June 2016

Continuity of Subsidized Child Care in Maryland: Does Center Accreditation Make a Difference?

Research Brief

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Introduction to the Maryland Child Care Administrative Data Analysis Cooperative Agreement

This research brief was developed as part of the Maryland Child Care Administrative Data Analysis Cooperative Agreement (MD CCADA). The goal of the MD CCADA is to use research to refine policies and practices in order to facilitate greater continuity and stability in subsidized child care, thereby making services more family-friendly and supportive of positive child outcomes. To achieve its goal, the MD CCADA is using child care subsidy administrative data from June 2007 onward to address three research objectives:

(1) describe longitudinal patterns in the continuity of subsidy spells and identify differences in these patterns by child, family, and community characteristics;

(2) examine the association between use of high-quality care and continuity in subsidized care arrangements; and

(3) examine whether Maryland's shift to a private, centralized subsidy case management system is associated with changes in the length of eligibility periods as well as voucher length.

This research brief presents findings related to the second research objective. The findings from the MD CCADA will have implications for children, parents, and child care providers, as well as policymakers at the state and federal level. In addition, the MD CCADA aims to contribute to research methodology for child care subsidy research by applying advanced statistical techniques to the analysis of child care subsidy data.

INTRODUCTION

Stable child care supports children's positive development. Researchers have found greater cognitive development among children who stay in one child care arrangement longer.[1] In contrast, children who experience many changes in their child care arrangements are more likely to display internalizing behavior problems, such as anxiety.[2] Having unstable child care arrangements may also make it difficult for parents to maintain their jobs.[3]

In Maryland, child care subsidies (*vouchers)* help low-income families who are working, in job training, or obtaining education pay for child care. Subsidized arrangements tend to be short: From 2007-2014, half of all subsidized arrangements had ended within 21 weeks.[4] Given the importance of stable care for children's development, the short length of subsidized arrangements may be a cause for concern.

This study examines center-based child care arrangements that were subsidized through Maryland's Child Care Subsidy Program. We investigate whether child care arrangements at accredited child care centers—where providers met a set of standards based on research and best practices—were longer (or shorter) than arrangements at non-accredited child care centers. Using propensity score techniques, comparable groups of accredited and non-accredited center-based arrangements were created and compared.

KEY FINDINGS

Across all subsidized arrangements, we found that children at accredited centers stayed in their arrangements for a slightly shorter period than children at non-accredited centers (see "Key definitions" box below). However, results varied:

- Preschoolers and school-aged children's arrangements were longer when the center was not accredited. In contrast, the length of time that infants and toddlers stayed in their arrangements was not associated with the center's accreditation status.
- We also compared families with different co-payment rates, which are fixed fees based largely on family income (see "Key definitions" box below). When

Child Trends Publication # 2016-14

families had a high co-payment, children stayed in non-accredited arrangements longer than accredited arrangements.

- Children stayed in non-accredited arrangements longer when they lived in counties with lower levels of risk factors that can potentially affect child outcomes, such as low levels of poverty and better maternal and child health.

Findings from this study suggest that low-income families may face a trade-off between high-quality child care and stable child care. Although we do not know why families in the study had shorter subsidized arrangements when the arrangements were accredited, one possibility is that families may have paid higher out-of-pocket fees for accredited care. In Maryland, child care centers can charge families the difference between the subsidy reimbursement rate and the regular center rate, on top of the family's co-payment. If the high cost of quality care is passed on to parents, it may be difficult for parents to afford these arrangements long-term. Future research is needed to better understand parents' reasons for ending subsidized arrangements across varying levels of child care center quality.

KEY DEFINITIONS

Accredited care: Child care in which the provider meets a set of standards set forth by an accrediting agency; standards are based on research and best-practice recommendations for early care and education and/or school-aged care. Child care centers in the present study could be accredited by Maryland's own accrediting program or by a national organization, such as the National Association for the Education of Young Children (NAEYC).[a]

Subsidized care arrangement: The period of time during which a child continuously attended a child care center *and* that care was funded through Maryland's Child Care Subsidy Program. For the purpose of analyses represented in this brief, a subsidized care arrangement started the first week that a child care center received a payment from the subsidy program, and ended when the center had not received a payment for any of the subsequent four weeks.

