



# DSHS | Predictors of Out-of-Home Placement

REPORT 5.34 | Report for Division of Developmental Disabilities



## Predictors of Out-of-Home Placement Among Children with Developmental Disabilities

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The Washington State Department of Social and Health Services, Division of Developmental Disabilities (DDD) was directed by the Governor to design, implement, and manage a new Intensive Behavioral Support Services program beginning in FY 2009. The intent of this new program is to provide services for families of children as a preventive alternative to out-of-home placement or institutionalization. DDD contracted with the Research and Data Analysis Division to establish an out-of-home risk prediction model using DDD assessment information to support decision making about which children will receive these services.

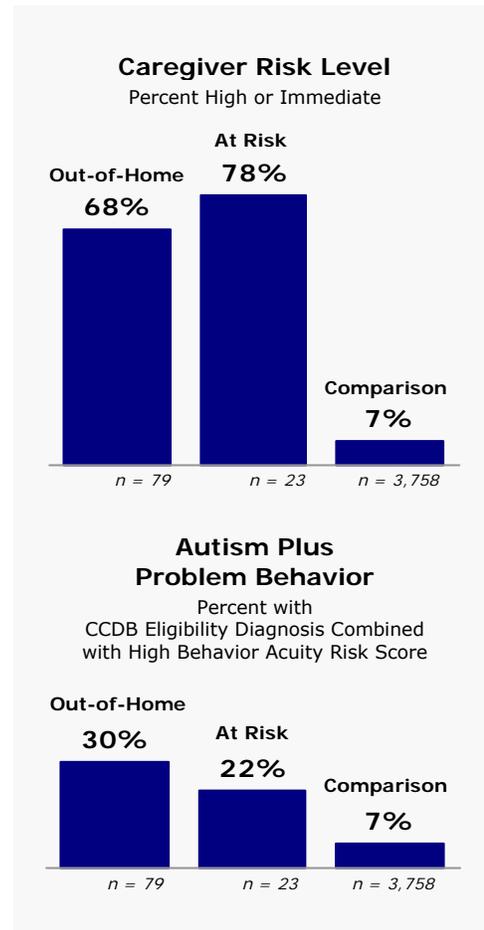
### Key Findings

Significant predictors of out-of-home placement are listed below with the prevalence of the two strongest predictors illustrated for three study populations in the adjacent charts:

- Caregiver risk is high or immediate.
- A diagnosis of autism combined with behavior problems.
- Prominent problem behavior involves severe assaults or injuries.
- Supervision need level is line of sight or within earshot
- No backup caregiver is available.
- No or minimal Activities of Daily Living (ADL) or mobility support is indicated.

### Recommendations

- Implement presented algorithm for generating out-of-home placement risk scores based on assessment responses.
- Prioritize DDD clients for Intensive Behavioral Support Services based on a combination of clinical judgment and risk scores.
- Pilot this approach with existing assessment information and re-assess the model.
- Continue to monitor psychometric properties (e.g., reliability, validity) of acuity scales over time.



## Background

### Children's Intensive In-home Behavioral Support Program (CIIBS)

The State of Washington Department of Social and Health Services, Division of Developmental Disabilities (DDD) offers a comprehensive range of services for eligible clients needing skill development, behavior support and/or intensive nursing care. In May of 2007, Governor Gregoire expressed concern regarding the growing number of institutional placements of children in Residential Habilitation Centers (RHC) in lieu of adequate funding for in-home supports (see Appendix—Governor's memo).

The Governor's Directive of 2007 indicated a clear priority for "placing children with disabilities in least restrictive settings" and the Governor's proposed budget for FY 2009 allocated funding to administer "Intensive Behavior Support Services" to reduce the need for out-of-home placement. In planning the implementation of this process, DDD completed a study of other states and recommended a model based on Oregon's Children's Intensive In-home Services (CIIS) for children with intensive support needs. This waiver-based preventive approach required a method for identifying children at high risk for out-of-home placement and allocating service funds accordingly. Oregon's CIIS program uses the presence of several factors in a behavioral scoring process to determine receipt of an in-home services waiver.

