providers in the study sample changed their type of care throughout the study period. The Oregon Department of Human Services (ODHS) provider number generally served as a constant unique ID, regardless of provider type changes. To allow for a PRE and POST comparison by provider type, each provider was assigned to a single type of care per study period. For those providers with more than one type of care over time, their type of care was based upon the last billing entry in each study period.
- *Payment* was defined as the average payment dispensed to a provider from all child-month billing submissions in one study period, in US dollars.
- *Hours* was defined as the average number of hours billed by providers for all child-month billing submissions in one study period.
- *Average number of children served* was defined as the average number of children a provider cared for within a study period, averaging across all months the provider received a payment.
- *TANF* was defined if the provider cared for child(ren) with TANF benefits in at least one month of the study period. (Note: a family had to have received benefits because of employment (ERDC) to be included in the study, but that family may have also received benefits due to participation in TANF in a different spell).

The following describes each of the variables in the provider descriptive analysis. For descriptive analysis results, see the main report: *Evaluating CCDBG in Oregon: Impact of the 2014 Act on Children, Families, and Providers Final Report*.

- *Spark participation* indicates if the provider participated in Spark, Oregon's Quality Rating Improvement System (QRIS), during the study period. Participation levels range from C2Q (commitment to quality), 3, 4, and 5 stars. This information is only available for licensed care.
- *Provider step level* indicates the level of attainment on the state's professional development recognition registry. For Certified Centers, this includes whether the director and a percentage of program staff are at or above a specific step level. For Certified Family and Registered Family providers, this is whether the provider is at or above a specific step level. This information is only available for licensed care.
- *Provider education* indicates the provider's educational attainment of an associate's degree or higher. For Certified Centers, includes whether the director and a percentage of program staff have an associate's degree or higher. For Certified Family and Registered Family providers, this is the percent of providers with an associate's degree or higher. This information is only available for licensed care.
- *Training hours* indicates the total number of training hours completed by the provider. For Certified Centers, this reflects the percentage of program staff with a specific number of training hours completed. For Certified family and Registered Family providers, this is the percent of providers who have completed a specific number of training hours. This information is only available for licensed care.

Analysis Details for Predicting Total Months of Subsidy Participation

A logistic regression model approach was used to model predictors of the total cumulative months of provider participation in the program over the study period; total cumulative months was the outcome variable. Models accounted for clustering because providers could be included in both PRE and POST study periods. Since many providers had two observations per variable, the data were analyzed using a Generalized Linear Mixed Models approach, with ODHS provider number modelled as a random intercept to account for within subject correlated data. The model was fit using a truncated negative binomial distribution and model selection was conducted using Akaike Information Criterion (AIC) scores to determine the most parsimonious model, with all models with 2 AIC units considered for explanatory power. The models were run separately for licensed and license-exempt provider groups to evaluate potential differences in what predicted fewer months of participation across these two groups.

Provider Study Analysis Results

To measure the length of provider participation in the program, the data were modeled the data to compare cumulative months of provider participation in the PRE vs. POST period.

All statistically significant findings are described in the list below:

- *PRE/POST*. License-exempt providers had a 5% decreased likelihood of subsidy participation in the POST period when compared to the PRE period and holding for all other terms in the model. There was no measurable difference between licensed providers in the PRE or POST during this same period.
- *Average number of children served*. Each additional child that a provider cared for monthly increased participation likelihood by 2% for Registered providers and by 9% for the Unregistered providers, with all other factors controlled in the model.
- *Hours*. Each additional 10 hours per month of provider care increased the likelihood of provider participation, with all other factors controlled in the model. There was a 2% increase in likelihood for Unregistered Providers and a 4% increase in likelihood for Registered Providers.
- *Type of provider*. For licensed providers, compared to the reference group of Certified Centers, Certified Family providers showed no measurable difference in participation length. Registered Family providers had a 5% higher likelihood of participation than Certified Centers, controlling for all other factors in the model. For license-exempt providers, compared to the reference group of Exempt Centers, Exempt Relatives showed no measurable difference in participation length. Exempt Nonrelatives had a 24% lower likelihood of participation than Exempt Centers, controlling for all other factors in the model.
- *Payments*. Monthly payments made to the provider were found to be significant for license-exempt providers only, where each increase of \$100 made to the provider increased the likelihood of participation by 10%. Licensed providers

showed no measurable difference in likelihood of participation with payment increases, controlling for all other factors in the model.

- *TANF*. Providers with at least one child with TANF subsidies had a longer likelihood of staying in the program compared with providers without TANF children in the program, based upon monthly participation and holding all other factors constant in the model. The likelihood of participation increased by 36% for licensed providers and 45% for license-exempt providers.

Table 3. Predictors of Provider Participation Over Time

	Licensed Provider Type N = 4,914	License-Exempt Provider Type N = 9,355
Study period		
PRE (REF)		
POST	1.00	0.95**
Average number of children	1.02***	1.09***
Hours (in units of 10 hours)	1.04***	1.02***
Provider type		
<i>Licensed</i>		
Certified Center (REF)		-
Certified Family	1.01	-
Registered Family	0.95*	-
<i>License-Exempt</i>		
Exempt Center (REF)		
Exempt Nonrelative	-	0.76**
Exempt Relative	-	0.99
Payment (in hundreds in dollars)	1.00	1.10***
TANF & ERDC participation		
Only ERDC (REF)		
TANF & ERDC	1.36***	1.45***

* $p < .05$, ** $p < 0.01$, *** $p < 0.001$; REF = reference group.

Reference

Pratt, M., Weber, R. B., & Wohner, M. (2023). *Evaluating CCDBG in Oregon: Impact of the 2014 Act on Children, Families, and Providers Final Report*. Retrieved from https://health.oregonstate.edu/sites/health.oregonstate.edu/files/early-learners/pdf/research/ccdbg_in_oregon_final_report.pdf