High-risk and low-risk counties: Categorization of Maryland's counties based on 10 risk factors that have been linked to poor developmental outcomes for children, such as the percentage of children under age 5 living in families below the federal poverty level, and the percentage of low birthweight infants. Risk levels were determined in the *Maryland Early Childhood Risk and Reach Assessment*.[b] Additional details are provided in the technical appendix.

High co-pay and low co-pay: Categorization of children participating in the Maryland Child Care Subsidy Program based on their family's co-payment ("co-pay") level. Maryland has a sliding co-pay scale based on family income level. Children in the "low co-pay" category had no co-pay (Income Level X) or the lowest co-pay (Income Level A). Children in the "high co-pay" category included children with higher family incomes (Income Levels B –J). The co-pay is a fixed rate, rather than a percentage of the cost of the selected child care.[c]

Age group: Categorization of a child into one of four groups based on their age at the start of a subsidized care arrangement: infant (younger than 16 months), toddler (16 months - 31 months), preschool (32 months - 59 months), school-aged (60 months - 155 months)

[a] NAEYC (2014). *NAEYC Early Childhood Program Standards and Accreditation Criteria & Guidance for Assessment*. Washington, DC: NAEYC. Retrieved April 5, 2016 from http://www.naeyc.org/files/academy/file/AllCriteriaDocument.pdf

[b] Daily, S., Welti, K., Forry, N., & Rothenberg, L. (2012). *Maryland Early Childhood Risk and Reach Assessment*. Child Trends Publication #2012-41. Washington, DC: Child Trends.

[c] Within each income level, the co-pay varies by child birth order, provider type (i.e., center, family child care, or informal provider), child age, family income, and market (geographical) region of the state.

BACKGROUND

Stable care supports children's positive development. Children who experience fewer changes in their child care arrangements tend to develop more secure attachments with caregivers and have fewer internalizing problems (i.e., anxiety, withdrawal).[5] Stability of center-based care may also support cognitive development. Researchers have found that low-income 4-year-olds who had attended their current child care setting for more months had greater cognitive growth, compared to children who had been in their current setting for just a short time.[6] Short-term child care arrangements may therefore jeopardize the social and cognitive development of Maryland's low-income children. Having unstable child care arrangements may also make it difficult for parents to maintain their jobs.[7]

In Maryland, child care subsidies (*vouchers)* help low-income families who are working, in job training, or obtaining education pay for child care. The Maryland State Department of Education (MSDE) administers the Child Care Subsidy Program, but case management services for families are provided through local Departments of Social Services. Note that Maryland shifted all case management services to a private, centralized contractor in December 2015. In January 2016, families receiving Temporary Cash Assistance returned to case management at local Departments of Social Services. All data for the present study were collected prior to these changes.

Families that receive child care subsidies in Maryland have the freedom to choose their preferred child care provider(s), but the quality of providers varies widely. For example, while some child care centers in Maryland are accredited, the majority are not.[8] It is not known whether higher-quality providers are associated with continuity of subsidized arrangements. In general, child care providers in Maryland report that a major challenge in supporting subsidized children's school readiness is the lack of continuity in these children's care due to loss of subsidy.[9] From 2007 to 2014, half of all subsidized child care arrangements in Maryland had ended within 21 weeks.[10]

The nature of the association between high-quality care and continuity of subsidized care arrangements is still not fully understood; at least two competing hypotheses exist. On the one hand, using higher-quality providers might lead to more stable arrangements. For example, higher-quality providers might help parents to complete regular paperwork necessary to maintain their subsidy. Higher-quality providers might also create a satisfying arrangement that parents put more effort into maintaining. On the other hand, high-quality care can be expensive.[11] In Maryland, child care centers can charge families the difference between the subsidy reimbursement rate and the regular center rate. If the high cost of quality care is passed on to parents, it may be difficult for parents to afford these arrangements long-term.

About this study

This study sought to answer the following question: On average, do children using subsidized, center-based child care have longer arrangements when the centers are accredited? We also investigated whether accreditation status had the same effect in certain subgroups that are of particular interest to MSDE and case managers: different age groups (infants, toddlers, preschoolers, and school-aged children), different co-pay levels, and counties with different levels of risk. Details on these subgroups are provided in the "Key definitions" text box.