In Washington, Substitute Senate Bill 6448 (SSB 6448), as proposed, directed DDD to use a federal waiver process to provide services for families of children as a preventive alternative to out-of-home placement or institutionalization. Although SSB 6448 did not pass, funds were allocated to create the specified Children's Intensive In-home Behavioral Support Program (CIIBS) as follows in the revised omnibus operating budget conference proposal:

Funding is provided for a new waiver program for children with developmental disabilities who are at risk of being institutionalized as a result of intense behaviors. The Division of Developmental Disabilities' new comprehensive assessment tool will identify families who are eligible for Home and Community Based Services and who are most likely to request an out-of-home placement for their children. The families of eligible children will receive coordinated in-home support services, such as minor home or vehicle adaptations, respite, therapies, and intensive behavior management training for the family, other caregivers, or school staff. The funding reflects a phase-in of services for up to 100 families. (General Fund-State, General Fund-Federal) *Ongoing*

CIIBS is thus funded to serve up to 100 children, phased in over the next three years beginning in fall 2008. The major goal of this project was to use a population-specific, data-based approach to prioritize children for the CIIBS waiver allocation program.

## Method

### Study Populations

#### *Out-of-Home Group*

The main outcome of interest was out-of-home placement. For purposes of this project, out-of-home placement was defined as living in a Residential Habilitation Center (RHC) or staffed residential/supported living facility. RHC facilities include Fircrest School, Rainier School, Frances Haddon Morgan Center, Yakima Valley School, and Lakeland Village. Staffed residential group homes accommodate children who have complex or extreme behaviors and who may be too challenging for family or foster home care.

Children receiving staffed residential services were included in the out-of-home group for these analyses based on the assumption that circumstances leading to such placement are very similar to those of children placed in RHCs. Clients who were living in one of the listed RHCs or a Staffed Residential group home during the timeframe of data collection for this study (January 15 to March 15, 2008), or who had been in such a living arrangement in the two years prior, were considered to be out-of-home for purposes of these analyses.

DDD provided RDA with a list of RHC clients. RDA staff confirmed RHC or Staffed Residential placement via consultation with DDD program management and regional staff and through review of the DDD Case Management Information System (CMIS; includes data fields formerly in CARE and CCDB). Clients who were placed out of the family setting for three years or longer were removed from the analyses, as it was assumed assessment information would be outdated and parental recollection of specific caregiver and sleep issues would be inaccurate. A retrospective perspective was taken in assessing care giving challenges for these children (see Assessment Data section below). Children in the out-of-home group were more likely to be male and to be age 13-17 than children in the comparison group ( $p < .05$ ).

### Comparison Group

Based on existing administrative data, DDD constructed a comparison pool of 4,772 children under the age of 21 years with completed assessments. Preliminary analyses indicated that the comparison pool represented a younger population than the out-of-home or at risk children (see below), with 18 percent of the comparison pool under the age of 8 and 7 percent age 4 and younger. As the younger children were not likely to be placed out of home, RDA limited its analysis to 8-20 year-olds. Additionally, since assessments occurred subsequent to placement in many out-of-home cases, date of admission was used to calculate age for the out-of-home group, while date of assessment was used to calculate age for the comparison group. After limiting analyses to children ages 8-20 and removing those in the out-of-home or at risk groups as well as those with incomplete or insufficient data, 3,758 remained in the comparison condition.

### At Risk

In addition to children in RHC and staffed residential placements, DDD identified a group of children designated as being at risk of out-of-home placement according to a list compiled by each region. The "At Risk" designation represents clinical judgment and has not been validated with a gold standard assessment instrument. Bivariate analysis indicated that, with the exception of age, children in the at-risk group were demographically similar to children in the out-of-home placement group. The at-risk group tended to be older than the comparison group and younger than the out-of-home placement group.