Measures of observed quality were not available in the administrative data. In the absence of such measures of quality, the child care center's accreditation status was used as a proxy for quality in this study. Programs that are accredited by organizations such as the National Association for the Education of Young Children (NAEYC) are considered to be high-quality, as they must meet standards for teacher and staff qualifications, the physical learning environment, curricula, and/or family engagement.[12]

METHODS

Data

The data for this study are child care subsidy administrative data from the state of Maryland which include weekly information on subsidy receipt between June 25, 2007 and September 28, 2014. Because child care centers are more likely to be accredited than family child care or informal arrangements, we restricted the sample to center-based arrangements.

For our purposes, subsidized arrangements started the first week that a child care center received a payment from Maryland's Child Care Subsidy Program. Subsidized arrangements ended when the center had not received a payment for any of the subsequent four weeks. The data included 117,194 unique arrangements for 60,866 children. Arrangements that began before June 25, 2007 are not included in our sample because the length of the spell could not be known. Note that a child's arrangement did not necessarily end once the payments stopped; a child may have continued to attend a child care center without a subsidy payment.

Propensity scores and survival analysis

Of the 117,194 unique arrangements in our sample, 8.5% were accredited. We used a statistical adjustment known as propensity score weighting to ensure that accredited and non-accredited arrangements represented similar types of children and families. This adjustment accounts for a host of characteristics, including when the arrangement began, child's county of residence, and child and family demographics.

Once we created similar groups of accredited and non-accredited arrangements, we conducted survival analysis to determine the median length of accredited and non-accredited arrangements. We also tested whether the difference in length was statistically significant while controlling for a number of child and family characteristics. Survival analysis allows us to measure how long an arrangement may last even if we do not observe the end of that arrangement.

For a more detailed description of the propensity score techniques and survival analysis used in this study, please see the Technical Appendix at the end of this brief.

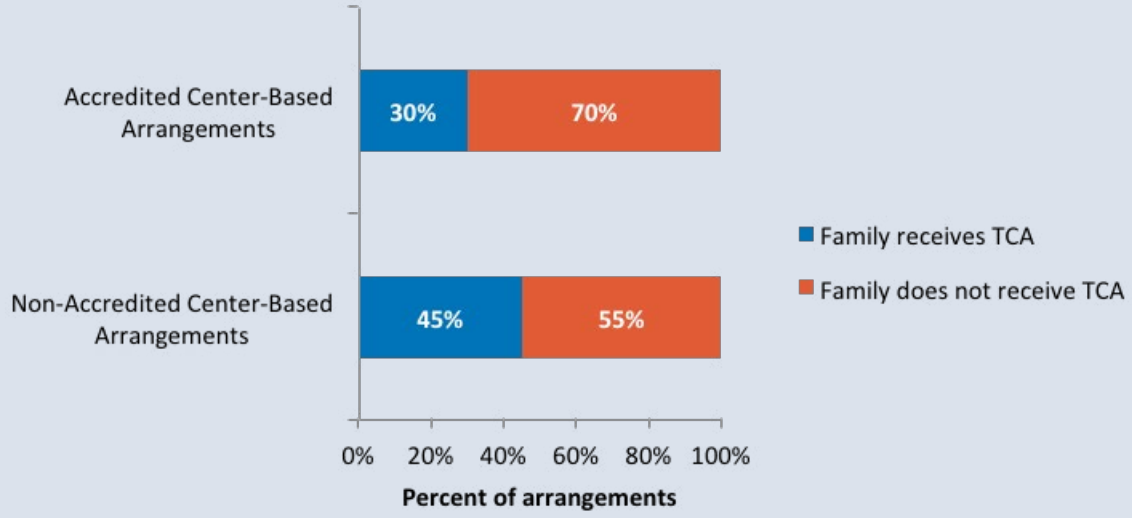
FINDINGS

Differences between children in accredited and non-accredited arrangements, prior to weighting

Before adjusting the data using the propensity score weighting, we first compared children in accredited arrangements to children in non-accredited arrangements. As expected, there were some important differences between these children.

Some child and family characteristics were overrepresented in non-accredited arrangements. Black children, families with low subsidy co-pays (an indicator for very low income), and families receiving Temporary Cash Assistance (TCA) were overrepresented in non-accredited arrangements. Children from Prince George's County, Baltimore County, and Baltimore City were also overrepresented in non-accredited arrangements, reflecting the fact that the availability of accredited care varies greatly across counties in Maryland.[13] Figure 1 illustrates the overrepresentation of families receiving TCA in non-accredited arrangements.

Figure 1. Children receiving Temporary Cash Assistance (TCA) were overrepresented in subsidized arrangements that were not accredited.



Source. Authors' calculations based on Maryland child care subsidy administrative data.

Other child and family characteristics were overrepresented in accredited arrangements prior to weighting. Children from Talbot, Frederick, and Montgomery counties were overrepresented in accredited arrangements, as were white children.

Full details on the differences between children who attended accredited and non-accredited arrangements are provided in Appendix Table A2.

Comparing the length of accredited and non-accredited arrangements

After applying propensity score weights to create more similar groups of accredited and non-accredited arrangements, we compared the length of both types of arrangements.

Overall, accredited subsidized arrangements were shorter than non-accredited subsidized arrangements. As shown in Table 1, half of all non-accredited subsidized arrangements had ended by 20 weeks. In contrast, half of all accredited subsidized arrangements had ended by 18 weeks.

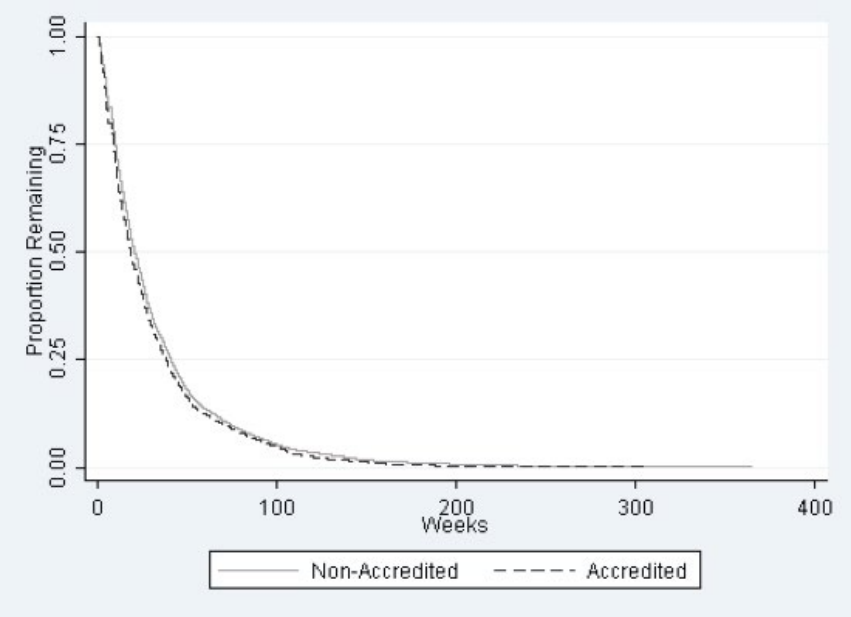
Table 1. Length of subsidized arrangements by accreditation status

Sample	Median arrangement length (weeks)	
	Non-accredited arrangements	Accredited arrangements
Full sample*	20	18
Age group		
Infants	24	24
Toddlers	23	24
Preschool*	21	19
School-aged*	18	13
Co-pay level		
Low co-pay*	18	17
High co-pay*	24	20
County risk level		
Low risk*	19	16
High risk	22	21

Source. Authors' calculations based on Maryland child care subsidy administrative data.
*Within this (sub)group, children in accredited arrangements and children in non-accredited arrangements had arrangement lengths that were statistically different at $p < .05$. The statistical significance of differences was tested using a Cox proportional hazards model, which accounted for multiple child and family characteristics.

Figure 2 shows the proportion of arrangements that continued, by the number of weeks since the arrangement began. The rates for accredited and non-accredited arrangements are shown with separate lines. It is evident that the overall difference in arrangement length between accredited and non-accredited subsidized arrangements was quite small.

Figure 2. Proportion of subsidized arrangements in child care centers continuing by week, by accreditation status



Source. Authors' calculations based on Maryland child care subsidy administrative data.
Note. Spell lengths were measured using the Kaplan-Meier method and include all spells for all children that started after June 25, 2007.