### Profile of the Populations

	Out-of-Home	At Risk	Comparison
	n = 79	n = 23	n = 3,758
<b>Age*</b>			
8-12	16%	39%	32%
13-17**	66%	48%	34%
18-20	18%	13%	34%
<b>Sex</b>			
Male**	73%	74%	62%
Female	27%	26%	38%
<b>Race/Ethnicity</b>			
Native American/Alaska Native	2%	4%	3%
Asian/Pacific Islander	5%	9%	7%
Black or African American	9%	9%	7%
White	84%	78%	83%
Unknown	0%	0%	<1%
<b>Hispanic</b>	6%	9%	10%

\*Age calculated for age at time of assessment for comparison group and admission to current placement for out-of-home group

\*\*Out-of-Home > Comparison (p < .05)

### Assessment Data

DDD administers full assessments to all clients to identify and measure support needs and those data are entered into the CARE data system, now subsumed by the Case Management Information System (CMIS). However, not all assessment modules are required for all clients. As such, some procedures were implemented to complete the projected data needs for this project. For example, the Caregiver and Sleep items are not typically administered for clients already placed in RHC or Staffed Residential living situations. As these were considered potentially important predictors in our model, a procedure was set in place to administer these scales retrospectively.

Following communication (see Appendix – letter to parents) to relevant caregivers and case managers, a DDD Assessor contacted parents of those clients with missing caregiver (n=4 for RHC, n=29 for staffed residential) or sleep screens (n=3 for RHC, n=26 for staffed residential) and administered those via telephone. Additionally, there were 23 sleep screens and two caregiver screens that needed to be administered for the at-risk group. These were also administered via telephone by DDD headquarters staff or by DDD Field Staff. Scripts were utilized to standardize this process and to emulate the typical DDD assessment procedures as closely as possible (see Appendix – Scripts).

For clients in RHCs or staffed residential facilities with assessments that were due to be completed by the end of the study period (March 15, 2008) or that were missing, Case Resource Managers (CRM) administered full assessments, with caregiver and sleep screens included as supplemental modules. For individuals placed out-of-home (RHC, Staffed Residential), parents or caregivers of these children were asked to report such information retrospectively for the period of time "immediately prior to placement." Required assessment components were entered into CARE and supplemental screens were entered into a separate project data set.

DDD extracted CMIS data sets for the out-of-home, at risk, and comparison conditions and RDA combined these data with the supplemental information described above. For clients with multiple assessments, data from the most recent assessment were used in the analyses.

## Predictors

DDD research and program staff identified likely predictors of placement. Early in this study, the DDD assessment acuity scales, as well as other factors such as CCDB eligibility diagnosis (such as mental retardation, cerebral palsy, autism) and sleep difficulties, were identified as likely predictors of out-of-home placement. The acuity scales take into account a wide range of psychosocial and medical issues; behaviors (such as destruction of property, self-harm); strengths (such as independent mobility, attend school/work outside the home); and caregiver stressors, with calculated summary scores that are easily inserted into statistical analyses. Later in the study RDA learned that the Sleep Scale was not a required module and, therefore, there were very few Sleep Scales completed for the comparison group. As a result, RDA was unable to include this scale in the regression model.

## Results

Because the goal was to identify predictors of out home placement, we used a population-level regression analysis rather than a case-control (matching) approach. Initially a direct logistic regression was used to identify the assessment elements that are most predictive of out-of-home placement for children. It was determined that a linear probability model would generate similar results and would provide a more user friendly risk scoring algorithm. The predictors entered into the final model are presented in the regression table below, along with regression coefficients, standard errors, and p-values.