Accreditation was not always associated with shorter arrangements. We analyzed specific subgroups of children to see whether accreditation was consistently associated with shorter subsidized arrangements. In fact, differences in subsidized arrangement length by accreditation status were only found for a few specific groups.

- **Results differed by age group.** Accredited arrangements were shorter than non-accredited ones for *preschoolers and school-aged children,* but not for *infants or toddlers*.
- **Results differed by co-pay level.** For children with a *higher co-pay,* the median arrangement length was four weeks shorter when the center was accredited. For children with a *lower co-pay,* however, the median arrangement length was only one week shorter when the center was accredited.
- **Results differed by county risk level.** In general, accredited arrangements were shorter than non-accredited ones in *low-risk counties,* but not in *high-risk counties (*see "Key definitions" text box). However, for school-aged children, accredited arrangements were shorter than non-accredited arrangements regardless of county risk level.

CONCLUSIONS AND NEXT STEPS

The relationship between quality and continuity of care for families using subsidies

As noted earlier, the nature of the association between high-quality care and continuity of subsidized care arrangements is still not fully understood. However, the findings from this study seem to suggest that there may be some factors associated with higher-quality care that make it less likely for families using subsidies to stay in such arrangements.

One potential factor is the high cost of higher-quality care for some low-income families. We did not have information about any out-of-pocket fees that families may have paid for subsidized arrangements, in addition to their co-pay, but two findings suggest that out-of-pocket fees may have been a burden for some families using accredited centers:

- **Families with higher co-pays ended accredited arrangements sooner than they ended non-accredited arrangements.** Higher co-pays should indicate that a family has more available income to pay for care. We found, however, that children with higher co-pays were especially likely to exit a subsidized arrangement when it was accredited. Recall that child care centers in Maryland are allowed to charge families the difference between the reimbursement rate (paid by the Child Care Subsidy Program) and the actual cost of care. It may be that families with higher co-pays were unable to sustain both the co-pay and any extra fees charged by accredited centers.
- **In low-risk counties, families ended accredited arrangements sooner than they ended non-accredited arrangements.** Low-risk counties were those with low levels of poverty, fewer low-birthweight children, and other factors that support positive child development.[14] Child care tends to be more expensive in Maryland's low-risk counties.[15] If families in low-risk counties are paying high out-of-pocket fees for child care, any additional fees for accredited care might be especially difficult to sustain. In addition, the high cost of living in low-risk counties may also make any out-of-pocket fees for accredited care especially burdensome to low-income families.

Subsidized care arrangements of school-aged children

The association between quality and continuity of care varied by child age. **For school-aged children, accredited arrangements tended to be much shorter than non-accredited arrangements.** This pattern held regardless of the risk level of the county of residence. From our data, we cannot tell why accredited arrangements were especially short for school-aged children.

One hypothesis that warrants further exploration in future studies is that accredited programs for school-aged children might be of shorter duration. Although we ensured that summer-starting programs (and other

programs starting in a specific month) were not overrepresented among the accredited programs, other types of accredited programs may be more likely to be short-term for school-aged children than for children of other ages.

Policy and practice considerations

There may be tradeoffs between the stability and quality of care. If parents end an arrangement early due to the costs, exposure to high-quality care may not be sufficient to benefit the child and family. This instability may also put children at risk for poorer developmental outcomes.[a]

Policies that limit families' out-of-pocket expenses may support continuity in care. The 2014 reauthorization of the Child Care and Development Block Grant (CCDBG) prohibits child care centers from charging fees beyond the family's co-pay.[b] This policy is designed to help families remain in care by making care more affordable. It is important to note that this policy may cause high-quality child care centers to stop serving subsidized children.

[a] de Schipper, J. C., van IJzendoorn, M. H., and Tavecchio, L. W. C. (2004), Stability in center day care: Relations with children's well-being and problem behavior in day care. *Social Development*, *13*: 531–550. doi: 10.1111/j.1467-9507.2004.00282.x.

[b] Child Care and Development Block Grant Act of 2014. 45 CFR 98.45(l). Retrieved April 4, 2016 from https://www.gpo.gov/fdsys/pkg/FR-2015-12-24/pdf/2015-31883.pdf.

Limitations

In general, the limitations of this study were due to the fact that the administrative data we used were collected for purposes other than answering the questions in this particular study.

Accreditation status is only one indicator of quality. Additional indicators of child care quality, such as staff education levels, family engagement practices, and observations of teacher-child interactions or the learning environment have been used in state Quality Rating and Improvement Systems.[16] These indicators of quality might reveal different associations with the length of subsidized child care arrangements.

We do not know if an arrangement continued after a subsidy ended. This study focused on the length of *subsidized* care arrangements. It is possible that children stayed in a child care arrangement even after their subsidies ended. Thus, the findings from the present study do not tell the full story about accreditation status and arrangement length.

Some child and family characteristics were not measured/controlled for. We accounted for a host of child and family characteristics that were available in the administrative subsidy data; however, there are still some unmeasured characteristics that could result in biased estimates of the association between center accreditation and duration of the arrangement. For example, we did not have a measure of children's special needs. If children with special needs were more likely to enroll in accredited care and have shorter arrangements, results from the present study could be biased.

Some information was not available in the administrative data to examine competing hypotheses. For example, we did not have data on parents' out-of-pocket fees for child care. Without data on parents' out-of-pocket fees, it is not possible to know whether the short length of accredited subsidized arrangements can be attributed to higher out-of-pocket expenses.

Next steps for research

Consider out-of-pocket expenses. Do families' out-of-pocket expenses for child care account for the shorter length of accredited arrangements, relative to non-accredited arrangements, among families receiving child care subsidies? In states where child care centers are not allowed to charge parents the difference between reimbursement rates and the cost of care, does the association between accreditation and arrangement length disappear? Once states have put revised CCDBG policies into place, is accreditation (or another indicator of quality) still associated with shorter arrangements?

Follow arrangements after subsidies end. After losing a subsidy, do children tend to stay in higher-quality care more often than lower-quality care? Why or why not?

Examine school-aged child care. For school-aged children receiving subsidies, how are accredited arrangements different from non-accredited ones? What family and child characteristics determine whether school-age children receiving subsidies use accredited arrangements, and do these same characteristics also predict arrangement length? Are accredited school-age arrangements shorter for all children, or just children receiving subsidies?

Consider the distance between families and child care. Do children whose care is subsidized exit accredited arrangements sooner because they have to travel farther for the care? Among subsidized families who travel the same distance to their care, is there still an association between accreditation and arrangement length?

Examine other indicators of quality. Do other indicators of quality, such as staff education, family engagement practices, observed quality, or overall QRIS rating, have similar associations with subsidized child care arrangement length?

Examine tradeoffs between quality and stability for low-income families. For families receiving child care subsidies, does high-quality care offer benefits that lessen the consequences of low stability? Or, does stability provide benefits above and beyond the benefit of high-quality care?

CONCLUSIONS

Findings from the present study suggest that accredited arrangements are associated with greater instability of child care among children receiving subsidies in Maryland. As this was not an experimental study, we cannot conclude that accredited centers caused children to have shorter arrangements. Still, as accreditation was used as a proxy for higher-quality care in this study, it was interesting to find that accreditation was associated with shorter subsidized arrangements. Given the importance of child care stability for children's development, researchers should continue to examine how, and why, child care quality might facilitate or hinder stability of care for children receiving subsidies.

ACKNOWLEDGMENTS

This project is being conducted under the Maryland Child Care Administrative Data Analysis Cooperative Agreement funded by the Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services (Grant Number 90YE0148). The authors wish to acknowledge the contributions of Nicole Forry and Kate Welti to the project, particularly in conducting preliminary analysis on subsidized providers' accreditation status in Maryland and providing advice on research design and objectives. The authors also wish to acknowledge the important contributions of research partners at the Maryland State Department of Education (MSDE) and RESI of Towson University. Candy Miller and Rolf Grafwallner at MSDE provided substantive leadership for the project, and John Spears at RESI of Towson University prepared the subsidy data sets analyzed in this brief and provided guidance on appropriate use of the data.

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[14] Ibid.

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TECHNICAL APPENDIX

This technical appendix provides additional details about the study methodology.