Due to the small size of the out-of-home population, it was necessary to reduce the number of predictors by using a bivariate approach prior to the regression to avoid over-fitting the model. Frequencies and completeness of data for predictors were assessed. In the assessment algorithm, scales or items may not be generated depending on factors such as eligibility status, diagnostic criteria, or age. In general, null values were considered as an additional response level for the predictor variables. Additionally, levels of predictor variables were collapsed (e.g. low and medium; high and immediate) when deemed appropriate to compensate for small cell sizes. The Activities of Daily Living (ADL), Interpersonal Support (ISP), and Mobility child and adult acuity scales were combined based on information from DDD that levels are comparable for both versions. Autism was combined with high behavior acuity to improve on the predictive value of CCDB diagnosis alone. Mental retardation was a significant but unstable predictor in preliminary models and was ultimately removed from the final model.

In addition to the acuity scales and diagnostic information, bivariate analyses revealed that assaults and injuries identified as prominent problem behaviors were more likely for the out-of-home children. Further exploration indicated that only those with "severe" levels of such behavior (defined as a rating of potentially dangerous or life threatening) should be considered in this category. Therefore a binary predictor was created that indicates the presence of assaultive/injurious behavior at the severe level. Additionally, in a preliminary analysis, the age adjusted scoring for the Protective Supervision acuity scale rendered a model favoring 18-20 year-olds simply due to age. Therefore, the unadjusted Protective Supervision scale was used to create a binary variable that made sense clinically (supervision need level of Line of Sight/Earshot versus Not). The at-risk group appeared more likely to have reported need for physical restraint or in sight assistance (70 percent) compared to both the out-of-home (46 percent) and comparison (22 percent) groups. However, this variable did not emerge as a significant predictor, possibly due to small cell sizes and/or timing of the assessment for the out-of-home children.

## Bivariate Analyses

Predictors						
	Number with Risk Factor (%)					
	At Risk n = 23		Comparison n = 3,758		Out-of-Home n = 79	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
<b>CCDB Eligibility Diagnoses:</b>						
Autism*	5	22%	577	15%	38	48%
Mental Retardation	7	30%	1,706	45%	35	44%
Cerebral Palsy	1	4%	533	14%	4	5%
Developmental Delay	1	4%	201	5%	0	0%
Another Neurological Condition	2	9%	133	4%	1	1%
Down Syndrome	0	0%	28	1%	0	0%
Epilepsy	0	0%	127	3%	0	0%
Other Condition*	7	30%	889	24%	9	11%
<b>Acuity Scales and Behavior:</b>						
ADL Acuity – Any*	23	100%	3,588	95%	66	84%
Behavior Acuity – High*	9	83%	1,193	32%	43	54%
Assault/Injury-Severe*	10	43%	265	7%	18	23%
In Sight Assistance/Physical Restraint*	16	70%	810	22%	36	46%
Medical Acuity – High*	11	48%	1,466	39%	21	27%
Seizure Acuity*	5	22%	1,067	28%	14	18%
Interpersonal Support Acuity - High	20	87%	2,567	68%	57	72%
Protective Supervision – Line of Sight*	18	78%	1,793	48%	60	76%
Caregiver Acuity – High/Immediate*	18	78%	277	7%	54	68%
No Backup Care*	9	39%	480	13%	39	49%
Mobility Acuity – Any*	13	57%	2,160	57%	32	40%

\*differences between Out-of-Home and Comparison (p < .05)

## Regression Results

All of the predictors in the final model were statistically significant (p < .05) with the exception of Assault/Injury-Severe, which approached statistical significance at p = .096. Predictor coefficients indicate that Caregiver Risk (B= .136) levels of high or immediate and Autism with behavior problems (B = .037) are the most powerful positive predictors of out-of-home placement.