ASSIGNING COUNTY RISK LEVEL

We categorized counties as high-risk or low-risk based on the *Maryland Early Childhood Risk and Reach Assessment.*[1] County risk level accounted for 10 risk factors that have been linked to poor developmental outcomes for children: percentage of children under age 5 living under the federal poverty level, percentage of births to unmarried mothers, percentage of births to teen mothers, percentage of births to mothers with less than 12 years of formal education, percentage of low birthweight infants, percentage of births to mothers who did not receive prenatal care, percentage of children who are uninsured, percentage of children who are not ready for kindergarten, percentage of schools that have a Title 1 status, and percentage of schools that are implementing Title I School Improvement Plans. Data for the risk factors were drawn from multiple sources. Although the specific time periods covered by each data source varied, all risk factors were measured at some point between 2008 and 2013. This period of time is well-aligned with the range covered by the present study (2007 to 2014).

For each risk factor, counties were ranked based on the percentage of children affected by the risk factor. The highest third received a ranking of 3, the middle third received a ranking of 2, and the bottom third received a ranking of 1. Counties with an average risk level greater than 2.2 were high-risk. Counties with an average risk level less than or equal to 2.2 were considered to be low-risk. Note that the *Risk and Reach Assessment* subdivided the low-risk counties into moderate-risk or low-risk. In this study, a motivating question was whether accredited arrangements might be especially beneficial to children living in counties at the highest level of risk, in terms of supporting longer arrangements. We did not need to differentiate between low- and moderate-risk counties to address this question. For the present study, moderate-risk and low-risk counties were collapsed into a low-risk category. Table A1 provides details on each county's risk level, as calculated in the *Risk and Reach Assessment.*

Table A1. County risk status, as calculated in the *Maryland Early Childhood Risk and Reach Assessment*

High-risk counties		Moderate-risk counties		Low-risk counties	
County name	**Average risk level**	**County name**	**Average risk level**	**County name**	**Average risk level**
Baltimore City	2.9	Alleghany	2.2	Washington	1.8
Dorchester	2.8	Baltimore County	2.2	Montgomery	1.7
Prince George's	2.6	Caroline	2.2	Queen Anne's	1.6
Kent	2.5	Talbot	2.2	St. Mary's	1.4
Somerset	2.4	Worcester	2.1	Calvert	1.4
Wicomico	2.3	Cecil	2	Frederick	1.4
		Charles	2	Harford	1.4
		Garrett	2	Howard	1.4
				Anne Arundel	1.3
				Carroll	1.3

Source. Adapted from Daily, S., Welti, K., Forry, N., & Rothenberg, L. (2012). *Maryland Early Childhood Risk and Reach Assessment.* Child Trends Publication #2012-41. Washington, DC: Child Trends.

USING PROPENSITY SCORES TO REDUCE SELECTION BIAS

The best way to determine the effect of accreditation on arrangement length would be to randomly assign children to accredited or non-accredited providers. In reality, subsidized children in Maryland are not randomly assigned to providers. Parents select child care providers based on factors that are important to them, such as proximity to the home and affordability.

As shown in Table A2, children who were enrolled in accredited arrangements were different from children in non-accredited arrangements on a number of characteristics. For example, TCA receipt was overrepresented in non-accredited arrangements. If these same characteristics also led to longer or shorter subsidized arrangements, we might draw incorrect conclusions about the effect of accreditation on the length of the arrangement. This problem of *selection bias* is common when participants are not randomly assigned to treatment groups.

We used the propensity score technique of *inverse probability of treatment weighting* to account for potential selection bias due to characteristics measured in the administrative data (e.g., income, race/ethnicity). We could not account for potential selection bias due to unmeasured characteristics, such as a child's special-needs status.

The propensity score technique allowed us to create groups of accredited and non-accredited arrangements that had similar child and family characteristics. The propensity score technique had three steps:

1. **Create propensity scores for each subsidized arrangement using a logistic regression.** Accreditation status was regressed on a set of covariates, such as county of residence, family income, and child gender. For each arrangement, the regression produced a predicted probability that the subsidized arrangement would be accredited (based on child and family characteristics). The predicted probability is the propensity score.