## Predicting Out-of-Home Placement

Linear Probability - Final Model			
<i>n = 3,837 R<sup>2</sup> = .12</i>			
Variable	Parameter Estimate	Standard Error	p
Intercept	0.054	0.010	<.0001
(ADL Acuity – Any)	-0.054	0.011	<.0001
Assault/Injury Severe Behavior	0.014	0.008	0.096
Protective Supervision Line of Sight	0.013	0.005	0.001
Caregiver Acuity – High/Immediate	0.136	0.008	<.0001
No Backup Caregiver	0.033	0.007	<.0001
(Mobility Acuity – Any)	-0.015	0.005	0.001
Autism with Problem Behavior	0.040	0.009	<.0001

Dependent Variable: Out-of-Home Placement Status (RHC or Staffed Residential)

## Risk Levels

Based on the regression model and resulting coefficients, risk levels were defined and placements for each group were made depending on a total predicted risk score. The severe level represents the top 5 percent (95<sup>th</sup> percentile) of risk scores and high represents the next 5 percent (90-94<sup>th</sup> percentile). Based on the calculated risk scores, the children in the at-risk group were more likely to be placed into the high or severe levels than children in the comparison group.

Risk Level by Group						
	Number in Risk Level (%)					
	Out-of-Home n = 79		At Risk n = 23		Comparison n = 3,758	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
Low ( ≤ 79%)	12	15%	5	22%	3085	82%
Med-High (80-89%)	12	15%	0	0%	340	9%
High (90-94%)	10	13%	8	35%	192	5%
Severe (95-100%)	45	57%	10	43%	141	4%

## Age Distribution for Children with High and Severe Risk

The table below presents the number and percentage of children in each age category who have Severe and High risk scores and who may be likely candidates for a preventive intervention program. Detailed information on age for all risk levels is presented in the Appendix. Although age was not entered into the predictive model, risk information by age is pertinent for program planning purposes. Out-of-home children tend to fall in the 13-17 age range, as do children living in family settings who have high or severe risk scores.

Age for High and Severe Risk Categories				
Age	Risk Level by Age		Comparison and At Risk Group WITH HIGH OR SEVERE RISK SCORES	
	NUMBER	PERCENT	NUMBER	PERCENT
8-12	13	16%	86	25%
13-17	52	66%	145	41%
18-20	14	18%	120	34%

NOTE: The comparison and at risk group here represents only those with High and Severe risk scores.

Age Group	Out-of-Home (%)	Comparison and At Risk Group (%)
8-12 yrs	16%	25%
13-17 yrs	66%	4%
18-20 yrs	18%	34%

## Recommended Algorithm

The coefficients from the regression model were used to create an algorithm for generating an out-of-home placement risk score based on assessment responses. For ease of implementation, the intercept (a constant in this model) was dropped from the algorithm and subtracted from the cutoff scores. The risk score involves the simple tabulation of points associated with different assessed client characteristics, with the total points compared against thresholds that define the different risk levels.

Characteristics	Assessment	Points
<b>START</b>		<b>0</b>
Autism Diagnosis	Yes, and Behavior Acuity=High	ADD 40 points
ADL Acuity	High, Medium, or Low	<b>SUBTRACT 54 points</b>
Prominent Behavior = Assault	If level = Severe	ADD 14 points
Protective Supervision (not age adjusted)	Within Line of Sight/Earshot	ADD 13 points
Caregiver	High or Immediate	ADD 136 points
Backup Caregiver	No other caregiver available	ADD 33 points
Mobility Acuity	High, Medium, or Low	<b>SUBTRACT 15 points</b>
<b>TOTAL SCORE</b>		<b>###</b>

Then apply the score to determine the individual risk level:

Level	Risk Score
Severe	Greater than 96
High	17 to 95.99
Medium-High	<b>(-16) to +16.99</b>
Low-None	<b>(-16.01) or lower</b>

**Example 1:** A child who is assessed as below would receive a score of 122 and be placed in the Severe Risk category:

- A Caregiver Risk acuity of "High" (add 136 points),
- A CCDB eligibility autism diagnosis and behavior acuity scale score is "High" (add 40 points),
- An ADL acuity of High (**subtract 54 points**), AND
- Other indicators above are not present.

Therefore:  $136 + 40 - 54 + 0 = 122$

CAREGIVER RISK ACUITY    AUTISM WITH BEHAVIOR PROBLEM ACUITY    ADL ACUITY    ALL OTHER INDICATORS    **TOTAL**

**Example 2:** A child who is assessed as below would receive a score of 18 and be placed in the **High** risk category:

- No backup caregiver available (add 33 points),
- A Protective Supervision RAW score of 4 (PA05 = Onsite) (add 0 points),
- A Mobility Acuity scale level of "Medium" (subtract 15 points), AND
- All other remaining indicators above are non-existent.

Therefore:  $33 + 0 - 15 + 0 = 18$

NO BACKUP CAREGIVER    (RAW) PROTECTIVE SUPERVISION SCORE    MOBILITY ACUITY    ALL OTHER INDICATORS    **TOTAL**

## Discussion

### Conclusions and Recommendations

The present study was conducted to establish an algorithm for allocating funds for DDD services. The risk of out-of-home placement is highest when the Caregiver Risk acuity scale is scored at the high or immediate level and when a CCDB eligibility diagnosis of Autism is present combined with high behavior acuity. Caregiver risk emerged as highly predictive, reflecting high levels of caregiver and family stress, barriers such as other work and care giving responsibilities, and possible health issues among caregivers prior to the placement of their children in RHCs or Staffed Residential facilities. Other important positive predictors in the model for out-of-home placement were: no available backup caregiver, severe assaultive/injurious prominent behavior, and protective supervision level of line of sight/within earshot (not age adjusted).

Mobility and ADL predictors were in the reverse direction, which means that children with such difficulties are *less likely* to be placed out-of-home. This may be due to additional resources available for DDD clients with established medical and/or mobility challenges. It also may be that that parents are able to cope longer with children who are unable to move around freely and therefore less able to act out physically (e.g. run away, destroy property).

Implementation of this risk-scoring algorithm is only *one component* of the information used to assess clients for services and DDD should proceed with caution for several reasons. Assessment data used in this analysis were limited to assessments administered after June of 2007. In the future, data for the acuity scales will be much more complete and analysis of the consistency in scale scores over time will be possible. Given that some assessments were administered after the admission of a child to an RHC, it is not possible at this time to determine whether scores and diagnoses would have been the same as before such placement.

Sleep and sleep difficulties were mentioned early on in the study as potentially important predictors of out-of-home placement. As the Sleep screen was not administered to the majority of DDD clients, we were unable to include Sleep as a predictor. If the Sleep scale is added as a required assessment component in the future, such an analysis would be possible. Alternatively it is possible that the Sleep scale is an additional means of gathering information directly and indirectly related to caregiver stress, or may otherwise turn out to be a non-significant predictor for various reasons. Only by requiring the sleep screen to be completed for all DDD clients can the significance of this predictor be determined.

We recommend that DDD pilot test this model on a group of DDD clients prior to formal implementation of a waiver algorithm. For example, the algorithm could be applied to a sampling of 10-20 DDD clients with results compared to clinical knowledge. Algorithm risk levels could then be compared to case managers' clinical recommendations and reasons for differences in findings would be analyzed and discussed. This corroborative approach would add justification for use of the algorithm for current program implementation and may also generate a list of new predictors to analyze in the future.

Furthermore, as the CMIS/CARE assessment modules and acuity scales are relatively new and there will be clients with data from multiple assessments in the future, an investigation of the validity and reliability of the acuity scales over time in predicting out-of-home placement is recommended. Additionally, a larger group of at risk children is needed to test the application of the model to this group. For the at risk children, it is important to look at the descriptive statistics for characteristics that may change if assessed while institutionalized such as behavior acuity and physical restraint. Such factors should be analyzed again in the future when assessment data over time are available.

Finally, this short list of predictors does not account for all of the variability in out of home placement and there may be factors pertaining to safety and/or eligibility that have not been accounted for in this model. Therefore, it is very important that clinical judgment play a major role in determining allocation of preventive services.

An APPENDIX to this study is available, as well as an electronic version of the REPORT at:  
<http://www1.dshs.wa.gov/RDA/>