2. **Create an inverse probability of treatment weight (IPTW) for every subsidized arrangement.** IPTWs allow some arrangements to be "more important" than other arrangements. For example, certain characteristics may be under-represented in accredited arrangements (e.g., black children; children from Baltimore City; see Table A2). A child who has these characteristics and is enrolled in an accredited arrangement would be allowed to "count more" than a white child from Frederick county, because these latter characteristics are overrepresented in accredited arrangements. We stabilized the weights by multiplying each weight by the average probability of being in the respective type of arrangement (i.e., accredited/non-accredited). Weights were capped at a maximum value of 10 so that a single arrangement did not represent an extremely large number of arrangements in analyses.

3. **Apply the IPTW to every subsidized arrangement in the data.** This step created groups of accredited and non-accredited arrangements that are very similar in terms of family and child characteristics. We also inspected each subgroup (e.g., infants only) to ensure that accredited and non-accredited arrangements within the subgroup had similar distributions of covariates after the weights were applied.

Table A2. Unweighted percentage of arrangements with certain family and child characteristics, by accreditation status of the child care center

Family/child characteristic	Unweighted percentage of arrangements	
	Non-accredited (N = 107,201)	Accredited (N = 9,993)
County of residence		
Allegany	1%	1%
Anne Arundel	3%	2%
Baltimore City	29%	8%
Baltimore County	16%	8%
Calvert	1%	2%
Caroline	0%	1%
Carroll	2%	4%
Cecil	2%	1%
Charles	3%	2%
Dorchester	1%	1%
Frederick	2%	11%
Garrett	0%	1%
Harford	3%	5%
Howard	4%	5%
Kent	0%	0%
Montgomery	9%	20%
Prince George's	18%	11%
Queen Anne's	0%	1%
Somerset	1%	1%
Saint Mary's	1%	0%
Talbot	0%	4%
Washington	2%	4%
Wicomico	3%	6%
Worcester	1%	2%
Race/ethnicity of child		
Black	81%	67%
Hispanic	4%	8%
White	14%	24%
Other race	1%	2%
Units of care per week		
One (≤ 15 hrs)	12%	17%
Two (15-30 hrs)	27%	24%
Three (≥30 hrs)	61%	59%

Family/child characteristic	Unweighted percentage of arrangements	
	Non-accredited (N = 107,201)	Accredited (N = 9,993)
Reason for subsidy		
Employment & training/education	8%	12%
Employment	70%	73%
Other reason	3%	3%
Training/education	18%	12%
Family income	$11,898	$13,626
Low co-pay (income level X, A)	64%	52%
Child is male	50%	50%
Child's age		
Average age (months)	54	51
Infant	12%	11%
Toddler	19%	19%
Preschool	32%	39%
School-aged	37%	31%
Single parent	93%	90%
TCA receipt	45%	30%
Year		
2007	7%	8%
2008	14%	16%
2009	15%	18%
2010	17%	18%
2011	14%	14%
2012	12%	0.09
2013	13%	11%
2014	8%	7%
Household size		
One	3%	4%
Two	25%	28%
Three	32%	33%
Four	22%	22%
Five or more	18%	14%

Source. Authors' calculations based on Maryland child care subsidy administrative data.

SURVIVAL ANALYSIS

Median arrangement length. We used the Kaplan-Meier method to examine the median length of subsidized arrangements, excluding all arrangements that began before June 25, 2007 because the length of those arrangements could not be known.

Comparing the length of accredited and non-accredited subsidized arrangements. We tested the statistical significance of differences in arrangement length across accredited and non-accredited centers using a Cox proportional hazards model. Models included a host of child and family characteristics as control variables, which are listed in Table A3. A robust standard error was used to account for the fact that one child could have multiple arrangements.

Table A3. List of covariates included in all Cox proportional hazard models, in addition to the main effect of center accreditation status

Covariates
Child gender
Child race/ethnicity
Age group
Household size
Reason for subsidy (employment, training/education, both, other)
County of residence
Co-pay level (low or high)
Number of care units (1,2, 3)
Single parent status
Temporary Cash Assistance (TCA) receipt
Start month of subsidized arrangement
Start year of subsidized arrangement
Interaction term between "start month" and "start year"

REFERENCES-APPENDIX

[1] Daily, S., Welti, K., Forry, N., & Rothenberg, L. (2012). *Maryland Early Childhood Risk and Reach Assessment*. Child Trends Publication #2012-41. Washington, DC: Child Trends.